

Exploring How Generative AI Painting Systems Can Enhance Social Connectedness between Young Adults and Parents Living Apart

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Long-distance living increasingly challenges emotional closeness between young adults and their parents. This study explores how generative AI (Gen AI) painting systems may enhance social connectedness in such relationships by incorporating different levels of parental involvement into AI-generated visualizations. We designed a multimodal system that transforms personal sound datas, emotional prompts, and photos into paintings using GPT-4o. Through a within-subject study with 24 young adults living apart from parents, we compared three visualization methods, ranging from low to high parental information involvement. Results show that greater parental input, particularly through emotionally meaningful photos, often increases perceived closeness and sense of connection. However, high involvement does not guarantee stronger closeness. Emotional resonance depends on the relevance of the content, the perception of authorship, and the affective tone. Our findings highlight that social connectedness is not a linear metric and may involve ambivalence or discomfort, which can still reflect meaningful emotional engagement and connection. We conclude with design implications for Gen AI systems aimed at supporting familial relationships, emphasizing personalization, interpretability, and balanced co-creation.

Additional Key Words and Phrases: Social connectedness, Gen AI, Human AI collaboration

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1 Introduction

The World Health Organization reports a record high global migrant population, including people who relocate to seek employment or educational opportunities [53]. Such long distance separation challenges emotional bonds and weakens the social connectedness between parents and children [44]. Within human-computer interaction, visualizing personal data through digital art has emerged as a non-intrusive and effective approach to fostering social connectedness [23, 30–32, 48]. Compared to direct communication tools, generative data-driven artworks allow people to express and perceive emotional cues in subtle and aesthetically engaging ways [25, 35, 54–56]. However, traditional visualization methods that implement personalized design principles are usually costly and relatively unfriendly to the common user [36]. With the rise of Gen AI, creating personalized artworks has become more accessible to the general public [42, 57].

This study explores how Gen AI can serve as a supplementary medium to generate low-cost, emotionally expressive, and visually engaging digital artwork that supports social connectedness between geographically separated parents and young adults. Although prior research has investigated the perception and preference for AI- versus human-created works [15, 33], and the role of human oversight in improving content acceptance [20, 60], the specific impact of different levels of human involvement remains underexplored. To address this gap, we investigate how different involvement

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levels of parents in AI-generated paintings affect young adults' sense of social connectedness. Our system uses sound data, prompts, and pictures as basic input, which Gen AI analyzes to generate visual output. We define three visualization modes based on existing Gen AI methods [22, 49, 58]:

Method 1 - (AI + sound data) - AI (50%) + human information (50%): The AI independently processes sound data and generates visual output without human intervention.

Method 2 - (AI + sound data + emotional prompt) - AI (33%) + human information (66%): The AI incorporates sound data and additional human-provided emotional cues to guide the generation.

Method 3 - (AI + sound data + emotional prompt + photo) - AI (25%) + human information (75%): In addition to sound and emotional prompts, a photo is provided to enrich the visual representation collaboratively.

Based on these methods, this study poses the following research question: "How do different involvement levels of parents in AI-generated painting affect the social connectedness between young adults and their parents who live apart?" In essence, we seek to understand how increasing parents' information involvement in generative AI art influences young adults' emotional perceptions and young adults' feelings of connectedness in long-distance parent-young adults relationships. The results show that a higher level of human involvement generally has a more positive impact on social connectedness. However, both qualitative and quantitative findings suggest that this relationship is not strictly linear, which may be due to the emotional complexity and contradictions involved. This study makes three main contributions. First, we designed a visualization system that supports multimodal data input for long-distance families. Second, we conducted an empirical evaluation of three visualization methods with different levels of parental involvement. Third, we explored how different degrees of human involvement in generative AI affect social connectedness, and offered design suggestions for future visualization systems aimed at families living apart.

2 Related Work

2.1 Social connectedness

Social connectedness refers to the degree to which individuals perceive a sense of connection, belonging, and emotional bond with others or groups. It emphasizes emotional interactions, communication, and mutual support between people. This connection promotes psychological satisfaction, a sense of security, and general well-being [9, 12–14, 24, 52]. Social connectedness can be described in a hierarchy of three tiers: the most intimate tier includes close family members, the next tier comprises close friends and acquaintances, and the outermost tier involves strangers with whom one interacts [46]. Previous research has shown that a strong sense of positive social connectedness primarily emerges within the context of mutual care and understanding, specifically among the most intimate relationships such as family members and partners [5, 46]. Research shows that maintaining social connections plays a vital role in enhancing individual well-being[2]. It not only affects emotional health but also cognitive function and physical condition[51]. Therefore, cultivating and supporting social connectedness, especially for parents and children in long-distance families, is crucial to promoting psychological health and emotional stability in daily life for both parties.

2.2 Emerging technologies to support social connectedness between distant family members

Many early systems have been designed to support social connectedness among remote family members. For example, ambient displays of 'awareness' such as Digital Family Portrait [38] and CareNet [10] shared an elder's daily routine with distant relatives, providing peace of mind while respecting the elder's privacy. Other devices enabled lightweight emotional exchanges: the Lovelet wearable communicated the warmth of a loved one [18], and eKiss allowed parents

and children to exchange virtual 'kisses' through synchronized photos [11]. Even simple digital 'sticky note' interfaces let family members leave casual messages on shared devices or family websites [39]. More creative approaches have also been explored, such as shared storytelling activities for geographically separated loved ones [29]. All of these efforts aimed to cultivate a sense of closeness and mutual awareness in everyday life despite physical separation. However, while such systems foster peripheral awareness and playful interaction, they generally rely on static content or pre-defined modes of communication. Interactions are often one-directional or limited to preset messages, making it difficult to convey nuanced emotions or adapt to the changing context of an individual [13]. Furthermore, these systems often require high costs to create and maintain digital visualizations, making it difficult to achieve scalable personalization [36]. Generative AI techniques can dynamically tailor content and responses to the situation of a user, potentially infusing exchanges with greater personalization and emotional resonance than was possible with earlier static designs [61]. For example, an AI-driven system can dynamically align content and visualizations with the evolving emotional states and personal preferences of a family member based on real-time analysis of voice signals or text input.

Importantly, Gen AI also offers the potential to create personalized visualizations at a significantly lower cost compared to traditional manual design processes [4]. By automating aspects of content creation and optimization, AI can reduce the burden of manual curation while dynamically adapting to users' evolving emotional and contextual needs. Through the interpretation of multimodal inputs, such as voice tone, textual sentiment, or shared images, AI systems can help identify underlying emotional cues and selectively amplify meaningful signals [16]. This enables not only more personalized communication, but also more effective transmission of emotional intent across distance. In particular, the goal of introducing AI in this context is to support and personalize human-to-human communication rather than to replace it. By acting as a behind-the-scenes facilitator, generative AI can help remote family interactions feel more emotionally attuned and personalized, while keeping the focus on family members and their shared experiences.

2.3 Human Involvement and Emotional Value of AI-Created Works

Existing Gen AI research has focused predominantly on comparing people's emotional responses to human-created content versus AI-generated content, often examining the perceived value and acceptance of each [21, 47]. In domains ranging from text and music to visual art, many studies report a bias favoring human-made creations [15, 21]. For example, Ragot et al. [37] found that participants rated artworks believed to be human-created significantly higher than those labeled AI-generated. However, when the true origin of a piece is concealed, this preference can diminish or even reverse - some audiences have shown equal or greater appreciation for AI-generated works under blind conditions [37, 60]. Such findings highlight a complex public attitude: while there is skepticism toward art known to be made with AI, people may still find AI creations compelling when evaluated on their intrinsic merits alone [47].

Researchers have also explored how the creation process, particularly the level of human involvement, influences the creators' and viewers' perceptions of AI-assisted works. For example, Draxler et al. [15] reported that when users retained greater control over an AI-supported writing task, their sense of ownership over the resulting content increased. This suggests that a creator's active involvement (e.g., guiding the AI or making creative decisions) can strengthen their emotional attachment and the feeling of leadership toward the output. Similarly, in the context of visual art, moderate human guidance in the generative process has been shown to improve audience evaluations of the creativity and quality of the artwork, while excessive reliance on automation can undermine its perceived value [34]. In other words, a balanced human-AI collaboration tends to yield the most positively perceived outcomes.

Beyond the creators themselves, the degree of human involvement can also shape the perception of the audience of the finished work. Zhang et al. [60] investigated how knowing the source of the creation influences viewers' judgments

about AI-generated art. They observed a clear 'human preference' effect: Participants gave higher ratings to pieces they were told had been created by a person, yet when they were unaware of an artwork's origin, they often favored the AI-generated version. In particular, Zhang and colleagues further posited that visible human supervision or input during an AI's creative process can elevate an audience's appreciation of the result.

Although these previous studies provide important insights, most have examined emotional responses to AI-generated content in settings where the creator and the audience are unconnected or anonymous and have not explored deeply how different levels of human involvement affect the perception of such works. In contrast, our study focuses on creative works exchanged within relationships between close family members, specifically between parents and young adults. We investigate how different involvement levels of parents in an AI-driven creative process influence not only the young adults' emotional perception of the resulting artwork but also the extent to which such involvement enhances social connectedness between parents and young adults living apart. By highlighting this overlooked relational context, our work explores how human-AI collaboration can enhance not only the perceived value of the Gen AI artwork itself but also the social connectedness between people who share an intimate bond.

3 Design Process

The inspiration for this study comes from previous research findings of other researchers that human participation influences the perceived value of Gen AI work by users [15, 33, 60]. This study aims to extend this insight by exploring how different levels of human involvement in an AI-driven creative process affect social connectedness between family members. This section introduces the design process and considerations.

3.1 Design Foundations: Sound as Primary Input

To ground the generative process in the lived experiences of users, we selected raw sound data as the primary input. The sound is vivid and expressive, often reflecting an individual's daily routines and emotional states authentically [26]. It carries various types of information, including emotional and behavioral cues embedded in everyday contexts [59]. Previous work has shown that key sound features, such as frequency, loudness, and duration, can effectively reveal aspects of a person's activity or environment situation [28]. Based on these insights, we utilize GPT-4o's audio analysis capabilities to extract and interpret these features as the basis for generating personalized visual artwork.

3.2 Preliminary Visualization Methods

Based on the decision to use sound as the main data for the visualization, we developed three contrasting visualization methods. Each method was designed to reflect a different level of human involvement while maintaining consistency in the sound analysis pipeline. The key manipulated variables are: (i) Whether the user can provide additional emotion prompts, and (ii) who selects the final image.

- **Method 1 (Only-AI)** The system analyzes the sound activity based on the audio provided by users, the model generates multiple images, and the final image is automatically selected by the AI system.
- **Method 2 (AI + User Choice)** Using the same sound data to generate images but lets the user make the final selection, introducing a medium level of human agency.
- **Method 3 (AI + Prompt + User Choice)** Based on method 2, users can free text emotion prompts were added to maximize the explicit participation of users.

⁰In all methods parents provide the initial audio; percentages refer to *additional* explicit information control.

Table 1. Overview of the three visualization methods and the degree of parental involvement.

Method	Parental information fed to the system	Decision locus (image selection)	Parental involvement level
Method 1 Only-AI	Raw sound data	AI automatically selects the top-ranked image	Low
Method 2 AI + Parent Choice	Raw sound data	Parent participant selects one image from an AI-generated set	Medium
Method 3 AI + Prompt + Parent Choice	Raw sound data + free-text emotional prompt	Parent participant selects the final image	High

In each method, the system first analyzes the audio to identify key sound features and make a guess about what kind of daily activity might be happening. It then creates prompts for that activity. The system will generate colorful and flowing abstract images based on prompts (Figure 1). The resulting visual shows dynamic shapes and lines that hint at the activity while avoiding any personal or private details.



Fig. 1. Preliminary design output: the Gen AI pipeline analyses sound features to infer everyday activities and renders them as vibrant abstract images.

3.3 Evaluation and Results

After discussing the initial design with an experienced HCI researcher in Gen AI, we were advised that the visual differences between the methods might be too subtle for young participants to recognize. To explore this concern, we ran a small test with three parent-child pairs (3 parents, and 3 young adults). Each parent created nine images using the prototype, three for each method. These images were then mixed together and shown to their children, who were asked to group them by the level of parental involvement they thought each one represented. The results showed that only 10 out of 27 images (37%) were sorted correctly. A binomial test comparing this to the chance level of 33% found no significant difference ($p = 0.82 > 0.05$). The participants' comments supported these findings, with remarks like " all

images look equally abstract and cannot recognize what the difference is." These results suggest that the design did not clearly communicate the differences in parental involvement to young adults.

3.4 Design Refinements Based on Evaluation

The test confirmed that, given our initial pipeline, young participants had difficulty perceiving the difference in parental involvement based on the images alone. To address this issue, we introduced three key design considerations:

- **Controlled Variable** - Keep just one variable: the amount of information provided by parents. Parents did not select the final image, and all other settings (e.g., visual style, image size, and sound input) were held constant. This ensured that any observed differences could be attributed solely to the level of parental input.
- **Ambiguity as a Design Resource** - During early prototyping, we found that even when abstract visual styles were used, users could still recognize specific contextual details in the images. To better protect privacy and encourage open interpretation, we deliberately avoided allowing the system to identify or depict concrete activities. Instead, we shifted to a more ambiguous and symbolic visual language by mapping raw sound features directly to abstract visual elements. This design decision builds on the notion that ambiguity, when used intentionally, can invite reflection and reduce over-specificity in mediated communication [19].
- **Consistent Visual Language** - All images were standardized to a traditional ink-wash landscape style. Since the study was conducted in collaboration with Shenzhen Technology University and all participants were Chinese, this aesthetic offered a culturally meaningful baseline while minimizing distractions from varying styles.
- **Transparent Feature Mapping** - We established clear one-to-one mappings between sound features and visual elements (e.g., frequency → number of birds, loudness → mountain height, variability → water movement). These rules were designed to make the images more interpretable and grounded in the underlying data.

These refinements informed the final visualization pipeline described in the next section. We redesigned the three visualizations using a unified visual style, transparent mapping of acoustic features and controlled variables. Ensuring that only parental information was involved differently across methods.

4 Final Design and Implementation

4.1 Visualization Methods

To further emphasise the difference in the level of human involvement. We created three new distinct visualization methods that progressively increase the level of human involvement in the generation process (Figure 2). In all three modes, we make sure that only one variable is changing and that each variable acts clearly on the resulting image.

- **Method 1 (AI + sound data) -AI (50%) + human information (50%):**
In this baseline mode, images are generated solely from the sound data using the predefined mapping rules, without additional input from the user. The process is fully automated by AI: the system analyzes raw audio and directly produces a visual output based on these sound features. This mode represents the case of minimal human involvement, where the user's role is only to provide the initial audio recording.
- **Method 2 (AI + sound data + emotional prompt) - AI (33%) + human information (66%):**
In this mode, the user provides a brief emotional prompt alongside the sound input to guide image generation. The prompt, a word or short phrase such as 'happy' or 'lonely', is used to convey an intended emotional tone. The GPT-4o agent of the system analyzes the sound features while simultaneously adjusting the visual output based on the emotional context. This not only influences the mood of the generated image but also affects its

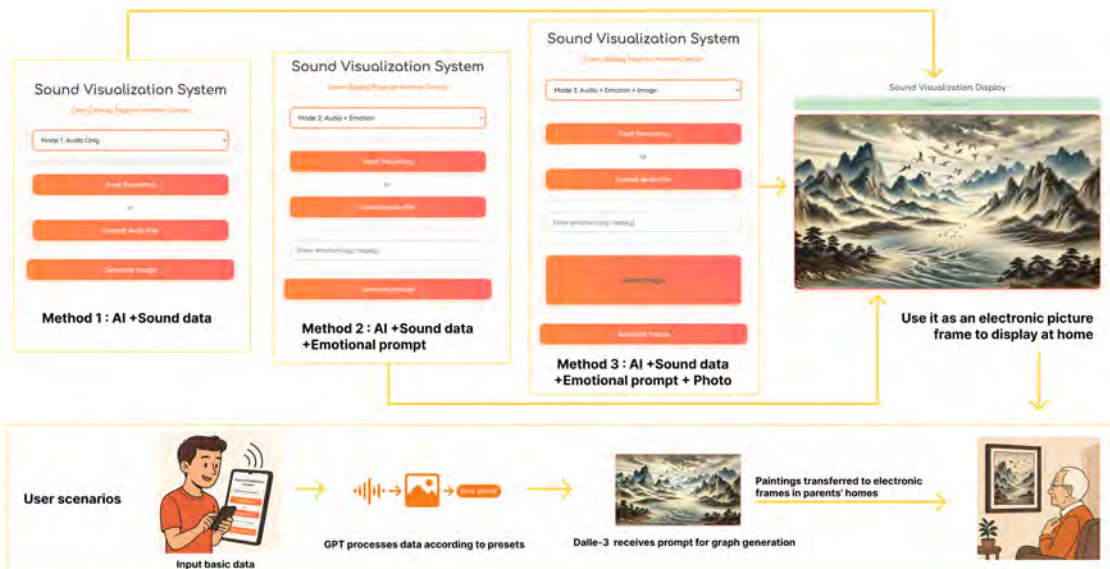


Fig. 2. This diagram illustrates a multimodal visualization pipeline using sound data, emotional prompts, and optional photos to generate personalized images for remote emotional expression. The two cartoon-style illustrations (bottom-left and bottom-right) were generated using GPT-4o to depict user interaction and home display scenarios

overall color palette and stylistic direction. By blending objective audio cues with subjective emotional input, this method introduces a moderate level of human guidance into the creative process.

- **Method 3 (AI + sound data + emotional prompt + photo) - AI (25%) + human information (75%):**

This mode represents the highest level of human information involvement, incorporating an emotional prompt and a reference photo in addition to the sound input. The photo—such as one recently taken by the parent—provides visual cues that guide the generation process. The GPT-4o model extracts key elements from the image, such as people, animals or other meaningful objects, and integrates them with the audio features and emotional prompt. This fusion of all three inputs results in a highly personalized and emotionally resonant visual output.



Fig. 3. AI-Generated Visualizations Using Method 1, 2, and 3

By progressively increasing parents' information involvement in the AI-generated art process, the study seeks to gain insights into how the intervention of parents affects a young adult's perceived value of AI-generated work, as well as the impact on the social connectedness between young adults and their parents living apart.

4.2 Visual Mapping Mechanism

To ensure consistency and coherence in Gen AI paintings and to control experimental variables, the design principles of generative AI [50] played a crucial role. We developed dedicated GPT models in the GPT Store and established a set of mapping rules to translate sound features, emotion prompts, and pictures provided by parents into visual elements:

- **Sound frequency** determines the number of birds in the artwork;
- **Sound duration** influences the complexity and richness of the image;
- **Sound loudness** reflects the height and quantity of trees and mountains;
- **Sound variability** is mapped to the intensity and movement of water waves.

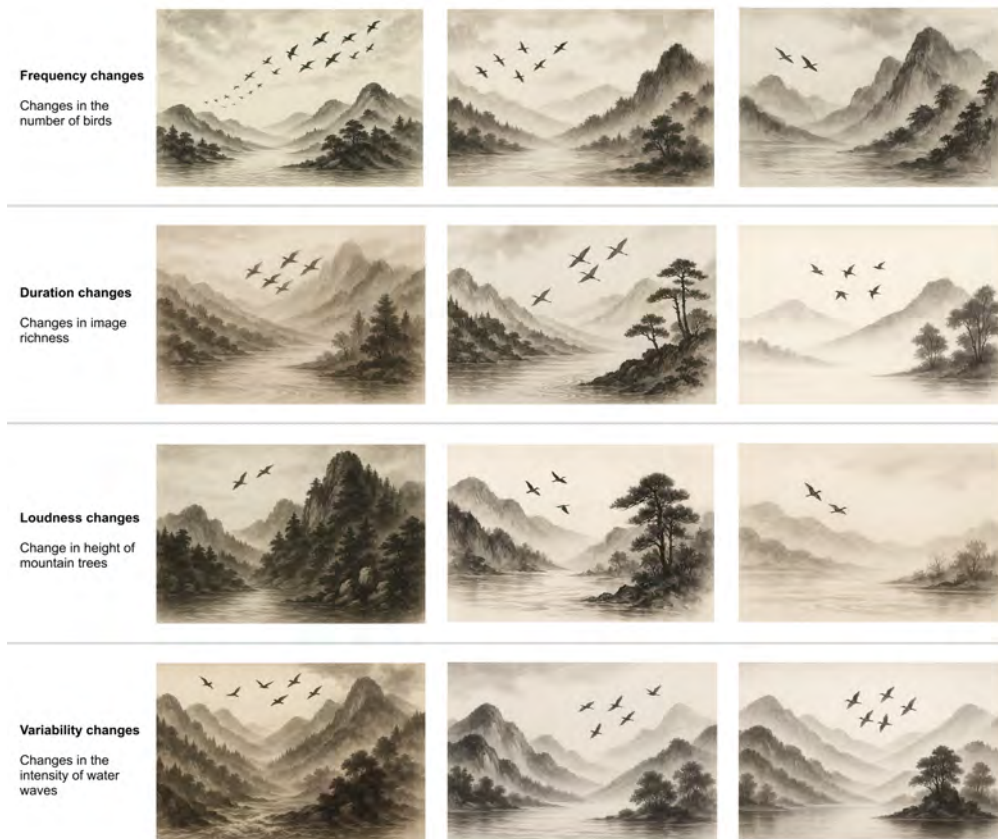


Fig. 4. Visual Mapping Rules Between Sound Features and Painting Elements

Using this rule-based mapping, the system dynamically transforms personal sound data into visual graphics (Figure 4). The intention is that the resulting Gen AI image encodes subtle details of the sound. Family members viewing the

image can infer cues about the recorder's context or emotions. For example, an AI image with many birds and tall trees could reflect a lively, loud environment, providing a window into each other's daily lives. This artistic translation from sound to imagery is designed to foster emotional closeness and strengthen connections through an interesting, ambiguous expression.

5 Study 1: Validating Perceived Differences in Human-AI Involvement Manipulation

We designed three different visualization methods based on the current mainstream processes of Gen AI image creation, which typically involve text-to-image and image-to-image generation. We assumed these three visualization methods represent different levels of human involvement, ranging from low to high, corresponding to Method 1 to Method 3:

Method 1 - (AI + sound data) - AI (50%) + human information (50%): The AI independently processes sound data and generates visual output without human intervention.

Method 2 - (AI + sound data + emotional prompt) - AI (33%) + human information (66%): The AI incorporates sound data and additional human-provided emotional cues to guide the generation.

Method 3 - (AI + sound data + emotional prompt + photo) - AI (25%) + human information (75%): In addition to sound and emotional prompts, a photo is provided to enrich the visual representation collaboratively.

To validate whether the three visualization methods could effectively convey different levels of human involvement. We conducted a perception study aiming to assess whether participants could perceive differences in the level of human information involvement based on the images generated by each method.

5.1 Participants

We recruited 23 participants (aged 18 to 35) for an online user study, with 13 of them having no prior experience with Gen AI art creation. No specific criteria were applied in participant selection, and these participants did not overlap with those involved in subsequent formal experiments.

5.2 Procedure

Before the experiment began, participants were shown examples of images generated by the three Gen AI visualization methods. The example images used here are not the ones used in the experiment but are just some generated examples to show participants. We explained the principles behind each method and highlighted the differences in the level of human involvement across the condition.

The experiment officially begins, we provided participants with the emotional prompt used for the images in Methods 2 and 3 in the experiment, as well as the reference photos used in Method 3. After this, participants were given a questionnaire with three images generated by the three visualization methods. However, the specific condition under which each image was created was not disclosed. Participants were asked to rate the perceived level of human involvement in each image based on their intuition and subjective impression.

5.3 Result

A one-way ANOVA test was conducted to compare participant ratings across the three methods, revealing significant differences in perceived human involvement among the methods, $F(2, 66) = 22.49, p < 0.001$. Post-hoc comparisons using Tukey's HSD test confirmed significant differences between all methods. These findings are consistent with results from independent t-tests conducted for pairwise comparisons (Method 1 vs. Method 2: $t = -4.22, p = 0.00035$; Method 2 vs.



Fig. 5. Gen AI images provided in the questionnaire

Method 3: $t = -2.23$, $p = 0.0361$; Method 1 vs. Method 3: $t = -6.78$, $p = 0.0000008176$), further supporting the hypothesis that participants can perceive varying levels of human involvement in AI-generated painting across the three methods.

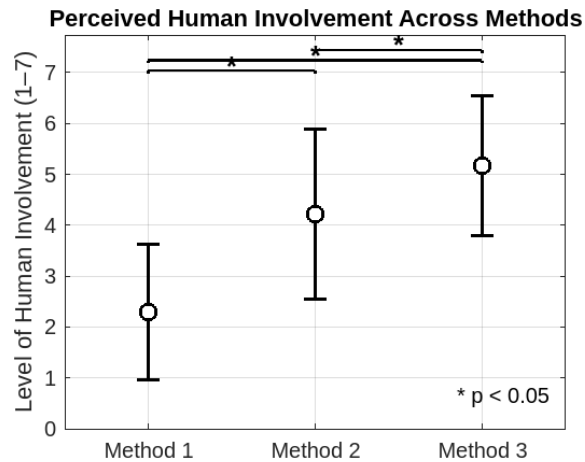


Fig. 6. Participants' perceived level of human involvement in AI-generated images across three methods (1-7 scale).

6 Study 2: The Impact of Different Levels of Parental Information Involvement in Gen AI on Social Connectedness

6.1 Pilot Study

This study conducted a pilot study to examine how different levels of related information involvement of parents in generative AI visualization affect social connectedness between young adults and their parents living apart. Three unmarried participants (1 female, 2 males; $M = 24$) who had lived apart from their parents for at least three months were recruited. The study used a within-subject design with three visualization conditions, each reflecting a distinct

level of the involvement of parents. Parents provided audio recordings, emotional prompts, and a photo, which were used to generate images via ChatGPT-4o. Participants received images and contextual information three times a day over 24 hours per condition. The order of the conditions was randomized, and a 48-hour interval was applied between sessions to avoid carryover effects. To measure social connectedness and attitudes toward AI, participants completed the Inclusion of Other in the Self Scale (IOS scale) [1] before and after each condition and the General Attitudes towards Artificial Intelligence Scale (GA AIS) [40, 41] at the beginning. After each condition, a semi-structured interview was conducted. When the participants had experienced all the methods, a summative interview was conducted. As the study focuses on the lived experience of users, we applied interpretative phenomenological analysis [45] to explore how different visualization methods shaped emotional perception and social connectedness.

6.2 Experimental Design Refinements

Based on the issues found in the pilot study, we made several adjustments to improve the setup. To reduce outside distractions and make the experience feel more natural, all sessions were moved to the participants' homes. We also added a simple planning task during the viewing period to keep participants equally focused across all sessions. Additionally, instead of viewing the images on their phones as in the pilot, participants viewed the AI-generated images on an iPad configured as a digital art frame, to ensure a more immersive and consistent visual experience.

To keep things consistent, we made sure that the only changing factor was the amount of information provided by parents, other elements like timing, setting, and task stayed the same. These improvements in the experimental setup helped this study better understand how different levels of parental involvement shaped participants' feelings, without interference from unrelated factors.

6.3 G*Power Analysis

An a priori power analysis was conducted using G*Power version 3.1.9.7[17] to determine the minimum sample size required to test the study hypothesis. The analysis was based on a repeated-measures ANOVA (within-subjects, one group, three measurements), with a medium effect size ($f = 0.25$), an alpha level of .05, and a desired power of 0.80. The results indicated that a minimum sample size of $N = 24$ was required. Thus, the obtained sample size of $N = 24$ is adequate to test the study hypothesis.

6.4 Participants and Recruitment

We recruited 24 young adult participants (ages 20–3, $M = 24.25$, 18 female, 6 male) who were living away from their parents. Recruitment was conducted through word of mouth, primarily within university communities and local networks. Both the youth and their parents need to understand the requirements of the experiment and agree to it in order to be eligible to participate. All participants are all Chinese. This shared cultural background was important, as cultural norms and family expectations can influence how social connectedness with parents is experienced and interpreted. As such, cultural background was treated as a relevant variable in this study. The study was deployed in each young adult participant's home to ensure a natural and familiar setting. Participants were required to have a private room with a personal desk or workspace to provide a quiet and consistent environment. As compensation, each participant received a shopping card equivalent to €20. A summary of participants' demographic information and separation context is provided in Table 2.

Table 2. Demographic overview of participants and their separation status.

User	Age	Gender	Separation Duration	Separation Type
P1	25	Male	6 months	Lives in different country from parents
P2	23	Male	6 months	Lives in different country from parents
P3	24	Female	18 months	Lives in different country from parents
P4	24	Female	9 months	Lives in different country from parents
P5	25	Female	12 months	Lives in different country from parents
P6	26	Female	11 months	Lives in different country from parent
P7	32	Female	1 month	Lives in different cities from parent
P8	32	Male	2 months	Lives in different district from parents
P9	21	Female	9 months	Lives in different country from parents
P10	31	Female	2 months	Lives in different district from parents
P11	22	Male	2 weeks	Lives in different city from parents
P12	22	Female	24 months	Lives in different province from parents
P13	24	Male	4 months	Lives in different province from parents
P14	23	Female	9 months	Lives in different country from parents
P15	26	Female	1 month	Lives in different country from parents
P16	20	Female	2 weeks	Lives in different city from parents
P17	22	Female	2 weeks	Lives in different city from parents
P18	20	Female	2 weeks	Lives in different city from parents
P19	20	Female	2 weeks	Lives in different city from parents
P20	23	Female	4 months	Lives in different province from parents
P21	24	Female	4 months	Lives in different province from parents
P22	25	Male	3 weeks	Lives in different province from parents
P23	25	Female	3 months	Lives in different province from parents
P24	25	Female	4 months	Lives in different province from parents

6.5 Procedure

For each method, AI-generated images were prepared by the researcher based on data collected from one of the participant’s parents. Specifically, the parent was contacted in advance and asked to provide five short videos with sound (with the option to cover the camera for privacy), a brief description of their current emotional state, and a photo they wished to share with their child. This input was used to generate the image using a predefined system pipeline involving GPT-4o. All materials were collected within 1–3 hours before the session to ensure temporal relevance.

Each participant experienced all three visualization methods (Method 1, 2, and 3) in a randomized order. At the beginning of the experiment, participants watched a video introducing the experimental process and then filled in the IOS Scale and GAAIS. In addition, before and after each method, participants completed an IOS scale to assess changes in perceived social connectedness for that specific condition.

During each session, participants completed a task related to travel planning. They need to planned a trip to one of three destinations: Semporna, Cinque Terre, or Split, including flights, hotel, and a daily itinerary. The destination was randomly assigned in each session. An AI-generated image was displayed on the iPad for 20 minutes during the task. After this, they spent two minutes freely browsing the image, followed by a post-test IOS scale. A short semi-structured interview was then conducted to explore participants’ emotional responses, interpretations of the image, and perceived closeness. A 10-minute break was scheduled between methods to reduce carryover effects. After all three methods

were completed, a final comparative interview was conducted. The full session lasted approximately 1.5 to 2 hours per participant, depending on the length of individual interviews.

6.6 Data Collection and Analysis

6.6.1 User Survey. We collected quantitative data using two instruments: the IOS Scale to measure perceived social connectedness, and the GAAIS to assess participants' views on AI. This study analysis focused on two key aspects: (1) how each method influenced participants' sense of social connectedness with their parents, (2) participants' general attitudes toward AI.

To determine the appropriate statistical tests, we first examined the normality of the data distributions using the Shapiro–Wilk test. For measures that significantly deviated from normality, we used the nonparametric Friedman test to detect differences among the three methods (IOS Scale). For measures that met normality assumptions, one-sample t-tests were conducted to determine whether the mean scores significantly differed from the scale midpoint (GAAIS).

6.6.2 Observations. In addition to survey-based measures, we conducted in-situ observations during each study session. These observations aimed to capture participants' spontaneous behaviors, facial expressions, verbal reactions, and interactions with the AI-generated images. We carefully documented various aspects, including task engagement, frequency of image viewing, time spent observing, and whether behaviors were active or passive. The observational data supported both qualitative interpretation and contextualization of quantitative findings. All observations were reviewed and confirmed by the researcher on the same day.

6.6.3 Interview. After completing the questionnaire for each session, participants took part in semi-structured interviews. For each visualization method, we asked about their initial impressions of the generated images, whether they noticed differences between images, whether they could associate them with their parents, and what personal meanings they associated with the content of the visualization and whether they could perceive a level of parental involvement.

After completing all three methods, we conducted a summative interview to compare their experiences with the different methods, to explore how each method affected their sense of social connectedness to their parents, and to gather suggestions for improving the system. All interviews were audio-recorded for analysis. For the qualitative analysis, we conducted a reflective thematic analysis of the interview transcripts following the six-stage approach outlined by Braun and Clarke [8].

7 Results

7.1 Quantitative Data

7.1.1 IOS Scale. To evaluate the impact of the three methods on perceived social connectedness, we analyzed participants' scores using the IOS scale. The change score for each method was calculated as the difference between post-test and pre-test ratings. Since the change scores for all three methods significantly deviated from a normal distribution (Shapiro–Wilk test, $p < 0.001$), non-parametric statistical methods were applied. A Friedman test revealed a significant overall difference across the three methods, $\chi^2(2) = 11.57$, $p = 0.003$. Follow-up Wilcoxon signed-rank tests indicated that Method 3 led to significantly greater increases in IOS scores compared to Method 1 ($p = 0.027$). No significant difference was found between Method 1 and Method 2 ($p = 0.399$), while the difference between Method 2 and Method 3 approached significance ($p = 0.057$).

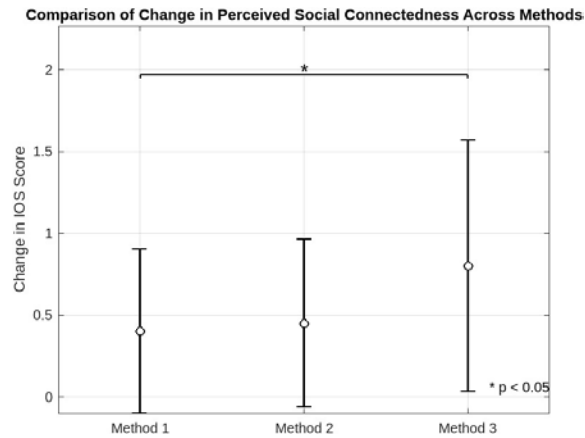


Fig. 7. Mean Change in IOS Scores (Post-Pre) for Perceived Social Connectedness Across the Three Methods.

7.1.2 *GAAIS Subscale.* The GAAIS was used to evaluate participants' attitudes toward AI, consisting of both positive and negative subscales. Higher scores on each subscale indicate a more positive attitude; in particular, a high score on the negative subscale reflects greater tolerance for the potential drawbacks of AI.

Participants' scores on the Positive subscale were significantly higher than the neutral midpoint of 3 ($M = 3.84$, $SD = 0.34$), $t(23) = 11.87$, $p < 0.001$, reflecting generally favorable attitudes. Scores on the Negative subscale were significantly lower than the midpoint ($M = 2.81$, $SD = 0.48$), $t(23) = -2.02$, $p = 0.05$, suggesting participants were not particularly tolerant of potential drawbacks and remained attentive to possible risks and limitations.

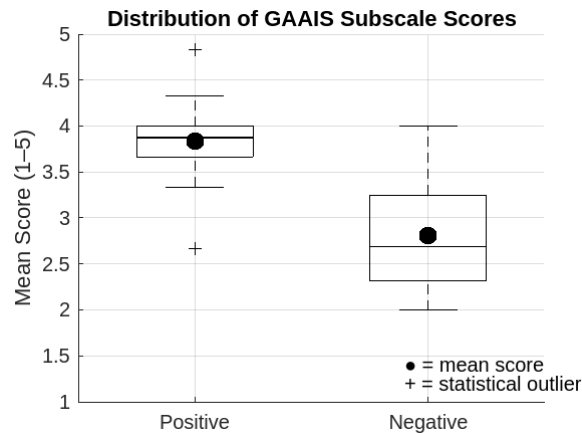


Fig. 8. Mean of GAAIS Subscale Scores (Scale Range: 1-5) (Higher scores indicate more favorable attitudes; higher Negative scores indicate greater tolerance for drawbacks).

7.2 Different levels of involvement in Gen AI's impact on social connectedness.

7.2.1 *High involvement leads to richer emotions.* Of the 24 participants, 20 indicated that the higher the level of parental information involvement, the stronger their sense of closeness to them. "Method 3 can give me a more accurate and true

understanding of my father's situation"(P10 M3). "Method 3 is the most intimate because it is based on the photos provided by my mother, and it is strongly correlated with participation and emotion" (P13 M3). "Because the photo my mom sent includes elements that are truly hers, this set of images gives me a strong sense of companionship. When I make my own plans, I find myself wanting to bring my parents along, to think about what they would enjoy—it feels much warmer"(P20 M3). "It was very recognizable. My mom loves cycling, and the floral dress is something she often wears... When a particular painting connected to my memories, it felt very clear—and quite intimate"(P11 M3).

Several participants noted that when the imagery contained elements tied to shared memories, it evoked a stronger sense of intimacy. "The version with an image makes me feel the closest. I often see my mom tending to flowers, and the flowers connect us, there's a real resonance. Method 1 is still quite abstract"(P16 M3). "Because I often go swimming with her as well, seeing the pool makes me feel even closer to my mom "(P17 M3). This represents a more solid sense of closeness and connection when the participant is able to recognise parental cues and shared memories in the generated images. Thus enhancing social connectedness.

7.2.2 Impact of low involvement and AI dominance. Except for a few participants, most of the participants said that Method 1 could not perceive their parents. "I didn't feel much, these pictures don't seem connected to my parents. They didn't move me, I couldn't sense any emotion, and they didn't spark my imagination, in my eyes they're just images"(P10 M1). "It feels like random audio data was used to generate something and labelled as my mom's. There's nothing concrete that represents my parents" (P3 M1).

Even with the addition of emotional prompts in Method 2, most participants still found the expressive power of the images limited. "The sunlight made me feel like it might correspond to her mood a little, but the change wasn't obvious" (P1 M2). "The sunshine helped a bit, but the whole thing still felt too AI-driven and failed to trigger any personal memories" (P3 M2). Overall, they felt that the AI dominated the generation process while parental involvement was minimal, resulting in a sense of disconnection. These results reveal a sense of AI-dominated detachment, with participants often feeling that it was the AI, rather than their parents, that was the dominant voice behind the pictures. As a result, the outputs appeared emotionally flat and overly AI-orientated. We interpret this as a decline in perceptual creativity: participants struggled to recognise meaningful cues or feel clones s when their parents' presence in the images was minimal or ambiguous.

7.2.3 High involvement doesn't always lead to a sense of closeness. Although most participants agreed that the intervention of pictures provided by parents strengthened the sense of connection, this was also related to the type of information. When the pictures were not strongly related to the parents or were beyond the scope of participants' interests, this sense of closeness was even reduced. "This image could have come from anyone and it doesn't reflect the uniqueness of my mom" (P2 M3). "The feeling of closeness will decrease and I am not interested in these things." (P5 M3). "I could really feel the emotion coming through—it was intense, almost oppressive and anxious. It didn't bring me closer to my mother, instead, I felt a little helpless... With Method 3 I hardly looked at the pictures, almost avoiding them because the feeling was too strong" (P15 M3). This suggests that active parental involvement alone does not guarantee a sense of closeness. Rather, the emotional tone and the alignment between the content and the child's expectations play a critical role.

7.3 The mediating role of AI-generated images in parent-child connection

7.3.1 The visuals felt disjointed, with an overly strong' AI feel. Some participants described the AI-generated images as disjointed or confusing and reported that these visuals failed to evoke emotional closeness. "There wasn't any strong

emotion. Some parts just didn't make much sense, and the AI-generated painting felt quite disjointed to me" (P18 M3). "I think the AI limits that closeness... the AI itself can make things feel a little bit alienating, especially when the sense of AI is strong, and some of the things that don't make sense have some cognitive cost to me" (P22 Summary). "My first impression was that it was too AI, not much else" (P3 M3). We suggest that this is a result of the AI presence being overly dominant, causing participants to focus on visual cut-offs rather than on emotional cues about their parents. As a result, their perception of parental presence became weak or secondary.

7.3.2 Meaning-making through information ambiguity in AI-generated images. When the images combined various elements, participants showed curiosity and rich imagination. "It feels very imaginative, and the combination of objects and background is interesting. It feels like our house has a window next to the scenery. My dad would be very happy if he lived there" (P14 M3). "The scene is very interesting and primitive, and it reminds me of my hometown. Maybe my mother didn't hike in the forest, but the image gives me a very interesting feeling" (P11 M3). This suggests that as the AI receives more information, the AI becomes more capable of interpreting itself and creates more interesting images, leading to more fun and curiosity.

Under methods with less parental input, several participants described engaging in personal interpretation or guesswork. "I can think of some of my mother's features, the style of Chinese painting, and the fact that I can write calligraphy myself, associated with my usual personal habits, the temperament is a good match" (P12 M1). "Loneliness, by interpreting the image more deeply, allowed me to imagine things on my own and from my own understanding" (P10 M2). "It might prompt me to imagine the environment my parents are in, leading me to make guesses, since everything is visually presented but without familiar elements" (P20 M1). In the condition with less parental information, participants made more positive and in-depth interpretations and associations based on the abstract paintings and minimal clues. We interpret this as a form of imaginative compensation: when personal data is scarce, participants fill the gap through self-guided meaning-making.

7.3.3 Parental contribution is valued over AI contribution. Most participants believed that parents' efforts were more important than AI. "The AI just added a certain style, but in this one, my mom's involvement felt stronger than the others, it really boosted my sense of immersion" (P13 M3). "Adding pictures is 90% of the point, the data content should be greater than the visual presentation" (P12 M3). "Although they didn't draw the image themselves, their contribution accounted for 80–90% of the content, it was largely led by them." (P11 M3).

Some participants felt that without sufficient parental input, the images lost their personal relevance and could have been generated for anyone. "AI can generate paintings like this on its own. For me, there's nothing particularly special about it—such images could be created from anyone's voice"(P19 M1). "Because the differences between the images weren't that noticeable, I couldn't really tell how much effort was put in. Having more of these images didn't make me feel much either" (P22 M1).

We interpreted these findings as a response to perceived parental contributions. Participants were more emotionally engaged when they were able to recognise the meaningful contributions their parents made to their work.

7.4 Observed Viewing Behavior and Overall Preferences

7.4.1 In site observations . In-situ observations revealed significant differences in participants' behavioral engagement across the three visualization methods. During Method 3 sessions, participants consistently spent more time viewing the images and returned to them more frequently than in Method 1 or 2. Many participants spontaneously expressed surprise or curiosity aloud, often asking reflective questions such as "Is that my mom's?" or "Did she choose this photo?"

Notably, image transitions in Method 3 frequently interrupted participants' task activity: as new visuals appeared, they would shift their attention away from the planning task and focus intently on the updated image. For example, some participants paused mid-task or leaned forward to look closer at the image, especially when new elements were shown. This consistent pattern of re-engagement was marked by repeated attention shifts and visible curiosity, especially when personalized visuals appeared. In contrast, Methods 1 and 2 elicited fewer spontaneous reactions and less sustained visual attention.

7.4.2 Comparison of the three methods: Subjective preferences and perceived emotional closeness. Participants generally associated higher levels of parental involvement with stronger feelings of emotional closeness. *"The visual impact brought by the method 3 picture is stronger, and it creates a portrait of my mother, so the impact is the strongest. Method 1 is very plain, without particularly detailed information and color. Method 2 has color and some emotional stimulation."* (P23 Summary). *"Method 3 gives me a more accurate understanding of the reality, while method 2 involves more imagination. Over time, this imagination has become quite fixed and mostly comes from my own head. Method 3 makes me feel closer to real life and my understanding of my parents is more accurate and real. Method 1 gives people a feeling of being difficult to understand, and AI accounts for too much"* (P10 Summary).

However, not all participants perceived this closeness equally. *"Method 1 is the closest, method 3 is the most distant, and the third one is more like what she wants to convey to me and has more impact on me. Method 3 is too strong for me, leaving me feeling a little overwhelmed and powerless"* (P15 Summary). *"Method 2 makes me feel more connected, color increases readability, and emotional transmission is clearer. About Method 3 my mother may be keen on some hobbies that I am not interested in, but I prefer emotional communication. Some things are not particularly important to me, and I don't particularly want to know them"* (P5 Summary). These findings highlight that when parental involvement was at its highest level, not all participants reported an increase in closeness, but the sense of connection remained, suggesting that feelings of connection and emotional closeness are not strictly binary and are not proportional to parental involvement.

8 Discussion

Overall, the findings suggest that more parental information involvement tends to strengthen social connectedness between young adults and their parents. When the generative art image incorporates emotionally meaningful contributions from the parent, for example, Parents' selfies, and shared memories with their children, participants can feel more connection compared to low parental information involvement in Gen AI. However, more involvement does not straightforwardly equal more closeness, combining qualitative and quantitative results, we identify additional factors that influence social connectedness and closeness. Closeness and social connectedness are not linearly related; fluctuations in the scale either up or down represent having a sense of connectedness. The following section discusses in detail the mechanisms of the sense of connectedness brought about by AI, the validity of high levels of involvement, and the complexities of social connectedness.

8.1 Mechanisms of Social Connectedness and Perceived Parental Involvement

Why does parental involvement enhance social connectedness in generative AI systems? Our analysis suggests two key mechanisms.

First, emotional resonance is strengthened when the AI-generated artifact incorporates personally meaningful cues from the parent—such as a familiar image, shared memory, or interesting. These elements turn a generative output into a form of mediated emotional communication. Similarly, our AI-generated paintings filled this gap by embedding a

parent's care and presence into visual form. As Bales et al.[3]showed with implicit mobile messaging systems, even non-verbal cues can foster a sense of "being in sync." In our context, a generative painting with parent input served a similar role: a symbolic cue of connection that the young adult could perceive and feel, even without real-time interaction. This emotional signalling is tightly linked to social connectedness. As Lee and Robbins theorized[27], feeling connected hinges on sensing that one is meaningfully linked with close others. By embedding meaningful cues from the parent, the AI artifacts likely tapped into the young adult's existing affectionate bonds, triggering feelings of support, connection, and belonging.

Second, the perceived authorship of the artwork plays a central role. When parents are actively involved in the creative process such as providing input or guiding the system. Young people often attribute part of the creation of their work to their parents rather than to the AI. This perception increases the artifact's social and emotional value. Previous work has documented a "human contribution preference" in creative domains: content perceived as co-authored by a person tends to be more favorably received[60]. In our study, knowing that "Mom helped make this" imbued the painting with intentionality and symbolic affection. This aligns with findings by Draxler et al.[15], who observed that higher user control in AI co-creation increases ownership and emotional attachment. From the observer's side (child viewing the parent's creation), the clarity of human input strengthened relational meaning. These results suggest that clarity of authorship and knowing whose emotional presence can transform AI output into powerful relational artefacts.

8.2 The Effectiveness of AI in Fostering a Sense of Connection

While greater parental involvement can support emotional closeness and a sense of connection, our findings also reveal that its effectiveness is conditional. High involvement does not always lead to stronger feelings of closeness and in some cases, it may even introduce emotional distance. Our findings reveal a subtle non-linear relationship: beyond a certain threshold, additional parental input brings diminishing returns—and in some cases, mixed or even negative effects. Factors such as negative emotional tones, content that the child finds unrelatable, or a sense of disjointedness in the AI-generated image can override the benefits of involvement and lead to emotional distance instead. When a parent's contribution feels emotionally sincere and contextually relevant, the sense of connection tends to increase. But when their input feels forced, abrupt, or lacking in personal meaning, participants often did not feel closer as a result.

In short, while high levels of parental involvement can often foster a sense of connection, it is the carefully considered and emotionally meaningful contributions that most effectively enhance social connectedness and deepen the feeling of closeness. Minimal or no input from parents may leave more room for interpretation and imagination; while this can result in a weaker connection, it can still offer a quiet sense of closeness through emotional distance. On the other hand, excessive or unfocused involvement can backfire, unless it carries clear emotional significance. The most resonant experiences emerged when the creativity of AI was enhanced by a parent's subtle personal touch, resulting in artwork that felt both interesting and relationally meaningful.

8.3 Interpreting Ambivalence Beyond Metrics: Rethinking the Measurement of Social Connectedness

While our quantitative data showed a decrease in IOS scores for some participants—even under conditions of high parental involvement—this does not necessarily indicate a weakening of social connectedness. Instead, our qualitative findings suggest a crucial distinction: a decline in reported closeness does not mean that the emotional or relational bond between parent and child has weakened. What it often reflects is the emotional complexity of the interaction, which single-dimensional instruments like the IOS scale fail to capture.

The IOS scale is designed to measure perceived interpersonal closeness at a given moment—how “merged” one feels with another person. However, social connectedness is not equivalent to closeness. It involves broader, subtler feelings such as being remembered, feeling emotionally noticed, or simply feeling a sense of connection with another person, even from afar [46][24]. This connection can remain intact even when closeness fluctuates. For instance, a participant may feel “less close” upon receiving an AI-generated image that includes a parent’s negative emotional tone or visual themes that the child finds irrelevant or uncomfortable. This reaction does not necessarily imply disconnection of social connectedness, it may instead reflect vulnerability, hesitation, or ambivalence triggered by emotionally charged content.

This interpretation also aligns with perspectives from HCI and design research, where discomfort is increasingly seen as a form of engagement rather than a failure[7] [43]. Scholars in reflective and critical design have shown that unsettling or ambiguous interactions can provoke introspection, emotional resonance, and even empathy[19]. Just as “uncomfortable interactions” in interactive art invite reflection[6], an AI-mediated message that provokes mixed or difficult feelings may deepen emotional engagement. The absence of a rise in IOS should therefore not be read as a lack of connection, but rather as evidence that connection may be taking place in more complicated, less measurable ways.

However, there is no widely adopted scale that specifically and independently measures social connectedness as distinct from closeness. This methodological gap makes it difficult to quantify these nuanced dynamics. Our findings suggest a need for new tools that can account for non-linear and emotionally complex forms of long-distance connection.

Overall, what appears as a neutral or even negative outcome in numeric metrics may conceal an emotionally rich and relationally meaningful experience. A more complete view of social connectedness acknowledges not only moments of emotional harmony but also the value of tension, reflection, and subtle presence. Designing and evaluating AI-mediated relationships requires tools and frameworks that can recognize these less visible, but also important, forms of emotional connection[7].

8.4 Design Implications

8.4.1 Enable meaningful personalization. Allow personal touches in AI-generated art to make each exchange uniquely meaningful. In our study, participants felt more connected when the content reflected their personal stories, shared memories, or individual preferences. By providing options to incorporate these elements, designs can help users create AI paintings that resonate with their unique relationships.

8.4.2 Enhancing the Interpretation of Gen AI. Participants would find it more interesting to see images that were more interesting and out of the ordinary during the experiment. This curiosity effect was not as strong when the images were similar to photographs. Appropriately increasing the AI’s ability to interpret and create unexpected images will stimulate their curiosity and interest.

8.4.3 Support for customization. The design should take into account the user’s level of involvement and emotional comfort. Users need more space to choose the modes they want to share so that they can comfortably engage in interactions or receive information on their own terms, without being too overwhelming.

8.4.4 Provide emotional and contextual cues. Embed cues that convey the emotion or context behind each AI-generated image. Participants indicated that too much abstraction increases their cognitive load a bit. Therefore, we suggest incorporating short annotations or familiar contextual references within the system to help recipients better interpret the meaning and emotional intent of the images. This design enhances the interpretability of the visuals while preserving their playfulness, making the communication more accessible and emotionally resonant.

8.5 Limitation and Future Work

A major limitation of our study is the lack of long-term field deployments. While we conducted the sessions in participants' homes to simulate a naturalistic environment, the study followed a controlled lab-style protocol with a relatively short duration. This approach allowed us to isolate the effects of parental information involvement and minimize confounding variables, but it also limited our ability to capture how social connectedness might evolve over time through repeated or sustained interactions with the generative AI system. As emotional resonance and feelings of closeness can fluctuate or deepen across longer periods, the short-term nature of our setup may have masked some of the more subtle or lasting impacts of AI-mediated co-creation. Future work should explore longitudinal field deployments to better understand how generative AI systems function within the rhythms of real-life parent-child relationships and to validate their long-term effectiveness in supporting emotional connection.

9 Conclusion

This study investigated that Gen AI systems can meaningfully mediate emotional expression and social connectedness in long-distance parents and their young adult relationships. By different levels of parental information involvement, we found that the main influencing factors such as personalized images or shared emotional context can foster a sense of closeness. However, high involvement does not always lead to a strong sense of closeness. Mismatched content or emotional overload may create discomfort, withdrawal, or ambivalence. But rather than understanding these moments as failures, we should have a more nuanced understanding of the relationship between closeness and connectedness in social connections. Our findings contribute to the growing discourse on human-AI co-creation and relational technologies. And point to new design directions for generative systems that support emotional bonds in closeness, and remote relationships. We proposed several design recommendations for future Gen AI systems to support social connectedness for long-distance relationships. Future work should explore longer-term deployments and adaptive personalization strategies to further sustain emotional resonance across time and context.

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A Visual Examples and Prompt



Fig. 9. Example Method 1

Prompt 1: A traditional Chinese ink painting in horizontal layout. Two birds fly gently across a distant, quiet horizon, lightly brushed in pale ink. The mountains are low and soft, outlined with dry strokes and shaded with gentle washes to create natural depth. Sparse, slender trees dot the hillsides, adding a calm, balanced feel. The water below has smooth, curving ripples with light reflections, showing gentle motion. The overall mood is peaceful and airy, with open space and a misty, tranquil atmosphere.



Fig. 10. Example Method 2

Prompt 2: The composition extends upward, with a flock of birds sweeping across the sky in an open V-formation—light, dynamic, and full of hope. The mountains remain low and gentle, but their lines flow with greater grace and vitality. Beams of slanting sunlight pierce through the valleys, casting soft, alternating patches of light and shadow on the sparse trees. Ripples on the lake shimmer under the sunlight, and the undulating water conveys a sense of energy. Overall, the brushstrokes are light and airy, with increased use of blank space. The ink tones are soft and translucent, and the edges are gently rendered, forming an ink-wash scene filled with warmth and vitality.



Fig. 11. Example Method 3

Prompt 3: Above the sky, more than ten birds soar through the clouds, their wings cutting across the distant heights, forming the dynamic core of the composition. The mountain outlines are simple, with overlapping depths, rendered

only with medium ink strokes to suggest their forms. Sparse trees are gently brushed in light ink, maintaining overall balance. The water surface rolls in layered waves—flowing yet calm—with ink lines swirling in rhythmic motion. At the bottom of the painting, a minimalist platform hosts a woman seated on a stone, her gaze peaceful as she looks toward the faint image of a smiling child. The composition is clean and refined, with a serene atmosphere throughout—like a still moment of longing gently preserved in ink.

B Survey for Study 1

Questionnaire question: Please rate the level of human involvement you feel in this image. The scale ranges from 1 to 7: (higher scores indicate a higher level of human involvement, lower scores indicate a lower level of human involvement).



Fig. 12. Questionnaire question 1



Fig. 13. Questionnaire question 2



Fig. 14. Questionnaire question 3

C Study 2: Interview Questions for Each Method

- (1) What was your first impression when you saw these paintings? Did they remind you of your parents or evoke any particular emotions?
- (2) To what extent did this image make you feel closer to your parents? What aspects contributed to that feeling—or made it feel absent?
- (3) Compared to the usual ways you and your parents communicate, did this AI-generated painting feel more or less emotionally powerful? Why?
- (4) How much of a role do you think your parents played in the creation of this image? Why do you feel that way?
- (5) Did your parents' involvement in this way meet your expectations or emotional needs? Do you think their level of participation matters? Why or why not?
- (6) Were there any parts of the image you found particularly interesting, emotionally touching, or thought-provoking? What kinds of associations did they evoke? Conversely, were there parts you found unimportant or emotionally flat? Why?

D Summary Interview Questions for Study 2

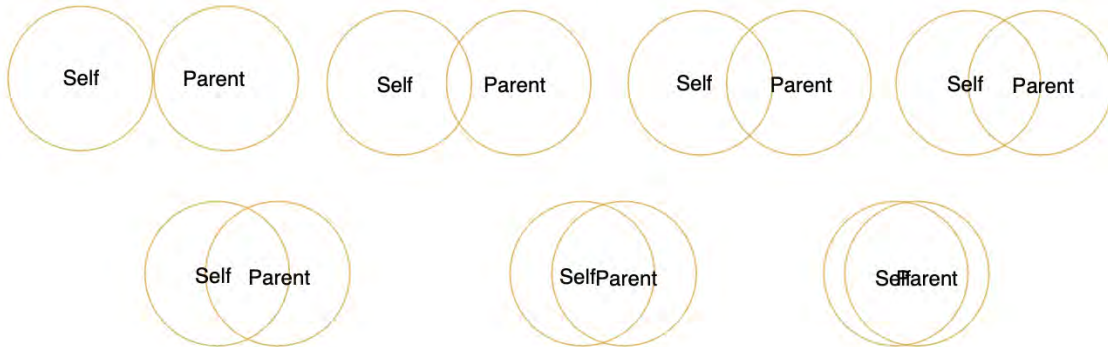
- (1) Among the three generation modes, which one made you feel closest to your parents? Why? In contrast, which one felt the most distant? What made it feel that way?
- (2) The three generation modes involved your parents to different degrees (from providing only audio, to adding emotional prompts, to including photos). How did these different levels of involvement affect your emotional experience and your sense of connection with them? Would you prefer more or less involvement in the future?
- (3) What features or methods would you like this system to include in the future to better support emotional connection between you and your parents?

E Survey for Study 2

F ERB Approve

Condition One

Instructions :Please circle the picture below that best describes your relationship between you and your parents (pre - testing)



Instructions :Please circle the picture below that best describes your relationship between you and your parents (post - testing)

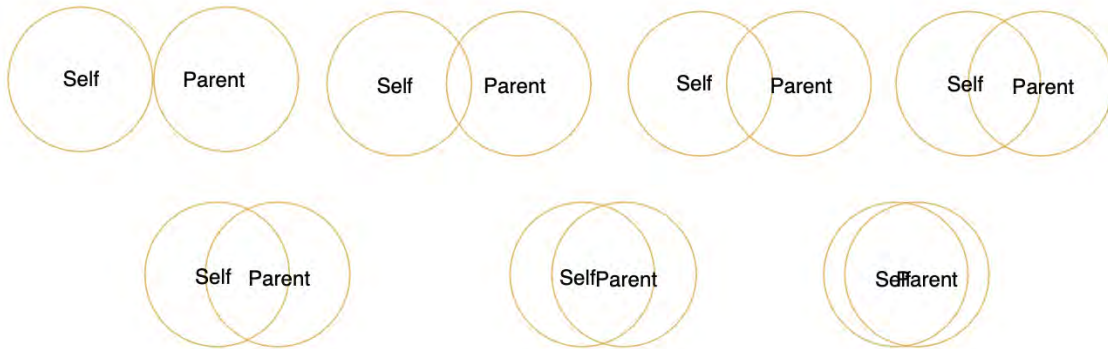


Fig. 15. IOS Scale

List of items:

The item order has been randomised so that the scale is ready for use.

Subscale (not for display)	Number (not for display)	Item
Positive	P1	For routine transactions, I would rather interact with an artificially intelligent system than with a human.
Positive	P2	Artificial Intelligence can provide new economic opportunities for this country.
Negative	N3	Organisations use Artificial Intelligence unethically.
Positive	P4	Artificially intelligent systems can help people feel happier.
Positive	P5	I am impressed by what Artificial Intelligence can do.
Negative	N6	I think artificially intelligent systems make many errors.
Positive	P7	I am interested in using artificially intelligent systems in my daily life.
Negative	N8	I find Artificial Intelligence sinister.
Negative	N9	Artificial Intelligence might take control of people.
Negative	N10	I think Artificial Intelligence is dangerous.
Positive	P11	Artificial Intelligence can have positive impacts on people's wellbeing.
Positive	P12	Artificial Intelligence is exciting.
Positive	P13	An artificially intelligent agent would be better than an employee in many routine jobs.
Positive	P14	There are many beneficial applications of Artificial Intelligence.
Negative	N15	I shiver with discomfort when I think about future uses of Artificial Intelligence.
Positive	P16	Artificially intelligent systems can perform better than humans.
Positive	P17	Much of society will benefit from a future full of Artificial Intelligence
Positive	P18	I would like to use Artificial Intelligence in my own job.
Negative	N19	People like me will suffer if Artificial Intelligence is used more and more.
Negative	N20	Artificial Intelligence is used to spy on people

Fig. 16. GAAIS

Dear Chenwei,

Your application (ERB2024ID586) has been approved by the ERB.

We assume that you have answered all questions correctly. We will perform regular spot-checks so you need to keep your documentation (ERB form, informed consent forms, surveys/interview questions, description of experiment/prototype etc.) available for at least 6 months.

Good luck with your research and have a nice day!

With kind regards,
Maartje Mulder

Fig. 17. ERB