

Users' Attachment Styles and ChatGPT Interaction: Revealing Insights into User Experiences

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[Abstract]

This study explores the relationship between users' attachment styles and their interactions with ChatGPT (Chat Generative Pre-trained Transformer), an advanced language model developed by OpenAI. As artificial intelligence (AI) becomes increasingly integrated into everyday life, it is essential to understand how individuals with different attachment styles engage with AI chatbots in order to build a better user experience that meets specific user needs and interacts with users in the most ideal way. Grounded in attachment theory from psychology, we are exploring the influence of attachment style on users' interaction with ChatGPT, bridging a significant gap in understanding human-AI interaction. Contrary to expectations, attachment styles did not have a significant impact on ChatGPT usage or reasons for engagement. Regardless of their attachment styles, users hesitated to fully trust ChatGPT with critical information, emphasizing the need to address trust issues in AI systems. Additionally, this study uncovers complex patterns of attachment styles, demonstrating their influence on interaction patterns between users and ChatGPT. By focusing on the distinctive dynamics between users and ChatGPT, our aim is to uncover how attachment styles influence these interactions, guiding the development of AI chatbots for personalized user experiences. The introduction of the Perceived Partner Responsiveness Scale serves as a valuable tool to evaluate users' perceptions of ChatGPT's role, shedding light on the anthropomorphism of AI. This study contributes to the wider discussion on human-AI relationships, emphasizing the significance of incorporating emotional intelligence into AI systems for a user-centered future.

▶ **Key words:** Human-AI Interaction, Attachment Style, Conversational AI Agents, Chatbots, User Experience

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[요 약]

본 연구는 OpenAI가 개발한 고급 언어 모델인 ChatGPT (Chat Generative Pre-trained Transformer)와 사용자의 애착 유형 간의 관계를 탐구한다. 인공지능(AI)이 점차 일상생활에 통합되면서, 다양한 애착 유형을 가진 개인들이 AI 챗봇과 상호 작용하는 방식을 이해하는 것은 특정 사용자 요구를 충족하고 사용자와 가장 이상적인 방식으로 상호 작용하는 더 나은 사용자 경험을 구축하기 위해 중요하다. 심리학의 애착 이론을 기반으로 한 이 연구에서는 애착 유형이 ChatGPT와 상호 작용에 미치는 영향을 탐구하여 인간과 AI 간의 상호 작용에 대한 이해에서 중요한 공백을 메우고 있다. 예상과는 달리, 애착 유형은 ChatGPT 사용에 유의미한 영향을 미치지 않았다. 애착 유형에 관계없이 중요한 정보를 전달하는 ChatGPT를 완전히 신뢰하는 것을 주저했으며, AI 시스템의 신뢰 문제를 해결해야 할 필요성을 강조한다. 단, 본 연구는 사용자와 ChatGPT 간 독특한 상호 작용에 중점을 두어, 애착 유형이 이러한 상호 작용에 미치는 영향을 해명하여 AI 챗봇의 개인화된 사용자 경험을 개발하는 데에 도움이 되고자 한다. 또, 본 연구는 Perceived Partner Responsiveness Scale의 도입은 사용자가 ChatGPT의 역할에 대한 인식을 평가하는 유용한 도구로 기능하며, AI의 인격화에 대한 관점을 제시한다. 본 연구는 인간과 AI 간의 관계에 대한 넓은 토론에 기여하며, 사용자 중심의 미래를 위해 AI 시스템에 감정 지능을 통합하는 중요성을 강조한다.

▶ **주제어:** 인간-인공지능 상호 작용, 애착 유형, 대화형 인공지능 에이전트, 챗봇, 사용자 경험

I. Introduction

As artificial intelligence (AI) continues to integrate into the fabric of daily life, the dynamics of human-AI interaction have become a focal point of exploration. In the field of human-AI interaction, one of the key challenges is to improve the effectiveness of AI as an interactive partner for humans. This requires AI partners to customize their behavior according to the specific needs and emotional states of users [1]. Attachment theory, a well-established framework in psychology, provides a perspective for understanding how individuals form emotional bonds with others [2]. Extending this framework to human-AI interactions, we aim to explore the implications of attachment styles—secure, avoidant, and anxious—on users' experiences with ChatGPT (Chat Generative Pre-training Transformer). While AI-driven chatbots like ChatGPT [3] have exhibited remarkable capabilities, the impact of users' attachment styles on these interactions remains relatively unexplored.

To address this gap, our research explores whether users' attachment styles influence their

usage of AI-powered chatbots and how these styles manifest in interactions. We present exploratory research questions in Table 1 and Table 2, narrowing our focus to understand how attachment styles shape patterns of usage, purposes, and perceptions when engaging with ChatGPT. Which included the scores of the Perceived Partner Responsiveness Scale (PPRS), which were used to evaluate participants' perceptions of ChatGPT in our research, can be found in Section III. We set aside broader discussions about AI technologies to concentrate on specific interactions between users and the language model.

Our argument is based on the belief that comprehending the role of attachment styles in human-AI interactions can lead to the way for more personalized and adaptive AI systems. By analyzing how users with different attachment styles interact with and respond to ChatGPT, we aim to contribute insights informing the design and improvement of AI chatbots for a more user-centered experience. Specifically, our contributions include:

- a. Investigating the influence of attachment styles on users' interactions with ChatGPT.
- b. Identifying patterns of usage, purposes, and perceptions based on attachment styles.
- c. Providing insights for designing emotionally intelligent and user-centric AI systems.

This research paper systematically explores the relationship between attachment styles and users' interactions with ChatGPT. The following sections will discuss attachment theory and its relevance to human-AI interactions, present our methodology for exploring attachment styles and ChatGPT usage patterns, delve into the findings examining the impact of attachment styles on interaction purposes and perceptions, and conclude with implications for designing user-centered AI systems and suggestions for future research.

Table 1. Research Questions

No.	Research Question
R ₁	How are attachment styles distributed among ChatGPT users, and is there a correlation with their usage?
R ₂	Do users with diverse attachment styles have distinct primary purposes for using ChatGPT?
R ₃	How do users with varied attachment styles perceive ChatGPT?
R ₄	How do users' attachment styles correlate with their PPRS scores?
R ₅	How do users with different attachment styles engage with ChatGPT across scenarios?

Table 2. Research Hypothesis

No.	Research Hypothesis
H ₁	H0 ₁ =There is no significant relationship between attachment styles and the frequency of using ChatGPT. H1 ₁ =Attachment styles are associated with the frequency of using ChatGPT.
H ₂	H0 ₂ =Attachment styles are not related to the primary purposes for using ChatGPT. H1 ₂ =There are significant differences in primary usage purposes based on attachment styles.
H ₃	H0 ₃ =There is no significant relationship between attachment styles and users' perceptions of ChatGPT (human-like vs. machine-like). H1 ₃ =Attachment styles influence users' perceptions of ChatGPT.
H ₄	H0 ₄ =Attachment styles do not impact users' PPRS scores and their perceptions of ChatGPT's role. H1 ₄ =Attachment styles are correlated with both PPRS scores and users' perceptions of ChatGPT's role.
H ₅	H0 ₅ =Attachment styles do not significantly affect users' interaction styles with ChatGPT in different scenarios. H1 ₅ =Users with different attachment styles exhibit distinct interaction patterns in various scenarios.

II. Background and Related Works

In this section we set the stage for our research, which seeks to enhance understanding of attachment dynamics in human-AI interactions.

1. Attachment between human and non-human

In psychology, attachment is the emotional closeness and relationship between two individuals [4]. Attachment theory, introduced by Bowlby [5,6], emphasizes the impact of early attachment relationships on individuals throughout life. Wherein Bowlby [2] defined attachment as behavior to connect with someone stronger or smarter. The primary caregiver is a "secure base" for the child's exploration and provides support in fear or fatigue [7]. This concept distinguishes an attachment figure from friends or peers [7]. Thus, the difference between an attachment figure and a non-attachment figure is reflected in the desire for the attachment figure when undergoing a difficult time, and the need for proximity.

Attachment develops in infancy and manifests differently in relationships. It changes based on contexts and new connections [8,9]. Individuals transition attachment figures from parents and primary caregivers to friends/peers and partners in adolescence and adulthood [9,10]. Attachment is foundational in forming social and emotional bonds, starting in early childhood and extending to adulthood [10,11]. Adult attachment theory extends these principles to personal relationships. Brennan, et al. [11] identified two dimensions: attachment anxiety and avoidance [10-13]. These dimensions relate to love: intimacy, passion, loyalty, and care. An intimate relationship changes with these elements [14].

Studies have discovered that attachment can also occur between individuals and non-human entities, not just between human individuals. Research suggests that people can find psychological security in non-human sources such as deities [15], pets [16,17], and objects, such as material possessions [18], blankets [19] and stuffed dolls [20]. That is,

these non-human sources can serve the same roles as a secure base, which were traditionally believed to be provided only by other people [21].

Technological advancements have explored attachment in areas, including human relationships with digital technology. In robotics and artificial intelligence, studies show that humans desire a robot's presence during stress, similar to seeking out other humans [22]. In which, users see human-like traits in robots, like independence, intelligence, and reliability. Others emphasized that when users perceive these traits, they can form emotional bonds with the artificial entities [23]. Na, et al. [24] proposed that users can develop emotional connections with virtual influencers. Congruity between virtual influencers and users' actual selves is important. This supports Malär, et al. [25] 's findings on human likeness and forming attachments. Research on AI speakers also supports this [26]. In the context of AI chatbots, recent research shows that humans can seek a safe haven and develop emotional connections with chatbots [27]. That is, attachment may play a crucial role in human-AI interactions.

Building up on previous studies, our study aims to explore the attachment dynamics between humans and AI and how users' attachment styles influence ChatGPT usage. This contributes to the field of human-AI attachment relationships.

2. Attachment styles and their Influence

According to attachment theory [5,11], attachment experiences and resulting working models shape individual differences in the attachment system. These differences can be examined by measuring attachment style, which refers to an individual's pattern of expectations, needs, emotions, and behavior in social interactions and relationships [10]. Attachment style predicts and reflects our thoughts, feelings, and actions in relationships, as well as our perceptions and responses to partners, emotional regulation, and support-seeking tendencies [11].

An individual's attachment style reflects their attachment security or insecurity, based on levels of anxiety and avoidance in relationships [28]. Secure attachment promotes positive self-perceptions and close relationships. Insecure attachment is linked to negative self-images and social withdrawal. Ainsworth et al. [28] defined three types of attachment styles: secure, avoidant, and anxious. Each style exhibits a different response to social situations. According to Ainsworth [29], secure attachment is characterized by comfort with closeness and separateness, avoidant attachment is marked by distance and self-reliance, while anxious attachment involves seeking contact and an inability to endure short periods of separation, alternating with anger.

Through numerous studies [30-35], we capture differences among attachment styles (secure, avoidant, anxious). Individuals with a secure attachment style typically have a positive self-perception and are comfortable with closeness and independence. They have stable relationships, display positive emotions, trust, satisfaction, commitment, and communicate openly. Avoidant attachment style individuals fear that being vulnerable may lead to rejection or abandonment. To shield themselves, they erect emotional barriers, avoiding expressions of intimacy and vulnerability in communication. They are uncomfortable with emotional closeness, refrain from relying on others for support, and may perceive others as untrustworthy or unsupportive. Individuals with an anxious attachment style exhibit a hyper-activated attachment system and strong need for closeness. They often expect and fear rejection from others, resulting in the need for constant reassurance can lead to behaviors such as nagging, smothering, and an excessive need for validation.

Building on attachment styles, previous research explores the intersection of attachment style and non-face-to-face social interaction scenarios. Studies [36,37] examined attachment styles and texting frequency. Findings show that individuals

with an avoidant attachment style tend to less phone communication to avoid proximity and build intimacy. In social media use, individuals with anxious attachment styles have been observed relying on social media to avoid more intimate face-to-face communication, possibly to ease loneliness and fear of rejection [38,39]. Young, et al. [40] suggests that individuals with anxious attachment style may be particularly susceptible to negative outcomes resulting from problematic social media use. Further insights from Oldmeadow, et al. [41] suggests that individuals with an anxious attachment style tend to use Facebook more frequently to combat loneliness. In contrast, secure individuals tend to enjoy others viewing their contents and experience happiness when using social networking sites (SNS). On the other hand, especially avoidant style, may experience SNS fatigue from privacy concerns. These studies highlight how attachment styles influence individuals' experience and varied modes of communication in non-face-to-face contexts.

Attachment style is important for interactions between people. Understanding these styles helps us grasp how people interact and form relationships. However, little research explores differences in human-computer and human-AI interactions based on attachment styles.

3. Human-AI interaction and relationship

Human-human interactions, whether through physical or verbal communication, have undergone a transformative shift due to AI systems' autonomy. This advancement brought the study of human-AI interactions to the forefront of research [42]. The use of digital conversational agents, particularly chatbots, has led to an increase in research focused on understanding social dynamics in human-AI relationships [27]. This becomes increasingly important as AI devices become integrated into various service industries. Understanding the communication dynamics in human-AI interactions becomes more and more crucial [43]. However, most studies focus on customer service and digital

assistant chatbots, examining social aspects that impact users' adoption, satisfaction, and trust in AI entities [44-46].

Studies have indicated that consumers exhibit distinct interaction patterns in scenarios involving both AI and human employees [47]. Findings in several studies have shown that consumers are willing to interact with AI devices. However, the conversations exchanged during consumer-AI interactions tend to be shorter and display less extroversion or self-disclosure [47,48]. In contrast, consumers tend to engage in longer interactions when dealing with chatbots or AI devices that are "human-like" [49]. This matches the previous passage, which emphasized the significant role of anthropomorphism in the design of human-AI interactions, as it appears to facilitate social behavior.

On the other hand, Rasouli, et al. [50] found that people with social anxiety prefer automated self-service tech over human services because it avoids contact with unfamiliar personnel. Other studies [51,52] also show socially anxious people feel more relaxed when interacting with robots and AI partners. This suggests that insecure attachment and social anxiety may encourage a willingness to interact with AI services, highlighting AI's potential in future human interactions and service sectors.

In the field of social chatbots, exemplified by AI dialogue systems, it has been suggested that they can function as conversational partners, friends, and even romantic companions [53-55]. ELIZA [56], an early natural language processing computer program created in the 1960s by Weizenbaum, aimed to simulate conversation and emphasize the importance of human-AI interaction in pioneering the field of interactive communication. Recent studies on Alexa, Siri, Replika, Xiaoice, ChatGPT, and similar systems have produced mixed evidence regarding the development of human-AI relationships.

Focusing on Alexa, studies have found that some users perceive Alexa as a friend or family member [54,57]. However, some studies did not find evidence of relationship formation between users

and chatbots. This was attributed to the strictly task-oriented nature of interactions with conversational agents such as Alexa [58,59]. Studies on social chatbots like Xiaolce [53,60] and Replika [54] demonstrated that chatbots can create a sense of a relationship in users. Furthermore, Ta, et al. [55] conducted research on Replika users. They found that users frequently mentioned emotional and companion support, which was provided by the chatbot being accepting, available, and capable of meeting users' communication needs. There is also a study suggesting that designing certain character traits, such as empathy, in a chatbot can increase the likelihood of users establishing relationships with it [61]. Similarly, Fitzpatrick, et al. [62] discovered that chatbot responses perceived as empathetic by users could lead to a positive user experience, as could factors related to a chatbot's personality.

Moving forward to previous research, our research aims to explore the interactions with chatbot, with focusing on the user's attachment style. Understanding these differences allows us to create personalized experiences, improving user engagement. This aligns with the evolving human-AI landscape and caters to users' diverse needs, enhancing the overall experience with ChatGPT.

III. Methods

1. Participants

Participants were recruited through an online anonymous survey in English, Korean, and Chinese. A total of 322 valid responses were collected, with 105 males, 216 females, and one individual who identified as others. Regarding language preference, 32 participants completed the survey in English, 158 in Korean, and 132 in Chinese. The age distribution was as follows: 144 individuals were aged 18-25, 98 were aged 26-35, 52 were aged 36-45, 24 were aged 46-55, and 4 were aged 55 and above. Out of the participants, 62 reported using ChatGPT daily, 152

reported using it on a weekly basis, 76 used it monthly, and 32 indicated rare usage. Of note, all participants identified themselves as ChatGPT users and provided responses based on this self-identification, which ensures the collection of relevant data and alignment with the study objectives.

2. Procedure

The online survey included an informed consent form at the beginning of the questionnaire because it was conducted anonymously. All information collected in the survey was kept strictly confidential. The survey was divided into four main sections: Demographics, Attachment Style Test, Experience with ChatGPT, and Situational Questions.

In the demographics section, participants provided information including, gender, age, usage of ChatGPT, primary purpose for using ChatGPT, and their perception of ChatGPT. Next, they took the Adult Attachment Questionnaire (AAQ) to determine attachment style. The next section involved participants reflecting on their interactions with ChatGPT using the Perceived Partner Responsiveness Scale (PPRS). In the final section, three situational questions were presented, each with specific scenarios about hypothetical interactions with ChatGPT. Participants could also provide additional comments throughout the sections.

3. Measurement

We employed specific techniques to further investigate participants' attachment styles, experiences, and interactions with ChatGPT.

3.1 Adult Attachment Questionnaire

In this research, the Adult Attachment Questionnaire (AAQ), developed by Simpson, et al. [63], was used as the main tool for assessing the attachment style of ChatGPT users. The AAQ is widely recognized and commonly used in attachment research. The AAQ consists of 17 items that are specifically designed to measure two different scales: attachment anxiety scale and

attachment avoidance scale. Participants rated their responses on a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). It is important to note that ten of the 17 items with negative valence were reverse-coded to improve the accuracy of the assessment.

Furthermore, in order to ensure the consistency of the AAQ across different language versions, the Chinese version, conducted and translated by Chiu [64] was used and later semantically refined. Additionally, for the Korean version, a rigorous translation process was implemented, which involved forward-translation (from English to Korean) and backward-translation (from Korean to English). Subsequently, native speakers reviewed and ensured accuracy and comprehensibility. The final versions of this survey incorporated the original AAQ, Chinese and Korean translation, with concepts accurately represented in each language.

3.2 Perceived Partner Responsiveness Scale

The PPRS, which was introduced in the Experience of ChatGPT section, was used as a quantitative measure to evaluate participants' perceptions of ChatGPT's responsiveness in this study. The PPRS is a well-established measure, developed by Reis and Carmichael in 2006 [65], and is available in multiple languages. It is designed to evaluate how individuals perceive their partner's responsiveness in a relationship. As a self-report measure, the PPRS assesses the extent to which individuals feel their partners are responsive to their needs and concerns. This 18-item scale incorporates two closely related constructs based on the interpersonal process model of intimacy initially proposed by Reis and Shaver [66]: understanding, which measures how well another person understands oneself, and validation, which measures how much another person appreciates and values oneself [65]. The scale assesses the perceived qualities of understanding, caring, and supportiveness in a partner.

The PPRS is used to assess the respondent's responsiveness to a specific target. Despite its

widespread use in studying romantic relationships and measuring factors associated with relationship's trust, satisfaction, and well-being [67-69], the PPRS has not been used to examine interactions between individuals and AI. This study aims to bridge this gap by using the PPRS to analyze users' perceptions of ChatGPT and understand the dynamics in human-AI interactions.

3.3 Situational Questions

The situational questions, in Table 3, explore users' interactions with ChatGPT in academic, emotional, and practical contexts. It includes three scenarios for specific interactions. The first scenario focuses on ChatGPT as a research assistant for organizing dissertation info. The second scenario involves emotional support from ChatGPT to improve mood. The final scenario involves using ChatGPT for problem-solving by composing a language email to fix a reservation date. They provide insights into the various ways users interact with ChatGPT in different aspects of their lives.

Table 3. Situational question

No.	Question
1	You are a university student working on your dissertation on the impacts of climate change on polar glaciers. You are currently in the process of gathering information and constructing ideas, but because of the time and the range of languages covered, you plan to use ChatGPT to help you organize the information.
	Q1: Please be specific about the first message you would send to ChatGPT in this scenario.
	Q2: How do you expect ChatGPT to respond?
2	Imagine that you are at a low point in your life because of the unsatisfactory results of your recent report, and you are feeling anxious and uneasy. However, due to the current time, there is no place to tell your feelings, so you decide to share your current feelings with ChatGPT.
	Q1: Please be specific about the first message you would send to ChatGPT in this scenario.
	Q2: How do you expect ChatGPT to respond?
3	Imagine you're planning a trip abroad and you've made a reservation for the wrong hotel and need to immediately contact the local hotel by email to change the reservation date, but you don't speak the local language. So you use ChatGPT to get the content of the email.
	Q1: Please be specific about the first message you would send to ChatGPT in this scenario.
	Q2: How do you expect ChatGPT to respond?

4. Analysis

Statistical analyses were performed using IBM (International Business Machines Corporation) SPSS (Statistical Package for the Social Sciences) Statistics (version 27.0). The primary focus was on investigating potential differences in attachment styles (Secure, Avoidant, Anxious) concerning the PPRS scores and participants' perceptions of ChatGPT. Qualitative text analysis was used to explore the subtleties in participants' interactions with ChatGPT based on their attachment styles. A portion of the qualitative data was coded and analyzed using NVivo 12 [70] analysis software, while the rest of the data was manually classified and interpreted.

IV. Result

The initial analysis focused on attachment styles, ChatGPT usage, purpose, and users' perceptions. Next, we investigated the correlation between PPRS score and users' perceptions of ChatGPT. Finally, we examined how user-ChatGPT interactions differ based on attachment style.

1. Attachment Styles and ChatGPT Usage

We categorized 322 participants into three groups: 104 in secure attachment style, 153 in avoidant style, and 65 in anxious style, as Table 4. Next, we expanded our investigation to examine attachment styles and their correlation with participants' ChatGPT usage frequency, intentions, and perception Table 5, 6, and 7. Later, several Chi-square tests of independence were conducted to find detailed information and determine relationships between attachment style and variables. Additionally, we explored user rankings and open-ended descriptions of ChatGPT.

Table 4. Attachment style across participants

Attachment Style	Gender			Total
	Female	Male	Others	
Secure	59	45	1	104
Avoidant	110	42	0	153
Anxious	47	18	0	65
Total	216	105	1	322

Table 5. Attachment style and ChatGPT usage frequency

Rate of usage	Attachment Style			Total
	Secure	Avoidant	Anxious	
Daily	16	30	16	62
Weekly	51	73	28	152
Monthly	31	35	10	76
Rarely	6	15	11	32
Total	104	153	65	322

Table 6. Attachment style and primary purposes for using ChatGPT

Primary Purpose	Attachment Style			Total
	Secure	Avoidant	Anxious	
ask for help	12	14	9	35
ask question	43	52	27	122
ask about objective knowledge	9	22	6	37
search for information	38	58	22	118
seek emotional support	0	4	0	4
share my feeling	2	3	1	6
Total	104	153	65	322

Table 7. Attachment style and participants' perception of ChatGPT

View ChatGPT as	Attachment Style			Total
	Secure	Avoidant	Anxious	
Human	44	50	26	120
Machine	60	103	39	202
Total	104	153	65	322

1.1 Chi-square Test Results

The first Chi-square test of independence examined the relation between attachment styles and the frequency of using ChatGPT. The relation between these two was not significant, $X^2(6, N = 322) = 10.709, p = .098 < .05$.

Another Chi-square test of independence was conducted to establish if there was a relationship between an individual's attachment style and their purpose for using ChatGPT. The purposes of usage were collected in the form of rankings, from the main purpose to the least important. However, we only selected the main purpose to use in the Chi-square test of independence. The result showed that there was no significant association between attachment styles and the primary purpose of using ChatGPT, $X^2(10, N = 322) = 8.959, p = .536$.

The other Chi-square test of independence was performed to determine whether participants' perception of ChatGPT differed based on their attachment style. The data used in this test were initially gathered from an open-ended question about the user's perspective on the role ChatGPT played. Then categorized ultimately into two groups: human-like and machine-like. In the secure attachment style group, 42.3% attribute human-like qualities to ChatGPT, while 57.7% see it more as a machine. In the avoidant attachment style group, 32.7% view ChatGPT as human, while the majority, 67.3%, perceive it as a machine. And in the anxious attachment style, there is a notable split, with 40% perceiving ChatGPT as human and 60% as a machine.

Despite these variations, the result of the Chi-square test of independence shows that there is no significant difference in attachment styles, $X^2(2, N = 322) = 2.715, p = .257 < .05$.

1.2 User's Description of Purpose and Perception of ChatGPT

Since no significant results were found in the previous Chi-square tests, we proceeded to analyze the qualitative data obtained from users' rankings

of purpose and related descriptions. This approach enabled us to explore deeper and gain a comprehensive understanding of users' experiences in ChatGPT.

1.2.1 User's Description of Purpose and Perception of ChatGPT

Ranking of participants' purpose of use can be found on <Figure 1, 2, 3, and 4>. Participants report that they use ChatGPT due to its efficiency, quickness, convenience, ease of use, and extensive knowledge base. Additionally, its responsiveness was mentioned in overall usage. For example, "I sometimes need feedback or ideas, which is better than just using Google" (X27). Many have also mentioned that they usually interact with ChatGPT for inspiration, ideas, and reliable information. Some believe ChatGPT is better than other search engines like Google or NAVER. Furthermore, many participants emphasized that their usage is strongly related to "literal content," such as summarizing, grammar checking, proofreading, generating literature, or even "rephrasing English content into children's level" (S66).

While statistical results show no significant differences between attachment style groups in usage purpose. But there is an interesting finding. All participants who selected "To seek emotional support" as their primary purpose are in the avoidant group. One of the participants expressed, "I use it to confirm and gain support for my thoughts." (V64)

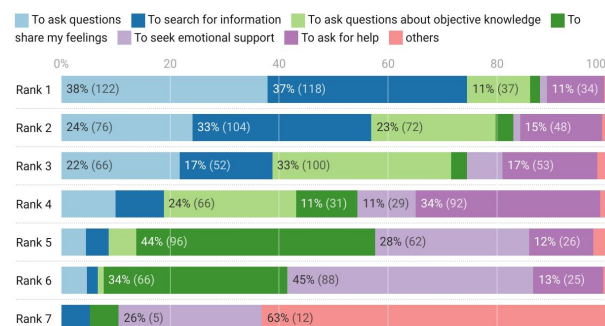


Fig. 1. The Ranking of purpose of all participants

Ranking of purpose (Secure style)

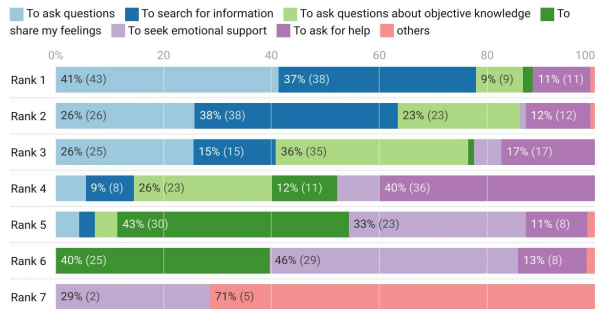


Fig. 2. Secure attachment style's ranking of purpose

Ranking of purpose (Avoidant style)

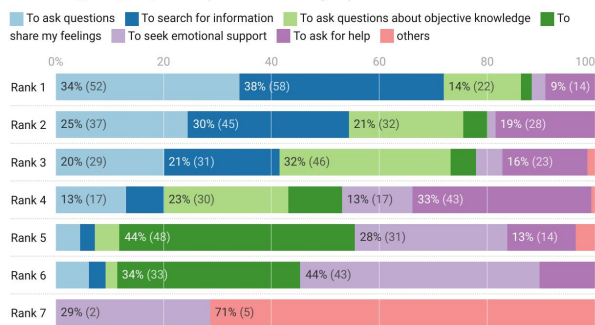


Fig. 3. Avoidant attachment style's ranking of purpose

Ranking of purpose (Anxious style)

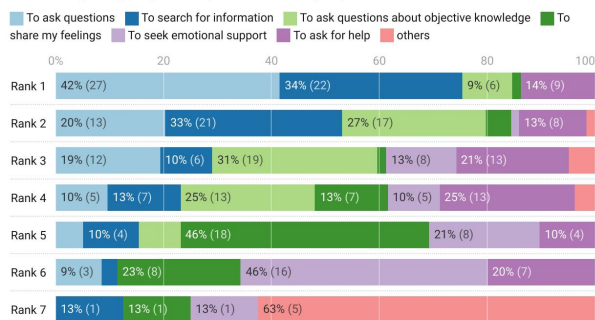


Fig. 4. Anxious attachment style's ranking of purpose

1.2.2 Users' Perception of ChatGPT's Role

The perception of ChatGPT's role was collected by allowing participants to describe how they view ChatGPT's identity freely. A total of 322 sentences were analyzed using NVivo, and the word frequency is presented in a word cloud <Figure 5>. Among the analyzed responses, the top ten most frequently occurring words include "search" (10.59%), "engine" (8.69%), "tool" (7.06%), "assistant" (3.80%), "friend" (3.62%), "information" (3.17%), "teacher" (2.35%), "help" (1.72%), and "use" (1.72%). Furthermore, several key themes emerged, revealing users'

perspectives on ChatGPT.

The descriptions of ChatGPT can be roughly divided into two categories: tool and human-like. Participants often described ChatGPT as a versatile role, such as one participant said that "ChatGPT is a search engine, but it is also a teacher who teaches me when I have questions, so it is really a good auxiliary tool." (S30). Most answers highlight it as a search engine or an assistant. Some participants even likened their interaction with ChatGPT to that of a friend or teacher. For example, "a friend who can speak, listen, and give me answers" (V53), "a friend who can do anything, in anywhere at any time" (V30), and "a spiritual teacher teaches me what to do" (X22). Additionally, one response assigned ChatGPT a human identity with even giving it a gender, mentioning "if I need help, he will always be there" (V13). Moreover, a participant stated that ChatGPT is an "emotional partner, good friend in life" (X15). There were also a few participants who described ChatGPT as "a place for searching" (V67) and "a place to get diverse information" (V125).

Delving into the responses of different attachment style groups. We found that participants with an anxious attachment style tend to use more than two identity descriptions in ChatGPT, along with additional explanations. Participants with an avoidant attachment style tend to use phrases such as "I think" and "to me" frequently in their responses. They described ChatGPT as "I feel like it's like a mentor [...]" (V41), "I think of it as a tool and assistant" (V82), and "to me, it is still a search engine, [...] solving doubts" (V36). Secure participants' responses included detailed explanations that are varied and objective, not solely focused on themselves. For example, "ChatGPT is a powerful customized search engine that can assist in document production and data collection, and accurately provide the required information and assistance." (S25) and "emotional support is relatively rare, as it mainly focuses on solving problems in lifetime" (S7). It was also found

Additionally, some participants began their prompts with a brief introduction, providing context about their status. For instance:

"I am planning to write a major thesis on Arctic glaciers and climate change, which will write it based on research results [...]" (S55)

"I am a college student working on my thesis about [...]" (V10)

"I am doing thesis research on... Please provide me with some capital information first." (X3)

3.1.1 Differences in Attachment Styles

Notable differences emerged based on the three attachment styles. Participants with a secure attachment style demonstrated a balanced approach. They seek information and assistance, but typically in a structured manner. Their prompts were specific and clear, and their responses contained words such as "research," "paper," and "information" that were highly related to the purpose of the situation more frequently than the other two types of attachments. For example:

"In 100 words or more, list five effects of climate change on Arctic ice." (S104)

"Please provide information on the impact on Arctic ice by considering the factors and changes of climate change, along with the source of evidence so that it can be used in the paper." (S74)

"Please summarize about 10 effects of climate change on Arctic ice and explain the basis for them." (S60)

Among the top five most frequently used words in this group of responses, "you" appears, whereas the word "you" is not a high-frequency word in the other two groups. For example, "Do you know..." or "Can you..."? We have even found some participants in this group who give ChatGPT a character, such as, "From now on, you will be my supervisor who will help me write my thesis." (S65), "You are my best search expert" (S89), and "You are a professor who has to write a paper on climate change" (S103). Additionally, we found that

they are the only group that says "thank" at the end of their prompt. It can be concluded that they also express gratitude, thereby contributing to positive interaction with ChatGPT.

In contrast, individuals with an avoidant attachment style exhibited a shorter and more task-focused interaction with ChatGPT. They seemed to prefer instructing ChatGPT to process the information they already had, or asking it brief questions, rather than requesting ChatGPT to collect information for them. Among these, we also discovered that the majority of them sought help with reorganizing or translating their articles:

"Find the key points in the following passage. (Attach the article)" (V5)

"(Post the collected information) Please help me organize the information" (V7)

"(The related papers have been collected) Summarize this paper." (V121)

"Please summarize the contents of (research paper's title)" (V141)

"(information)Please translate this part to korean" (V108)

"Please help me organize ... into Chinese" (V2)

In addition, they tend to use "What," which is one of the top five most frequently used words found only in this group, "Find me," and "Are..." to request a specific range of answers. Three participants stated that they prefer breaking questions into smaller parts and send it separately to ChatGPT. Participants with an avoidant attachment style often made straightforward requests first, prioritizing efficiency in obtaining dissertation information over detailed conversations.

Participants with an anxious attachment style showed similar prompting style as securely attached participants. They tended to prompt ChatGPT with multiple and more explicit requests at once. They expressed an increased need for detailed information. Use of words like "please," "help," and "could you" were more common in this group, indicating a tendency to communicate in a

euphemistic and cautious manner. For instance:

"Hello, I need your help with a paper [...] I need your help gathering information and developing ideas. Could you help me get ideas on what I could say in my paper?" (X27)

"Could you give me some information[...]Please give me 10 main tips." (X29)

"I am requesting to write a thesis on the impact of [...] Could you please help me with the data?" (X53)

"Please help me find a website with open data on climate change from the past 10 years, and only present the Chinese or English version. It would be better if you could explain the differences between the webpages. (X24)

3.2 Scenario 2: Emotional Support

In the second scenario, participants were instructed to imagine a distressing situation and use ChatGPT for emotional support to improve their mood. The participants exhibited a wide range of negative emotions, such as "anxious," "bad mood," "depressing," and others, which were not covered in the introduction. This might indicate their immersion in the scenario. We also discovered that participants had diverse expectations of the support they wanted from ChatGPT.

3.2.1 Differences in Attachment Styles

Participants with a secure attachment style demonstrated a balanced approach to seeking emotional support. Their prompts often included specific details about their emotional state and the cause:

"The results of today's report are unsatisfactory, and I feel a little anxious. What should I do?" (S31)

"I'm disappointed and in a bad mood about the results of my latest report. I need some advice or support." (S55)

It was also found that they showed a high frequency of using the words "please," "you," and "me," which was not found in the other two groups.

For example:

"Can I share something with you? It's... (the reason), I feel... (description of mood, thought)" (S7)

"I feel very nervous and in a bad mood. Can you help me get rid of my emotions? Listen to what I have to say." (S13)

"I am feeling low and anxious because of the unsatisfactory results of the report. Please relieve my anxiety." (S81)

"I am feeling low and anxious due to the unsatisfactory results of my recently completed report [...] Can you understand these feelings?" (S84)

Additionally, they also mentioned that their expectations of ChatGPT include receiving empathy, understanding, and specific recommendations to improve their mood. For example, they would appreciate some encouragement like "You're already doing great, keep up the good work next time" (S23), as well as jokes and tips for relaxation.

Unlike secure attachment style, those with an avoidant attachment style displayed a more reserved and task-oriented interaction with ChatGPT. They tended to briefly state their emotional state, seeking solutions or comfort without providing extensive elaboration. Additionally, two types of prompting styles in this group were found.

One was focusing on the mood, for example:

"I feel bad and anxious" (V120)

"I'm in a bad mood. What can I do?" (V51)

"What to do if I am sad?" (V56)

"How to adjust to anxious mood" (V33)

These participants reported that they expect ChatGPT to respond by asking them "What's wrong with you?" "How can I help you?" for further detail.

The other focuses on practical and solution-focused responses, valuing an inclination toward moving forward and not dwelling on emotions. With prompting:

"How to deal with the negative emotions caused by unsatisfactory academic results?" (V1)

"Teach me how to write a good report" (V140)

"What should I do if the report results are not satisfactory?" (V55)

In contrast, participants with an anxious attachment style demonstrated a more emotionally expressive and detail-oriented interaction with ChatGPT. Their prompts often conveyed heightened emotional states and a strong desire for reassurance, with using the word "comfort." For example:

"Hello. Sorry to bother you, but I need help. I have been feeling really down because of the results of my recent report..." (X27)

"May I talk to you about the stress I am feeling right now? I understand that you are a robot not capable of love" (X30)

"I am feeling low and anxious due to the unsatisfactory results of a recently completed report. Can you comfort me?" (X58)

"I'm not in a good mood, tell me a joke, comfort me, make me happy, praise me, encourage me, and give me the courage to move on." (X12)

Furthermore, they also expressed a desire to receive not only practical recommendations but also emotional validation and encouragement. Most participants in this group expect ChatGPT to provide encouragement and empathy in the first line of the reply.

3.3 Scenario 3: Problem-Solving

In the third scenario, participants were tasked with resolving a reservation error using ChatGPT as a multi-assistant. Overall, all participants displayed the need for translation in their prompts. None of the participants asked ChatGPT to generate a full email. All participants prompt ChatGPT with a rough script, some even provide full details and ask for a translation. Some said that in an emergency situation, they are not really accustomed to relying solely on ChatGPT in all processes. However, all participants indicated that they expect ChatGPT to perform well in translation.

3.3.1 Differences in Attachment Styles

However, there are still several differences that can be found based on different attachment styles. First, participants with a secure attachment style are found to use the word "please" frequently. Starting their requests with "Please reverse..." or "Please translate..."

Next, we found that participants with an avoidant attachment style surprisingly provided more detail in their prompt, which was not found in their prompt to the other two scenario questions. In the anxious attachment style group, some may use phrases like "hurry up," "I'm in big trouble," and "immediately." Additionally, they are more likely to prompt with "I don't know" for a reason. They tend to attribute their need for help to their perceived shortcomings, a behavior less common in the other two groups. Such as,

"Hi. I am in big trouble! I made a reservation at the wrong hotel and need to immediately contact the local hotel via email to change the reservation date. However, I don't speak the local language. Can you help me write an email to notify the hotel?" (X27)

"I made a mistake in booking the accommodation and need to change the date. I don't know how to write in the language of that country. The content of this email was written using a translator. If there are any rude sentences, please forgive me." (X40)

Moreover, many participants with an anxious attachment style reported that they would ask further questions or check ChatGPT's answer with other translators.

V. Discussion

The primary objective of our research is to identify patterns of attachment styles and their impact on user experience with AI chatbots, with the aim of enhancing personalization based on attachment style in the future. In this section, we will discuss the main research questions based on our findings.

1. Attachment Styles and ChatGPT Usage

First, our exploration of attachment styles and ChatGPT usage revealed a varied distribution among participants. The frequency of ChatGPT usage did not show a significant correlation with attachment styles (H_{01} was supported). This suggests that individuals with different attachment styles engage with ChatGPT at comparable rates. Also indicates that ChatGPT is effective as an assistance provider regardless of attachment styles and does not have distinct usage preferences. Moreover, contrary to our hypothesis, attachment styles did not exhibit a significant association with the primary reasons for using ChatGPT (H_{02} was supported). Users, regardless of their attachment style, identified efficiency, quick response times, and extensive knowledge as key reasons for interacting with ChatGPT.

This result differs from the argument presented in previous research [50], as we did not find significant preference for automation and artificial intelligence among users with insecure attachment styles.

Additionally we found that, compared to scenario 1, which asks for objective information from ChatGPT, in scenario 3, users of all attachment styles exhibited a notable trend: they did not ask ChatGPT to generate a complete email. Many have claimed that they will verify what ChatGPT generated on another platform. This observation suggests a common hesitance to fully trust ChatGPT with critical emergency information, indicating potential trust issues in human-AI interactions. Also, this finding supports the statement proposed by Castelo, et al. [71], that individuals are more receptive to AI in tasks that are more objective, compared to subjective ones.

2. Attachment Styles and Perception of ChatGPT

Analyzing users' perceptions of ChatGPT as human-like or machine-like revealed interesting nuances. The word cloud analysis highlighted common terms such as "engine," "tool," "assistant,"

and "friend", emphasizing ChatGPT's dual role as a functional tool and, notably, a human-like figure. However, our Chi-square test did not identify a significant difference (H_{03} was supported) between attachment style groups. Users across all attachment style groups have a similar ratio of viewing ChatGPT as a versatile role, combining aspects of a search engine, assistant, and even a friend or teacher. This finding is consistent with past research on other social chatbots [55,57,59], in which the view of these chatbots is diverse in human-like and tool.

Additionally, we found a positive correlation between scores on the Perceived Partner Response Scale (PPRS) and users' perceptions of the role of ChatGPT. Perceiving responsiveness from a chatbot could be similar to experiencing empathy from the AI [62,72]. This supports Bickmore, et al. [61] 's statement that this character trait can increase the likelihood of users establishing relationships and viewing ChatGPT as a human-like figure. Moreover, this could lead to a positive user experience [62].

3. Interaction Patterns Based on Attachment Style

Our study reveals intricate patterns of attachment styles across three scenarios, demonstrating their influence on interaction patterns between users and ChatGPT. This influence is evident in the tone, length, and content of user prompts, reflecting the diverse needs and expectations that users bring to AI interactions.

3.1 Secure Attachment: Balanced Engagement

Individuals with a secure attachment style exhibited a balanced and appreciative approach across various scenarios. They also tend to write long prompts, but provide clear, balanced narratives for obtaining multiple pieces of information coherently [73]. They seamlessly integrated politeness, frequently using "thank" and occasionally personifying ChatGPT by addressing it as "you" or giving it human-like characteristics in their prompts. Even in emotionally charged

situations, users with a secure attachment style exhibit the most self-disclosure and remain "balanced," incorporating specific details about their emotional state. Overall, this attachment style demonstrates a willingness to engage with ChatGPT for both task-oriented and emotional support scenarios, emphasizing a versatile use of the AI system.

3.2 Avoidant Attachment: Task-Focused Efficiency

Participants with an avoidant attachment style preferred short and task-focused interactions, emphasizing efficiency in obtaining information. They also emphasized their autonomy, by using the phrase, such as "I think," "I feel" frequently, and brevity, reflecting their comfort with independence and self-reliance [74]. In the emotional scenario, they focus on the reasons that make them feel down, rather than expressing their true emotions. Their prompts often focused on specific instructions, using short phrases to indicate a desire to gather information without engaging in lengthy conversations. They prefer to have the conversation step-by-step, expecting ChatGPT to ask for more details and understand their thoughts. This attachment style demonstrates a practical and goal-oriented approach to AI interactions.

3.3 Anxious Attachment: Emotional Expressiveness

In contrast, individuals with an anxious attachment style demonstrated a more emotionally expressive and detail-oriented style of interaction. The prompts conveyed heightened emotional states and expressed their needs in a more euphemistic and cautious manner, while providing many details. This behavior may be driven by their need for reassurance and confirmation from others [35]. Their use of polite language, such as "please" and "help" was more prevalent. Individuals with an anxious attachment style sought not only information but also emotional validation and encouragement, demonstrating a desire for a supportive interaction with AI. Their expectations

of ChatGPT included not only practical recommendations but also emotional validation and encouragement.

4. Using PPRS as a Tool to Assess Users' Perceived Role of AI Partners

Another contribution is the discovery of the potential use of the PPRS in human-AI interaction, which has not yet been widely used in this context.

Although attachment styles did not have a significant influence on PPRS scores (H_0_4 was supported). This suggests that users, regardless of attachment style, do not differ in their perceptions of ChatGPT's responsiveness. While attachment styles play a crucial role in shaping human relationships, our findings suggest that ChatGPT's perceived responsiveness is more likely to depend on general expectations and experiences, rather than just individual attachment styles.

On the other hand, our logistic regression analysis found correlation between descriptions of ChatGPT's role and PPRS scores. Higher scores increased the odds of attributing human-like roles to ChatGPT, indicating users perceived it as more responsive and anthropomorphized its role.

The incorporation of PPRS in the assessment of AI interaction represents a new approach. It also presents an opportunity for broader applications in the field of chatbot development. PPRS can be considered a valuable tool for enhancing users' overall chatbot experience. As the demand for emotionally intelligent and user-centric AI systems continues to grow, further development and refinement of scales like PPRS could pave the way for standardized assessments of user experience in human-AI interaction. This suggests a direction for future research. Scales such as PPRS could be expanded and adjusted to comprehensively measure various aspects of user satisfaction, engagement, and emotional connection with AI chatbots.

VI. Conclusions

Our research has revealed valuable insights into the interplay between attachment styles and user experiences with ChatGPT. Contrary to expectations, attachment styles did not significantly influence the frequency of ChatGPT usage or the primary reasons for engagement. Users, regardless of their attachment styles, showed a common hesitation to fully trust ChatGPT in critical situations, emphasizing the need to address trust issues in AI systems. The analysis of users' perceptions revealed a consistent dual-role perception of ChatGPT as both a functional tool and a human-like figure across diverse attachment styles. The positive correlation between PPRS scores and users' perceptions suggests that perceived responsiveness enhances the anthropomorphism of AI, contributing to a positive user experience.

Examining attachment styles for designing personalized AI partners. Understanding the unique needs of users with different attachment styles enables the creation of adaptive interfaces customized to individual preferences. Future research could explore the impact of culture on attachment styles and AI interactions. This could improve user experience in human-AI interaction.

VII. Limitation and Future Directions

Our study offers a new perspective on human-AI interaction. However, it is crucial to acknowledge its limitations and provide insights for future refinement. Sample size, particularly the lack of participants with anxious attachment styles, limit statistical power and may contribute to the absence of statistical significance in some analyses. Future research should aim for a balanced representation of attachment styles to improve reliability and validity of findings. This study includes participants who speak different languages, impacting text

analysis outcomes. Factors like language usage, user backgrounds, and cultures have an impact. Broader factors and contextual nuances remain unexplored. Future research can consider cultural nuances and previous AI interactions. Longitudinal studies can capture changing dynamics of attachment styles and AI usage. Addressing these limitations strengthens the methodology for a comprehensive understanding. Future research should prioritize user popularity, explore influencing factors, and consider evolving human-AI relationships.

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