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LumaDreams: Designing Positive Dream Meaning-Making for Daily Empowerment

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Open Access Support provided by:

Southeast University

Southern University of Science and Technology

The Australian National University

Published: 26 April 2025

CHI 2025: CHI Conference on Human Factors in Computing Systems
April 26 - May 1, 2025
Yokohama, Japan

Conference Sponsors:
SIGCHI

https://doi.org/10.1145/3706598.3713495
ISBN: 9798400713941

LumaDreams: Designing Positive Dream Meaning-Making for Daily Empowerment

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Figure 1: *LumaDreams* is an AI-driven mobile application that supports dream journaling, visualization, transformation, and reflection for daily empowerment. (a) The user journals a dream using sketches and textual descriptions in *LumaDreams*. (b) The application visualizes the original dream and transforms it into a warmer, more positive, and healing version. (c) The user revisits and reflects on the transformed empowering dream.

Abstract

Dreams contribute to cognitive and emotional health, yet tools for everyday dream engagement remain largely underexplored outside clinical settings. In this paper, we introduce *LumaDreams*, a mobile application designed to foster daily empowerment through positive dream transformation using generative AI. Informed by meaning-making theories, *LumaDreams* enables users to journal dreams through sketches and text, which are then transformed into positive images and stories for users to revisit and reflect on. We conducted a mixed-method study with 14 participants over 14 days. Our findings show that *LumaDreams* strengthened participants' daily empowerment through cognitive and emotional shifts that arise from the positive meaning-making process. Qualitative insights further revealed how users' perceptions and trust of AI-driven dream transformation were shaped through their interactions. In conclusion, we propose an inspiring approach that enables users to co-create positive meanings in dream experiences with generative AI, promoting cognitive and emotional shifts, fostering positive mindsets, and ultimately strengthening daily empowerment.

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CHI '25, Yokohama, Japan

ACM ISBN 979-8-4007-1394-1/25/04
https://doi.org/10.1145/3706598.3713495

CCS Concepts

• **Human-centered computing** → **Interaction Design**.

Keywords

Dream, Empowerment, Meaning-making, Generative AI, Well-being

ACM Reference Format:
Bolin Lyu, Zhuying Li, Pengcheng An, and Josh Andres. 2025. LumaDreams: Designing Positive Dream Meaning-Making for Daily Empowerment. In *CHI Conference on Human Factors in Computing Systems (CHI '25), April*

26–May 01, 2025, Yokohama, Japan. ACM, New York, NY, USA, 20 pages. https://doi.org/10.1145/3706598.3713495

1 Introduction

We spend nearly one-third of our average lifetime — around 25 years — sleeping, with about a quarter of that time occupied by dreams [15], which are strongly associated with our physical [41] and mental health [68]. Specifically, dreams profoundly influence self-consciousness [103], cognitive and emotional states [18], and general well-being [25]. Recognizing these impacts, the HCI community has increasingly focused on designing experiences that facilitate better understanding and engagement with dreams. Recent advances include sensory technologies that monitor and influence dreams to improve cognitive abilities [2, 28, 42]. However, many of these technologies subtly affect users' subconscious during sleep, often without their awareness, raising concerns about potentially undermining user agency and unintentionally influencing their subconscious. Other works support dream journaling or re-experiencing to foster self-understanding and personal growth [55, 101]. However, these systems remain primarily passive, providing limited opportunities for users to actively engage with their dreams, positioning them as interpreters or observers rather than active participants in their subconscious experiences.

We see a design opportunity for bidirectional dream engagement, enabling users to not only capture their dreams but also actively co-create their dreamscapes. Precedents such as guided imagery and image rehearsal therapy (IRT) illustrate the potential of dream interventions, where therapists help patients modify nightmare narratives to alleviate emotional distress and prevent recurrence [46, 57]. However, these practices are narrowly confined to therapeutic settings and do not fully utilize the interactive potential of HCI. Building on this, we propose extending this approach into a broader framework that fosters daily empowerment through positive dream meaning-making [54, 70]. Throughout the study, we took a pragmatic approach to empowerment, referring it as enabling users to take meaningful actions, make informed decisions, and achieve goals efficiently and effectively [14]. By incorporating techniques that enable users to interactively reshape their dream narratives, we seek to promote cognitive and emotional shifts, foster positive mindsets, and finally empower individuals in their daily lives.

In this paper, we introduce *LumaDreams* (Figure 1), an innovative mobile application that supports active dream engagements. *LumaDreams* enables users to journal dreams through sketches and textual descriptions, which are then visualized as detailed and vivid images. Subsequently, these visualizations are transformed into positive, healing, and empowering scenes, accompanied by text-based stories. This bidirectional interaction enables users to actively engage with their dreamscapes and co-create positive meanings using generative AI, establishing a new pathway to daily empowerment through cognitive and emotional shifts arising from the positive meaning-making process. We conducted a mixed-method study with fourteen participants using *LumaDreams* over fourteen days to evaluate the user experience. Our study revealed that *LumaDreams* promoted participants' emotional and cognitive shifts and ultimately strengthened their daily empowerment, as evidenced by related quantitative metrics and qualitative interview results. Participants also shared their experiences and insights on their perceptions and trust in AI-driven dream transformation throughout the interaction.

Our work makes the following contributions. First, we designed and developed *LumaDreams*, a mobile application that facilitates dream meaning-making experience through visually enhanced and positively transformed dreamscapes, providing users with an accessible and empowering way to engage with their dreams. Second, we presented empirical results demonstrating the system's effectiveness in fostering daily empowerment through cognitive and emotional shifts and the positive mindsets emerged from the positive dream meaning-making process, along with an analysis of the associated user experience. Third, we proposed a novel approach that treats dreams as an active experience where users can engage and co-create, rather than merely influencing the subconscious during unconscious states. We adopted a responsible approach that encourages users to consciously explore and reshape their dreamscapes using carefully fine-tuned and restrictively prompted generative AI, promoting cognitive and emotional shifts, fostering positive mindsets, and ultimately promoting daily self-empowerment.

2 Related Work

In this section, we explore prior dream engineering studies in HCI. We review dream interpretation and sense-making practices within sociocultural contexts, connecting these to the meaning-making process that fosters positive cognitive and emotional shifts, and explain how our work aims to address the current research gap.

2.1 Dream Engineering in HCI

Building on Freud's theory [24] that dreams reflect the unconscious mind and unconscious wish fulfillment; Jung's idea [39] that dreams mirror unconscious desires from waking life; and Schredl's view [86] that dreams can influence waking life and that altering dream content can have positive effects, modern dream engineering leverages technology to improve sleep quality, memory consolidation, emotional regulation, creativity, and motor learning [12]. Dream engineering techniques are categorized by timing into *pre-sleep*, *within-sleep*, and *post-sleep* manipulations. *Pre-sleep* engineering includes routines, exposure to stimuli, or rehearsal therapies. For example, Goodenough et al. [26] found that watching stressful films before sleep increases negative dream content, while Saredi et al. [84] showed that thinking about current issues increases related dreams. *Within-sleep* manipulations directly alter dream content using methods such as water spraying [17], pressure cuffs [65], or electrical pulses [43] to enhance vividness and physical sensations. EEG monitoring is commonly used in this context. For example, Esfahani et al. [22] developed *Dreamento* for sleep EEG wearables to induce lucid dreams. *Post-sleep* methods focus on dream recall, recording, and review, often through dream journals that help link dreams to waking life [73], improve emotional awareness [96], and foster self-understanding [21]. This is supported by an HCI study on personal dream informatics, which demonstrates that dream tracking and journaling can be effectively leveraged through various technological means to provide diagnostic and other forms of dream work support [34]. Traditional textual dream journals

capture emotions, actions, and scenes [59, 87], while mobile applications like *My Daily Dream* and *Dream Pad Pro* extend beyond text, offering diary-like interfaces with text, audio, and speech-to-text features [35].

For long-lasting and consistent results, recent work often combines different manipulation stages. For example, Targeted Memory Reactivation (TMR) pairs a sensory stimulus with a *pre-sleep* learning task, reintroduced *within-sleep* to trigger memory reactivation [51]. Similarly, dream imagery rehearsal involves therapists modifying *post-sleep* dream records and guiding dreamers to use *pre-sleep* techniques to create new dreams with positive endings [46, 57]. Although many dream engineering interventions have been applied in psychotherapy, there is increasing interest in utilizing similar techniques for cognitive and emotional enhancement. Recent HCI studies illustrate this potential. For example, Liu et al. [55] developed a virtual reality flying experience that supports self-transcendence and empowerment. Despite these advancements, more research is needed to transform everyday dreamscapes more effectively for positive impacts. This requires a deeper exploration of how dreams can be actively interpreted and modified to enhance daily empowerment. Our work, *LumaDreams*, addresses this gap by focusing on strengthening users' daily empowerment through cognitive and emotional effects from positive dreamscape transformations.

Additionally, inspired by Ranjan and Panda's work [79], which used generative adversarial networks (GAN) to generate images for guided imagery, our work incorporates generative AI (GenAI) technologies to interpret and transform dream meanings. This approach fosters a more accessible, convenient and intuitive dream engagement, supporting user engagement through a unique Human-AI meaning-making experience [4, 5].

2.2 Dream Interpretation and Positive Dream Meaning-Making

Dreams and their interpretations have been subjects of religious, philosophical, and scientific interest throughout recorded history [80]. Ancient civilizations sought senses in dreams to gain deeper self-understanding or even to predict future events. The Sumerians documented the prophetic nature of dreams, with accounts dating back to at least 3100 BC in Mesopotamia [94]. *Zhou Gong's Dream Dictionary*, authored by *The Duke of Zhou* in ancient China, provides interpretations for seven types of human dreams [104]. Although lacking scientific rigor, these practices still underscore a universal human tendency to interpret and make meanings out of dreams.

Meaning is a complicated word. It may refer to artifacts or occurrences, experiences, or interpretations based on Mekler and Hornbæk's [60] framework. In particular, semiotics in HCI focuses on using meaning as a non-modifying term to indicate a general sense of purpose or significance [16]. This aligns with the concept of "meaning" in "meaning-making", which refers to the interpretations or personal significance that individuals extract from experiences. Meaning-making, therefore, focuses on how individuals construe, understand, or make sense of life events, relationships, and their own identity [36]. The HCI community regards meaning-making as a process that shapes users' emotional connections, restores stable understandings of the world, and fosters a deeper understanding of their experiences [40, 60]. Several studies support this, including the intelligent mirror designed by Rajcic et al. [78], which encourages users to derive meaning from their emotional states, fostering self-awareness and reflection.

As dreams provide a unique context for exploring the subconscious mind and internal experiences [24], the meaning extracted from a dream can contain dream elements, scenes, emotions, or feelings that were experienced during the dream or even after the dream when revisiting [56]. A dream meaning-making process centers on how dreamers assign value, interpret, or intentionally alter these dream meanings. According to Schredl's theory [86], which suggests that altering dream content can positively influence waking life, dream meaning-making offers dreamers a sense of control and a unique opportunity to engage with and reflect on internal experiences, leading to cognitive and emotional shifts, improved self-understanding, and psychological well-being [52, 70, 98]. For instance, Wan et al. [101] introduced *Metamorpheus*, an affective interface that engages users in creative visual storytelling of emotional experiences during dreams, enabling users to reinterpret and shape their affective dream associations, fostering a sense of mindfulness and connectedness. LeFevre and Chung's [49] study on the digital game *GRIS* suggests that positive narratives can influence participant reflections, guiding them toward bereavement meaning-making and producing beneficial outcomes. However, while these practices effectively engage users, the underlying meaning-making process lacks positive guidance, which can result in unclear or even negative meanings, potentially leading to unsatisfactory experiences. This reveals a new design opportunity to engage users in constructing positive dream meanings, thereby fostering daily empowerment.

Contemporary neurophysiological and psychological studies have highlighted the benefits of recalling and interpreting dreams [32, 81]. Notably, modern dream interpretation theories are influenced by social and cultural norms, as the interpretation and its significance vary widely across different sociocultural landscapes [53]. Freud's psychoanalytic theory [24] suggests that dream content is symbolic, requiring interpretation through an understanding of latent and manifest content. For example, dreaming of water or deceased family members often represents emotions or subconscious thoughts, but specific meanings can vary between cultures. In eastern societies, water can symbolize spiritual renewal, while in western traditions it can signify suppressed emotions. In contrast, Jung's theory of the collective unconscious [39] provides another perspective, proposing that certain dream symbols or archetypes such as "hero" or "shadow", are universal across cultures. The Jungian perspective on dreams further posited that these archetypes are universal motifs that appear in dreams and myths, stored within the collective unconscious. They transcend cultural boundaries and represent shared human experiences and emotions [100]. These theories enable the analysis of shared human experiences and universal psychological patterns through dream symbols, highlighting the commonalities of the human mind and spirit. This understanding presents design opportunities to create innovative interactions that utilize interpreted dream senses to foster positive and emotive impacts on individuals.

Based on the Jungian perspective, the focus of positive dream meaning-making is on identifying and constructing positive meanings, with multiple theories providing valuable insights to support

this process. Seligman and Csikszentmihalyi's [93] positive psychology and the PERMA model [92] emphasize elements contributing to a flourishing life, focusing on positive emotions, engagement, relationships, meaning, and accomplishment. This suggests that a dream "meaning" can be considered universally positive if it evokes emotions and themes associated with well-being, such as joy, hope, gratitude, love and contentment. Building on this, dream meanings can be analyzed from a semantic perspective by assessing their potential emotional impact [29]. For instance, smiling faces, natural landscapes, or harmonious compositions often evoke positive emotions, while sharp angles, broken structures, or chaotic layouts may convey negative emotions. The physiology of emotion [64] and evolutionary psychology [1] offer valuable insight, suggesting that emotional responses to specific scenes and elements may be rooted in physiological structures and ancestral survival needs. For example, soft and natural scenes might evoke feelings of relaxation and pleasure, while scenes that convey pressure could trigger anxiety or fear. Bright, sunny scenes are often associated with safety and comfort, whereas dark, eerie scenes may be linked to danger or threats. These theories are essential in determining and building positive dream meanings that resonate across different cultures.

Notably, clinical practices have already utilized positive dream meaning-making process for treating chronic nightmares, such as Image Rehearsal Therapy (IRT) [46] and Guided Imagery [57]. These practices encourage patients to visualize positive scenarios and reinterpret negative dream experiences constructively, resulting in enhanced relaxation, increased senses of control, and reduction in nightmares [6, 45]. However, these techniques are limited to therapeutic settings, require experienced therapists, and lack active user engagement. As imagining positive outcomes fosters resilience and a sense of agency over dreams and their emotional impact [50], positive dream meaning-making can be extended beyond therapy for broader benefits. Our work addresses this gap by offering a positive dream meaning-making process by creating, investigating, transforming, and reflecting on dream meanings to promote emotional and cognitive shifts, foster positive mindsets, and ultimately strengthen daily empowerment for all users.

3 LumaDreams

LumaDreams is an innovative mobile application that leverages multiple machine learning models to enable users to journal, visualize, transform, and reflect on their dreams. Its core function is to interpret and visualize the user's dream input — captured through sketches and text — and to use AI to transform these dreams, creating a positive meaning-making experience. *LumaDreams* identifies elements to enhance and transforms dreamscapes into positive and healing scenes, promoting users' cognitive and emotional shifts, fostering positive mindsets, and ultimately strengthening daily empowerment. *LumaDreams* employs cloud-based models and features a mobile front-end for an accessible, convenient, and intuitive user experience.

3.1 Design Considerations

The primary goal of *LumaDreams* is to strengthen the daily empowerment of users by capturing, identifying, and transforming dream meanings into positive ones. To design a positive meaning-making experience, we based our design primarily on Mekler and Hornbæk's understanding of meaning [60], and Park's meaning-making model [71]. We consider the meanings extracted from the original dreams of users as situational meanings (*i.e.*, the meaning of specific events) according to Park's model. In contrast, positive dream meanings, which transcend cultural boundaries and represent shared human experiences and emotions according to the Jungian perspective [100], are considered global meanings. These considerations refine the steps of positive dream meaning-making into a structured process that bridges situational meanings and global meanings within the dream state, which facilitates psychological balance and restoration, ultimately strengthening empowerment through revisits and reflections on positive meanings [69, 72]. Based on Park's model, this structured process can be outlined as capturing situational meanings, investigating situational meanings, creating positive meanings, and reflecting on these meanings. This progression was ultimately distilled into the following design questions that guided the design of *LumaDreams*, incorporating responsible consideration and careful limitation of generative AI technologies.

DQ1. How can we effectively capture and extract users' dream meanings?
DQ2. How can we identify situational meanings to be transformed?
DQ3. How can we ensure the meanings are transformed into positive and empowering ones?
DQ4. How can we integrate these positive meanings into the daily lives of users?

A discussion session was held among the authors to address these design questions, resulting in the following design goals. For **DQ1**, we drew inspiration from Hofer et al.'s work on dream informatics [34], which highlighted the importance of easily gathering key dream content during the dreamset and facilitating multi-modal dream recording to capture indescribable experiences. This served as a foundation for our multi-modal approach in capturing and presenting dream elements. Since most people recall dreams visually [33, 56], and images are often more intuitive and expressive than text [67], we prioritized user sketches of their dreamscapes as the centerpiece of our dream journaling experience. To accommodate varying drawing skills and the need for text to complement sketches — especially for describing personalized aspects such as scene, emotion, context, and cultural elements — we incorporated the traditional textual dream journal design [59] by providing three types of text fields: narrative elements (capturing time, location, characters, and events), dream scenes (describing key scenes), and free-form text (for users to comment freely, especially on personal feelings, contexts and backgrounds). To accurately interpret user sketches, we fine-tuned the image-to-text model using the Quick, Draw! Dataset [23], aligning it with the sketch function provided in the application. We then integrated image captions and textual descriptions for a text model to extract meanings and identify the meanings to be transformed. The text model was fine-tuned using a large number of dream elements and scenes from the DreamBank dataset [19], pre-processed into positive-negative pairs. Balancing the discussion above, the dream journal design should center on user sketches while integrating textual descriptions for additional

clarity and personalized context, with machine learning models effectively and accurately extracting meanings from these inputs (**DG1**).

For **DQ2**, considering Park's meaning-making model and related studies, which suggest that bridging situational meanings (original dream meanings) and global meanings (transformed positive meanings) can facilitate psychological balance and restoration [60, 69, 71], the machine learning model must be designed to efficiently and precisely identify meanings that deviate from global meanings (*i.e.*, meanings to be transformed) (**DG2**). The prompt words used for the a model to identify these meanings includes a context of knowledge aligned with the Jungian dream perspective and related psychological theories (see Section 2.2) to identify meanings that transcend cultural boundaries and represent shared human experiences and emotions, supplemented with specific examples to support reasoning. The effectiveness of the model was ultimately confirmed by extensive testing and evaluation.

For **DQ3**, we recognize that the application should generate meanings that align with the original dream meanings while guiding them toward positive, warm, and healing transformations (**DG3**), as this is central to the positive meaning-making process. Given the potential for algorithmic and cultural biases [38, 75, 76], we carefully restricted the output capabilities of the models within the prompt design, embedding an understanding of the theoretical foundations described above, avoiding controversial or cross-culturally divergent meanings (unless explicitly provided by the user in textual descriptions), and ensuring introspection and correction in the generated meanings through a post-processing module. Broad tests and evaluations within the researchers confirmed that the models consistently generated positive meanings and supported cognitive and emotional well-being, with no unpleasant or disturbing scenarios.

For **DQ4**, inspired by clinical positive dream meaning-making practices such as Guided Imagery and Image Rehearsal Therapy (IRT) [46, 57], the application should provide users with positive meanings that can be reinforced through daily reflections (**DG4**). Various design details in *LumaDreams* embody positive allusions to transformed positive meanings, encouraging users to revisit and reflect on their dreams. For instance, we included visual animations and sound effects of glass-breaking, symbolizing the removal of old, negative meanings to make way for positive, healing ones. These cues act as positive psychological triggers, encouraging users to embrace the transformations. Creative, meaningful stories inspired by GenAI storytelling practices [99] were also incorporated into transformed dreamscapes. Additionally, *LumaDreams* enables users to browse, search, and revisit dreamscapes, facilitating ongoing reflection and daily empowerment.

3.2 User Interface and Interaction Flow

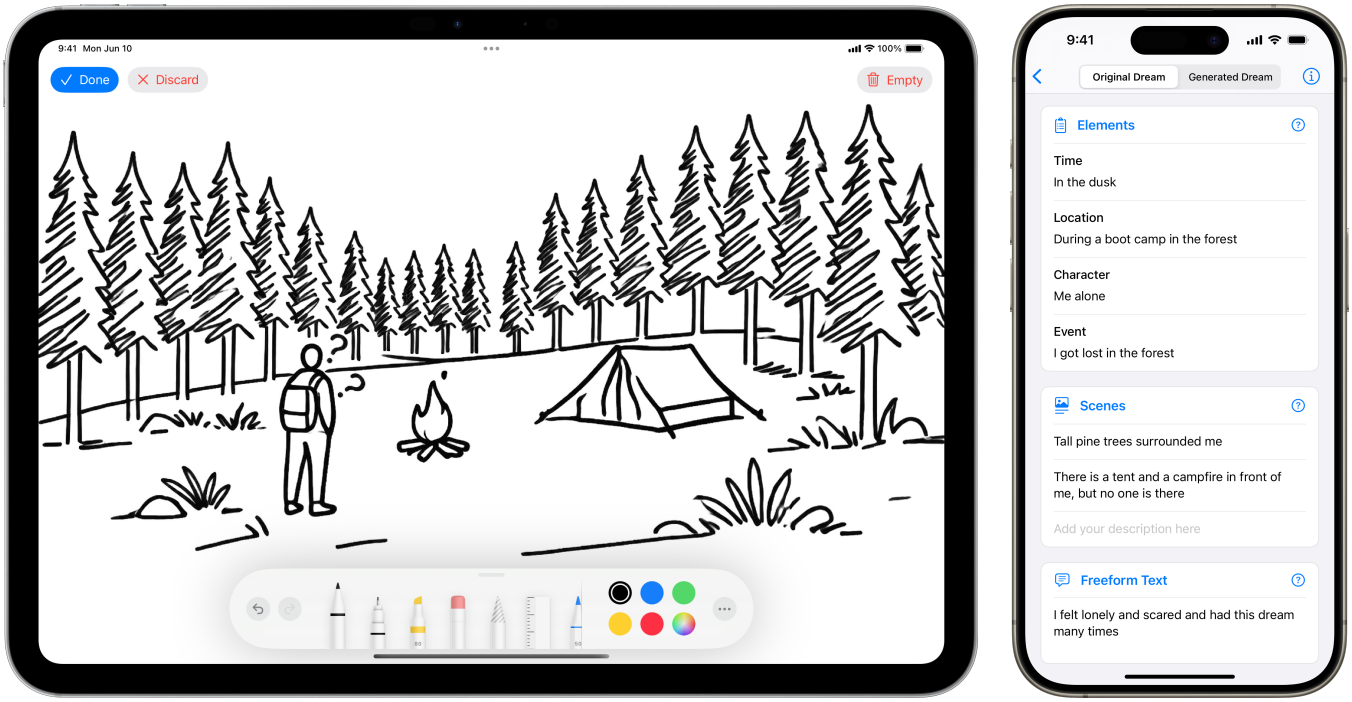
In this section, we present the interface design and interaction flow of *LumaDreams*, demonstrated through a usage scenario. The user interface is designed to be compatible and consistent across tablets and mobile phones. Tablets were used in this study to provide an optimal sketching experience.

3.2.1 Journal the Dream. If a user dreams of getting lost in a forest in a boot camp, they start by adding a new dream journal to the browser interface (Figure 4b). They then sketch the dreamscape on the canvas (Figure 2a) and provide descriptions in the corresponding text fields (Figure 2b). Users can scroll through the interface to view sketches and descriptions side by side, allowing them to decide the level of detail in their drawings and the number of text fields to fill in. Since dreams are often connected to life events, personal experience, religious beliefs, and cultural backgrounds [83, 88], the "Freeform Text" field is designed to allow users to freely express relevant content, enabling machine learning models to better understand diverse contexts and backgrounds. This design, aligned with **DG1**, provides users with flexibility in journaling their dreams while offering subtle guidance through a multi-modal approach.

3.2.2 Transform the Dream. After journaling the dream, users can tap "Generate" to reveal dreamscape visualizations. The machine learning models identify key elements and their approximate positions from the sketch, extract details such as time (*e.g.*, dusk) and emotions (*e.g.*, loneliness and fear) from the text descriptions, and create a tense atmosphere based on these cues (Figure 3a). This reflects effective dream meaning extraction required by **DG1**. *LumaDreams* then identifies meanings to be transformed, such as the lost person and feelings of loneliness, and generates a transformed scene that is warmer and more positive. By repeatedly tapping the visualization, accompanied by visual animations and sound effects that simulate glass breaking (Figure 3b), the user gradually reveals the transformed dreamscape. In this example, GenAI introduces a companion and adjusts the lighting to reduce tension, creating a more comforting scene (Figure 3c), aligning with **DG2** and **DG3**. This approach preserves the original dream fidelity while subtly making positive dream meanings. If users are dissatisfied with the transformation, they can tap "Discard," adjust their sketches and descriptions, and repeat the process. This process ensures accurate interpretation and personalized, positive transformation, as required by **DG2** and **DG3**, while helping to maintain a sense of control and active engagement.

3.2.3 Review and Revisit the Dream. Below the transformed dream scene, the user is presented with a short story related to the transformation, supporting their understanding and reflection on the positive meaning-making process (Figure 4a). In line with **DG3**, we ensure the stories are creative and positive, using carefully designed prompts and positive guidance. In this example, the generated story reads:

> "In a dense, twilight forest, a lone camper found herself lost and anxious. She had ventured into the woods as part of a boot camp... The towering trees cast long, eerie shadows, making her feel isolated... She felt the weight of loneliness pressing in... Suddenly, she noticed a faint, warm glow in the distance... As the light drew nearer, she saw the silhouette of a person. Her heart skipped a beat, torn between hope and fear. But as the figure came into view, she recognized a friendly face smiling at her, waving warmly... The camper's friend approached, bringing a sense of calm and reassurance... They



(a) (b)

Figure 2: The (a) canvas and (b) text fields for users to journal dreams.

(a) (b) (c)

Figure 3: These images represent the visual animation during the dreamscape transformation. Image (a) shows the initial dream visualization. Image (b) shows the transition, where the user taps the screen, triggering a glass-breaking animation (with sound effects). This reveals image (c), the transformed scene, presenting a positive, warmer, and more healing version of the initial visualization.

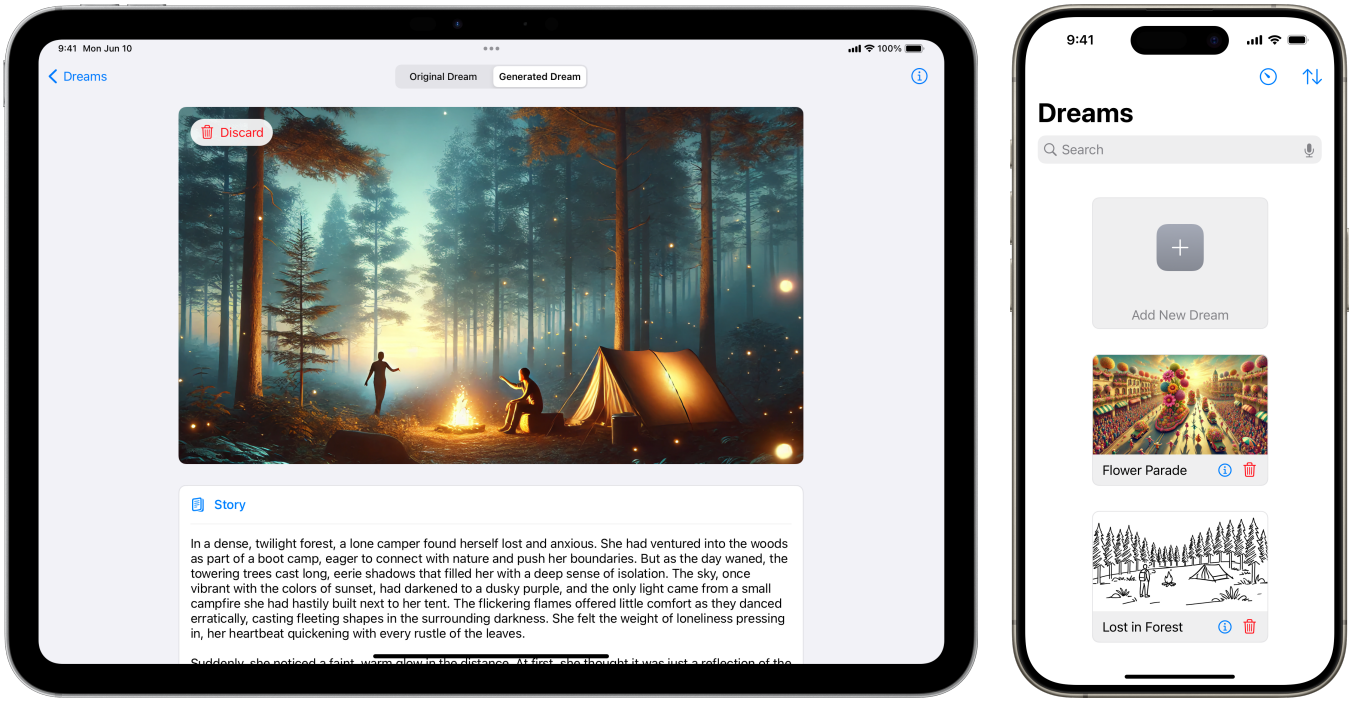
> sat together, watching as fireflies lit up the forest, creating a magical and peaceful atmosphere. The forest no longer felt threatening but like a safe cocoon... The camper, once lonely and fearful, now felt at peace, comforted by the presence of friendship and the beauty of the night."

We designed a journal browser to help users manage, revisit and reflect on their dreams (Figure 4b). The browser organizes all journals, including in-progress and completed ones, and allows users to customize the order for easy review. To align with **DG4**, we incorporated positive design cues into the reflection process. For example, when users revisit a journal, the transformed dreamscape is displayed by default, with the original visualization blurred to prevent exposure to potentially negative content or emotions.

3.3 Implementation

The front-end of *LumaDreams* is a Cocoa Touch application developed in Swift using Xcode. The back-end integrates several machine learning models, as listed below:

M1. An image-to-text model for a) captioning users' sketches and b) generating stories.



(a) (b)

Figure 4: The (a) transformed dreamscape with a related story and (b) dream journal browser interface.

M2. A text model that a) integrates sketch captions and textual descriptions to extract original meanings, and b) modifies and organizes text for smooth, precise and detailed outputs.

M3. A text model for composing image generation prompts for dreamscape a) visualizations and b) transformations based on its identification and modification of the meanings to be transformed. Different input prompts were applied to the trained model for these purposes.

M4. A text-to-image model for generating dreamscape visualizations and transformations.

For **M1**, we fine-tuned the Contrastive Language–Image Pre-training (CLIP) model [77] on existing checkpoints using the Quick, Draw! Dataset [23] to enhance the accuracy of sketch recognition. We carefully constrain the plot completeness and narrative style in the prompts used to generate stories from the transformed images, ensuring the positivity of the stories through model introspection.

For **M2**, we opted to fine-tune a GPT-3.5 Turbo model using OpenAI's platform to optimize the interpretation and transformation of dream meanings, as the most advanced text model does not support fine-tuning. Dream scene descriptions from the DreamBank database [19] were pre-processed and organized into positive-negative pairs based on the similarity of elements and scenes for the fine-tuning process to support better extraction of dream meanings.

Inspired by prompt engineering techniques for large models [102], we employed the GPT-4o mini model [37] with a customized personality to generate smooth, organized, and detailed textual outputs as **M3**. **M3** is designed with an understanding of the theoretical foundations described above, avoiding controversial or cross-culturally divergent meanings (unless the user explicitly provides cultural context and diversity background in textual descriptions). A post-processing introspection module was incorporated into **M3** to discard unsatisfactory meanings and regenerate improved ones. In our implementation, **M2** and **M3** were encapsulated into an end-to-end framework accessible via a unified API to support seamless text-to-text conversions.

For **M4**, we employed DALL-E 3 [8], an advanced text-to-image model capable of generating detailed and creative images from text descriptions, ensuring high quality and creativity in the production of dream scenes. Acknowledging the algorithmic and cultural biases inherent in text-to-image models [38, 62, 75, 76], we employ carefully designed prompts to neutralize diversity generation, minimize reliance on model assumptions, and avoid content that is explicitly culturally or geographically specific unless explicitly requested by the user. Furthermore, a similar post-processing introspection module was also incorporated, which uses bias detection algorithms [48] to reject images lacking diversity or inclusivity.

The final system architecture of *LumaDreams* is shown in Figure 5.

4 Study

We conducted a field study for fourteen days to evaluate the user experience of *LumaDreams*. Our objectives were to assess whether *LumaDreams* contributes to participants' daily empowerment through its positive meaning-making process, and to examine cognitive and

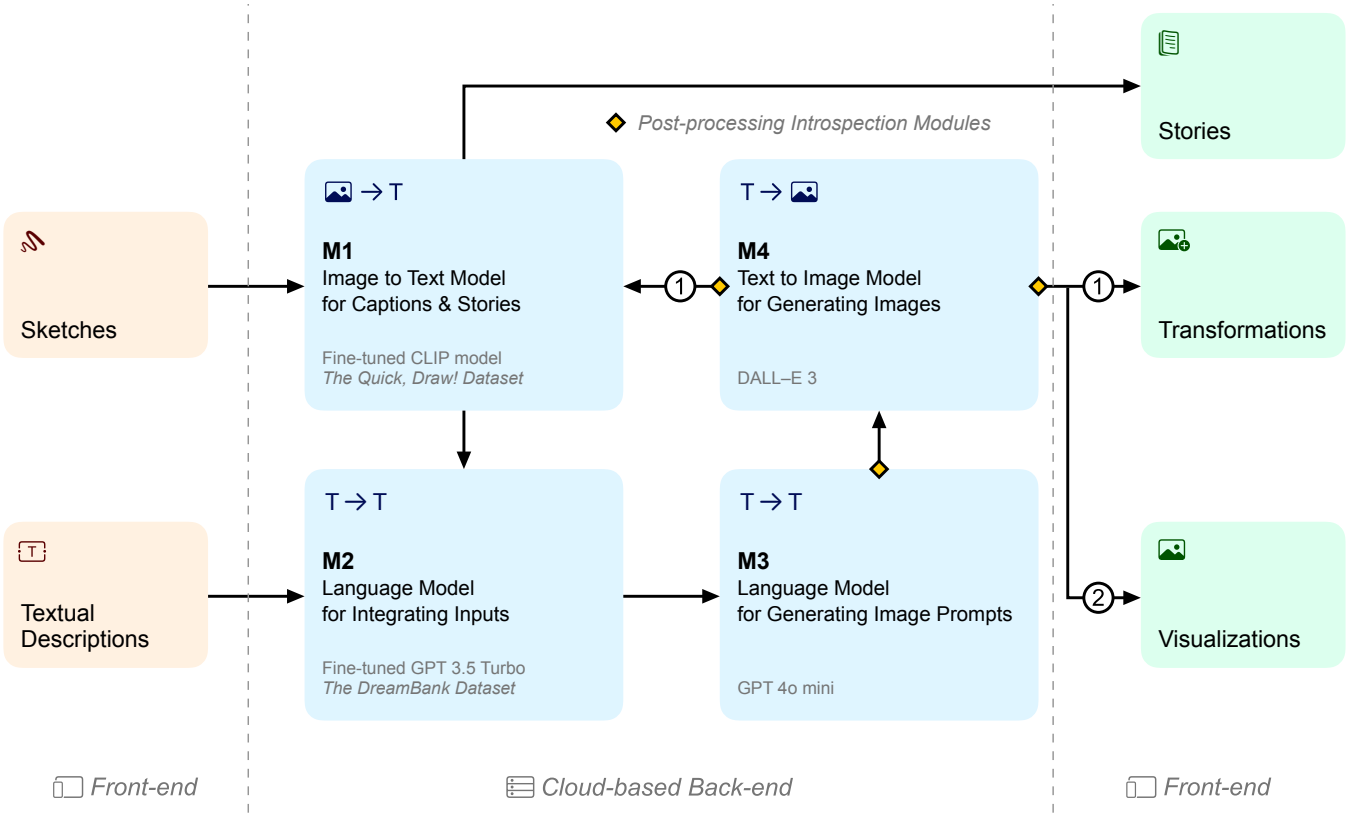


Figure 5: The system architecture of *LumaDreams* integrates a mobile application front-end with a cloud-based back-end hosting machine learning models.

emotional shifts in self-awareness, consciousness, and participants' attitudes toward dreams based on perceived positive dream meanings. In addition, we also explored the perception and trust of users in the AI-driven dream transformation process.

4.1 Participants

We recruited university participants through social media and posters. Fourteen participants (8 male, 6 female, no non-binary as self-reported), with an average age of 22.6 years (SD = 1.5), agreed to participate in this study. For anonymity, participants are referred to as P1 through P14 using pseudonyms. All participants were able to recall their dreams, self-reported no cognitive impairments, mental disorders, or neurological conditions, and were familiar with the use of tablets, having no difficulty sketching or providing textual descriptions. The study was conducted in Mandarin, and participants received a detailed briefing on the procedure and the opportunity to ask questions about the study and related technologies. Each participant received an 80 CNY (approx. 11.25 USD) cash honorarium and used their own tablets for participation.

4.2 Data Collection

4.2.1 Questionnaires. As psychological empowerment is a multidimensional concept encompassing intrapersonal, interational, and behavioral aspects [44], and is challenging to quantify directly, we focused on three specific dimensions of empowerment — well-being and autonomy, agency and efficacy, and confidence and control — to evaluate the empowerment levels of participants [74]. Inspired by studies measuring empowerment levels based on this multidimensional understanding [47, 58], we employed the WHO–5 Well-being Index (WHO–5), the General Self-Efficacy Scale (GSE), and the Revised Life Orientation Test (LOT-R), since each offers insight into related dimensions of empowerment. Furthermore, in accordance with the dream-based context of this study, we employed the Pittsburgh Sleep Quality Index (PSQI) and the Mannheim Dream Questionnaire (MADRE) as our complementary lens to evaluate participants' sleep quality, dreams, and their attitudes and perceptions of dreams. We integrated the above questionnaires into questionnaire suite **T1**:

(1) WHO–5 Well-being Index (WHO–5) [7, 66], a 5-item 6-point Likert scale.
(2) The General Self-Efficacy Scale (GSE) [91], a 10-item 4-point Likert scale.
(3) The Revised Life Orientation Test (LOT–R) [85], a 6-item 5-point Likert scale.
(4) The Pittsburgh Sleep Quality Index (PSQI) [97], a 10-item self-report questionnaire that assesses various aspects of sleep quality, with items rated on 4-point Likert scales and additional open-ended questions.

(5) The Mannheim Dream Questionnaire (MADRE) [89], a 21-item questionnaire that assesses various aspects of dreams, with items rated on multiple Likert scales and additional open-ended questions.

To evaluate the overall usability, user experience, and functionality of *LumaDreams*, we employed a questionnaire suite, **T2**, including the following questionnaires:

(1) The System Usability Scale (SUS) [9], a 10-item 5-point Likert scale.
(2) The Short User Experience Questionnaire (UEQ-S) [90], an 8-item 7-point Likert scale.
(3) A self-constructed application-specific functionality questionnaire inspired by previous studies [3, 20].

The application-specific functionality questionnaire is a 10-item, 5-point Likert scale, with the specific questions and results listed in Figure 10.

4.2.2 Semi-structured Interview. To gain an in-depth understanding of users' perceptions of the positive meaning-making process, empowerment levels, and the overall user experience with *LumaDreams*, we conducted a semi-structured 40 minute interview with each participant via an online meeting. The semi-structured interview began with general open-ended questions, such as "How was it?" and "What have you noticed about the dreams you journaled?" before moving to more in-depth questions about the roles and impacts of *LumaDreams* in facilitating the positive meaning-making process. These in-depth questions include "What happened during the transformations, how did you interpret them, and do you generally agree that the transformations were positive?", "Do you feel positively influenced by the transformations? Why?", and "Do you think *LumaDreams* effectively incorporates the positive elements and emotions of the transformations into your daily reflections, and do you feel this positive influence has a lasting effect?" We also invited participants to discuss changes in their empowerment levels alongside the quantitative questionnaire, asking questions such as "Have you felt more empowered than before after using *LumaDreams*?", "Can you describe any specific changes in feeling more empowered and explain why?", and "What do you think contributed to the change in your empowerment level?" Participants were also encouraged to share their user experiences, along with any additional insights or feedback, throughout the interview. All interviews were recorded in audio.

4.3 Procedure

The study was conducted over 14 days. Before the study, we obtained the consent of the participants to collect their demographic and study-related information through online forms with electronic signatures. The study then proceeded as follows:

(1) On the first day of the study, participants were introduced to the study procedure and shown how to download and use *LumaDreams* in a brief session lasting 25 minutes. Before participants began using *LumaDreams*, they were asked to complete questionnaire suite **T1** to gather baseline data.
(2) Participants used *LumaDreams* in the field for 14 days, integrating dream engagement into their daily routines. During this time, they completed questionnaire suite **T1** again on the seventh day. This mid-study check-in aimed to capture any changes in their empowerment levels, user experience, and perceptions of *LumaDreams*.
(3) At the end of the study period, participants completed questionnaire suite **T1** for the final time, along with questionnaire suite, **T2**, focused on evaluating the usability, satisfaction and overall effectiveness of *LumaDreams*. Each participant was then invited to a recorded semi-structured interview of 40 minutes.

4.4 Data Analysis

For quantitative data, we scored the WHO–5, GSE, PSQI, SUS, and UEQ-S questionnaires using their official guidelines. Then we compared the mean values (M) and other indexes recommended by the questionnaire authors using descriptive statistics. Furthermore, we included representative questions from the MADRE questionnaire and a self-constructed application-specific functionality questionnaire to assess the functionality and impact of *LumaDreams*.

For qualitative data, we performed an inductive thematic analysis [27] to analyze the collected data. Two authors independently reviewed all 91 participant dream journals (including original dream inputs and transformation outputs) and semi-structure interview transcripts multiple times, created code labels, and compared their codebooks. During this process, the dream journal elements (descriptions and images) served as supplementary materials, offering concrete examples and context when participants discussed specific experiences during the interviews. Instead of analyzing these elements independently, we referenced them alongside interview transcripts to enrich our understanding of participants' accounts of their experiences. In the first phase of the thematic analysis (7 days), we developed 32 labels, including "Positive dream transformation," "Reduction of nightmares," and "Empowerment in tracking dreams." In the second phase (additional 7 days), we reviewed and discussed these labels, clustering similar codes into broader labels to reduce complexity. The remaining codes were refined and integrated into existing labels. To ensure consistency, two authors held regular meetings every two days to assess inter-coder reliability and address disagreements. When disagreements arose, a structured resolution process was followed, involving explanations of respective coding rationales, joint reviews of the original data, and refinement of codes to better capture nuances. Finally, we resolved all disagreements and achieved consensus through multiple discussions, and reduced the number of codes to 10. This resulted in three themes that capture the overall effect and experience of *LumaDreams*. The analysis processes for quantitative and qualitative data were independent.

5 Quantitative Results

This section presents the results of the quantitative analysis.

5.1 Empowerment

Our analyses revealed positive trends across all three dimensions reflecting participants' empowerment levels: well-being and autonomy (measured by WHO–5), agency and efficacy (measured by GSE), and confidence and control (measured by LOT–R). As

illustrated in Figure 6a, overall well-being of the participants increased from low (M = 10) to medium (M = 14) in the first seven days and to high (M = 19) after 14 days according to official guidelines, indicating improved subjective well-being. Figure 6b shows an increase in average self-efficacy, suggesting greater personal agency and efficacy. Similarly, Figure 6c shows the LOT-R scales also increased from the initial assessment (M = 13) to the final evaluation (M = 18), reflecting a more positive outlook and confidence levels in future outcomes. These consistent upward trends across three scales demonstrate *LumaDreams*'s effectiveness in enhancing participants' empowerment levels within a multidimensional evaluation framework.

5.2 Sleep and Dream

Our analysis of the sleep conditions of participants using the PSQI revealed distinct improvements in multiple indices. As illustrated in Figure 7a, the average hours of sleep increased from M = 6.8 at baseline to M = 7.9 after 14 days. Sleep disturbances, such as waking up during the night or feeling too hot or cold, decreased from M = 7.6 to M = 1.5 (Figure 7b). Self-rated sleep quality also improved, with scores rising from M = 2.6 to M = 4.2 (Figure 7c). Additionally, the global PSQI score, where lower values indicate better sleep, dropped from M = 8.7 to M = 6.1 (Figure 7d), reflecting an overall improvement in the sleep health of participants.

Multiple characteristic indices were selected from the MADRE questionnaire to analyze dreams. Dream emotional intensity decreased (Figure 8a), and the number of nightmares declined (Figure 8c), while the emotional tone of dreams improved (Figure 8b), indicating that participants experienced more positive and calmer dreams over the 14 days. The average number of dream recordings increased from M = 0.4 to M = 2.2, and eventually to M = 3.9 (Figure 8d), indicating increased engagement and a subtle influence on the dream journaling habits of the participants over time. Participants' attitudes toward dreams became more positive, with scores rising from M = 14.6 to M = 20.6 (Figure 8e), and the levels of self-rated meaningfulness increased from M = 1.6 to M = 2.8 (Figure 8f), showing that the participants increasingly recognized the value of their dreams. Dream recall frequency (Figure 8g) and the number of creative dreams (Figure 8h) fluctuated, showing no notable changes.

5.3 System Usability and User Experience

The SUS and UEQ-S results indicate favorable outcomes in usability and user experience metrics. As shown in Figure 9a, the SUS scores reflect good usability (M = 77.3), with all participants scoring at or above the fair usability range (50 − 69). Figure 9b displays the UEQ-S results, highlighting positive scores for Pragmatic Quality, Hedonic Quality, and Overall Experience. Both Pragmatic and Hedonic Quality scores indicate that participants found *LumaDreams* functional and enjoyable. According to the official benchmark, the mean scores for all categories exceeded +1.0, falling within the "Good" to "Excellent" range, particularly for Hedonic Quality and Overall Experience, suggesting participants perceived *LumaDreams* as providing a high quality experience on average.

5.4 Application Functionalities

The application-specific functionality questionnaire revealed generally positive user evaluations, with a median score of 4 for each item in Figure 10, indicating a general agreement with the intended capabilities. Items R1–R3 assessed the ability to express dreams using sketches and text, and participants found these tools effective for describing their dreams. Items R4–R6 evaluated the effectiveness of dream visualizations and their relevance to the original dreams, with scores showing strong coherence between inputs and visualizations, accurately capturing dream elements and emotions. Items R7–R8 assessed dream transformations, and while some variability was observed, the median score remained high at 4, indicating general satisfaction with the outcomes. Participants responded positively to the dream stories, as reflected in Item R9. Lastly, Item R10 evaluated the overall functionality, with participants feeling *LumaDreams* effectively combined its features to meet their expectations, supported by a median score of 4.

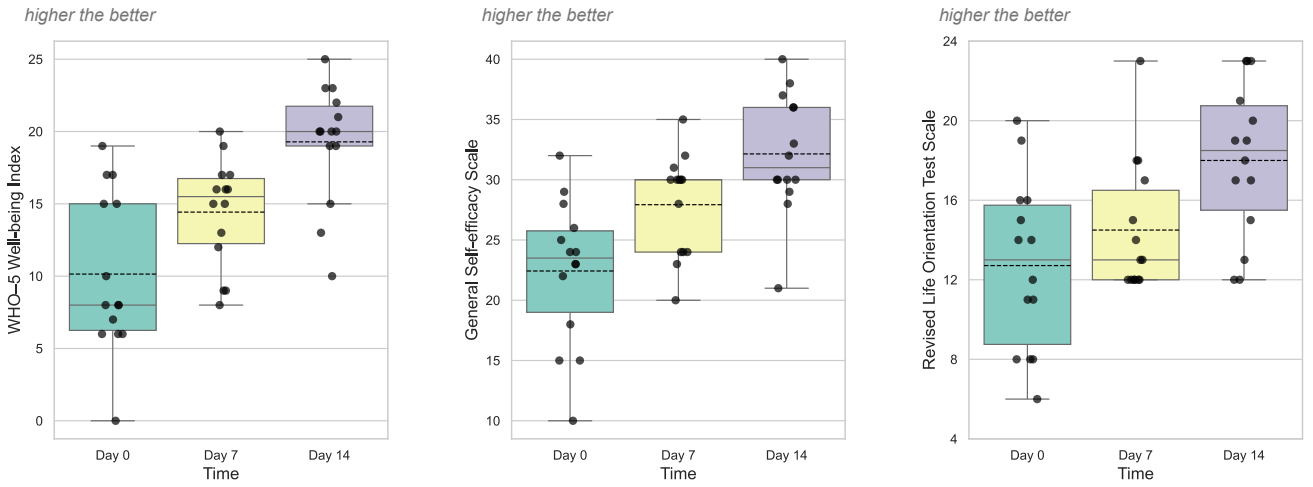
6 Qualitative Analysis

In this section, we present the results of the qualitative analysis. We selected examples of original sketches, along with the corresponding visualizations and transformation outcomes, from interview and application usage data, as shown in Table 1.

6.1 Theme 1. Cognitive and Emotional Shifts

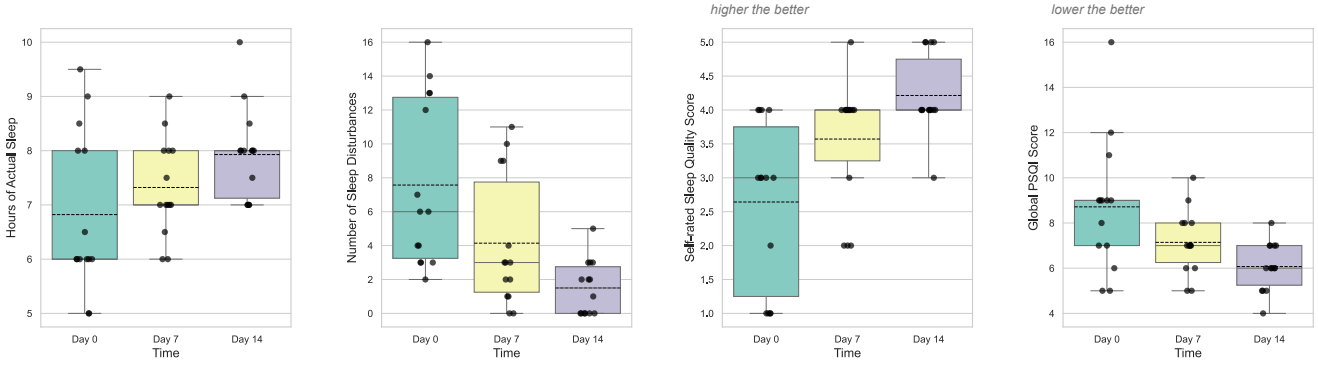
This theme demonstrates that *LumaDreams* enhanced participants' consciousness and attitudes toward dreams while also improving their self-awareness of dreams, emotions, and mental states.

6.1.1 Recalling and Reorganizing Dreams. Eleven out of fourteen participants reported that *LumaDreams* effectively supported dream recall and reorganization. In interviews, participants often noted how easily dreams were forgotten before using *LumaDreams*. For instance, P5 shared: "*Sometimes I had a dream, but I almost immediately forgot it upon waking up.*" Similarly, P11 said: "*After waking up, the dream's details gradually became vague until I couldn't remember anything.*" However, *LumaDreams* encouraged participants to actively recall and engage with their dreams, with six noting that it improved their ability to recall dreams more vividly. P14 noted: "*I once had a pleasant dream of dining out with my old friend... I remember we were in a pub with cake and coffee, but it was hard to remember the excitement and joy at that moment... After using LumaDreams, those emotions were reactivated along with visual memories. It helped me to remember not only the scenes but also the feelings.*" Terms like "*revive*" (P14), "*re-immerse*" (P5), and "*revisit*" (P11) across participants suggest that *LumaDreams* had a positive impact on dream recall. In addition, participants highlighted the system's ability to help reconstruct and reorganize fragmented dream scenes. P5 stated: "*I often have fragmented dream scenes in mind and struggle to connect them to a vivid whole. However, the visualization and transformation helped me piece the fragments together in a way that made sense, even with a story — it was an unprecedented experience.*" This process of recall and reorganization of dreams offered participants a novel way to engage with their dreams. All 14 participants appreciated how *LumaDreams* enhanced their awareness of dreams



(a) WHO–5 Well-being Index **(b) General Self-efficacy Scale** **(c) Revised Life Orientation Test Scale**

Figure 6: The (a) WHO–5, (b) GSE, and (c) LOT–R scores scaled from T1 gathered on Day 0, Day 7, and Day 14.



(a) Hours of Actual Sleep **(b) Sleep Disturbances** **(c) Self-rated Sleep Quality** **(d) Global PSQI Score**

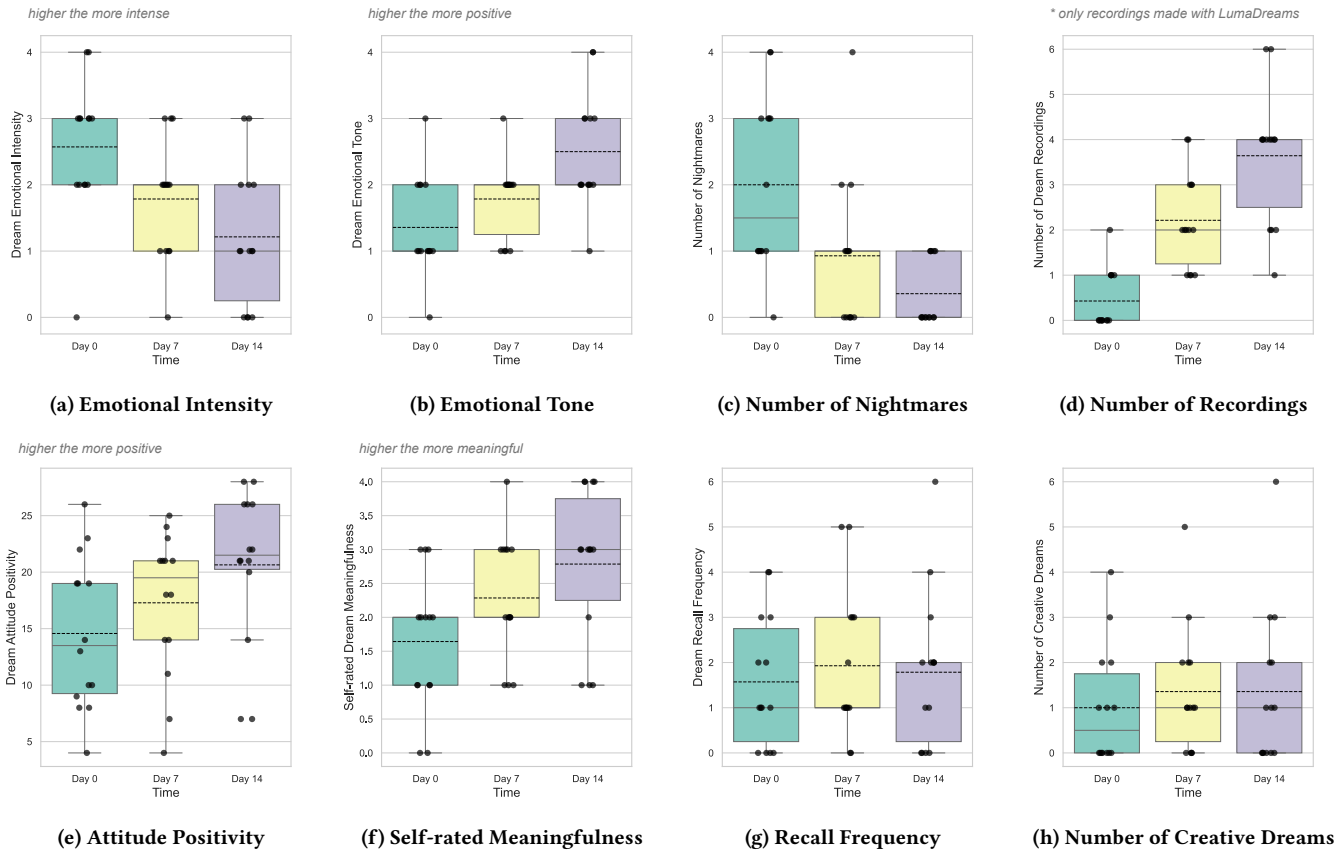
Figure 7: Representative PSQI indices and global PSQI scores scaled from T1 gathered on Day 0, Day 7, and Day 14.

— such as recalling whether they had a dream the previous night and its content — in a non-intrusive manner.

6.1.2 Awareness of Emotions and Mental States. Twelve out of fourteen participants reported that engaging with their dreams increased their awareness of emotions and mental states. For instance, P6 stated: "*Reviewing the dreams I recorded, I realized that I occasionally had nightmares, which helped me become more aware of their impact on my mood on those days.*" P11 similarly shared: "*I dreamed about training a machine learning model but could not achieve satisfactory accuracy, which mirrored my real-life struggles. After seeing the visualization, I realized that it was overwhelming for me... Initially, I thought it stemmed from my own lack of capability, but the story taught me that no model can be perfect and that pursuing such high accuracy is unrealistic. I started learning to lower my expectations and embrace imperfection.*" This awareness also aided emotional management, as P11 added: "*When I stopped setting such high expectations, I felt calmer and more in control, and I could see the positive effect it had on my mental well-being.*"

This growing emotional shift led nine participants to see their dreams as meaningful tools for self-understanding and emotional regulation rather than fleeting or insignificant experiences. For instance, P6 remarked: "*Before using LumaDreams, I never thought dreams were important... But I eventually realized that my dreams might be related to my emotions and mental states, which made me reflect more deeply.*" Similarly, P12 shared: "*It was hard to track my dreams and the emotions associated before. After using LumaDreams, I started recording more dreams and became more aware of changes in my emotions, helping me better understand and improve myself.*"

6.1.3 Playful and Lasting Engagement with Dreams. Ten out of fourteen participants reported that *LumaDreams* significantly deepened their engagement with dreams, extending the boundary of their experience beyond sleep as self-reported. P7 noted: "*I used to think*



(a) Emotional Intensity **(b) Emotional Tone** **(c) Number of Nightmares** **(d) Number of Recordings**

(e) Attitude Positivity **(f) Self-rated Meaningfulness** **(g) Recall Frequency** **(h) Number of Creative Dreams**

Figure 8: Representative MADRE indices gathered from T1 on Day 0, Day 7, and Day 14.

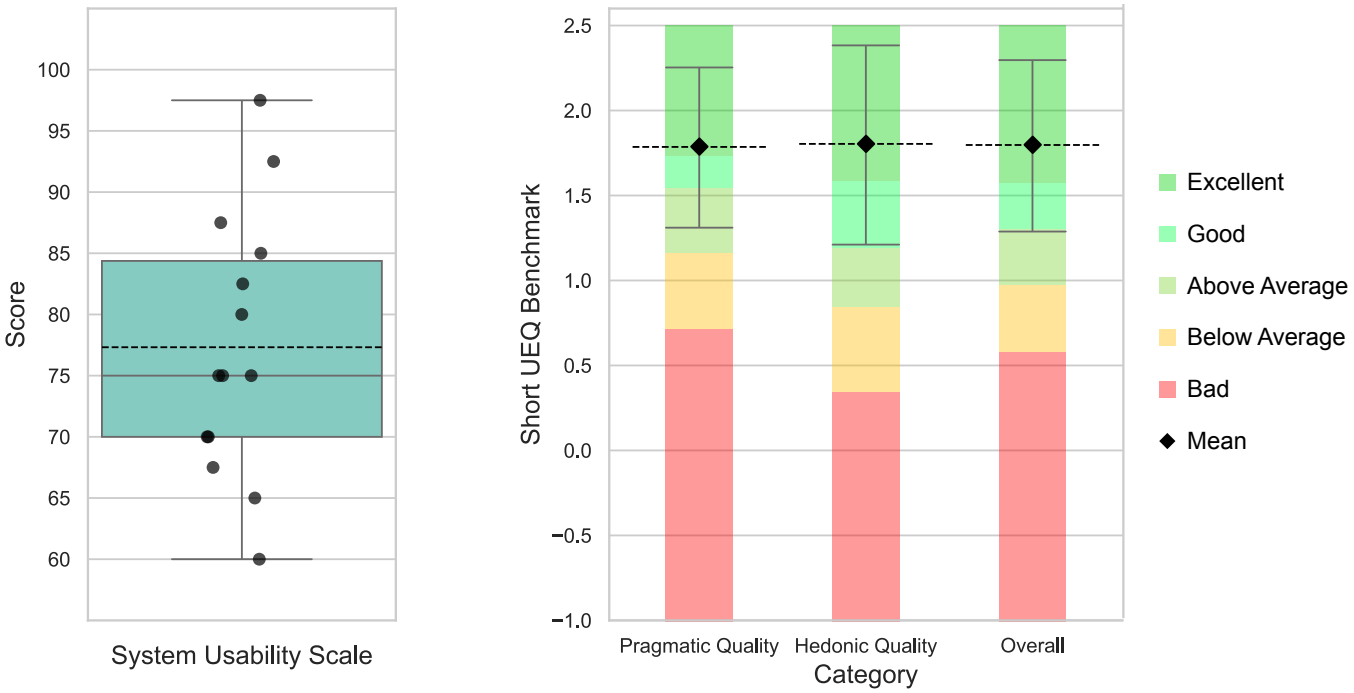
that my dreams ended when I woke up, but LumaDreams allowed me to continue the dream after waking up. I had never considered that before." The system also fostered ongoing curiosity, with five participants expressing anticipation while going to sleep and excitement about future dreams. For example, P14 shared: "*I now look forward to having and recalling dreams... I conceive the dream myself and then let LumaDreams transform... Comparing my thoughts with the result is quite a novel experience, and I like it.*" Additionally, *LumaDreams* made dreaming feel playful and social. P11 explained: "*Before using this app, I rarely shared my dreams, thinking that they were personal and difficult for others to relate to... But LumaDreams introduced creative and playful elements that made my sharing connectable and enjoyable.*"

6.2 Theme 2. Positive Meaning-making and Daily Empowerment

All participants consistently reported that *LumaDreams* transformed their dreams into more positive and meaningful experiences. Participants associated the AI-generated transformations with daily reflections, which they felt contributed to cognitive and emotional shifts, positive mindsets, and ultimately daily empowerment.

6.2.1 Positive Meaning-Making through Creative Dream Transformation. All participants reported that *LumaDreams* helped them transform their dreams, especially nightmares, into more creative and uplifting experiences. Twelve participants noted that elements of the transformed dreamscape — such as the environment, lighting, and interactions between organisms (*e.g.*, flower-covered lawns, sunlit settings, and harmonious relationships between people and animals) — conveyed positive meanings. Ten participants highlighted that the plot and narrative tone of the accompanying story created a warm and cozy atmosphere that made them feel supported and healed. Initially, many were skeptical, believing that their dreams were too negative or absurd to be positively transformed. For instance, P3 said: "*I tried interpreting dreams from a new perspective, but I couldn't create a positive and detailed interpretation from the vague and absurd scenes in my memory.*" P6 described a recurring nightmare of being trapped in a zoo cage surrounded by lions and leopards, saying: "*No matter how much I tried to laugh it off, the fear lingered.*" Despite these concerns, thirteen participants later expressed how *LumaDreams* served as a valuable tool for transforming their dreams and providing new perspectives. P6 shared: "*When LumaDreams transformed the lions into people in costumes who invited me to dance, it completely changed my view. I never thought I could find something positive in such a scary dream.*"

Beyond nightmares, *LumaDreams* also helped eight participants find positive meanings from neutral dreamscapes. P4 shared: "*It was a neutral dream. I was happy to see my passed-away grandma,*



(a) System Usability Scale **(b) UEQ–S Benchmark**

Figure 9: The (a) SUS, and (b) UEQ–S benchmark scores calculated from T2.

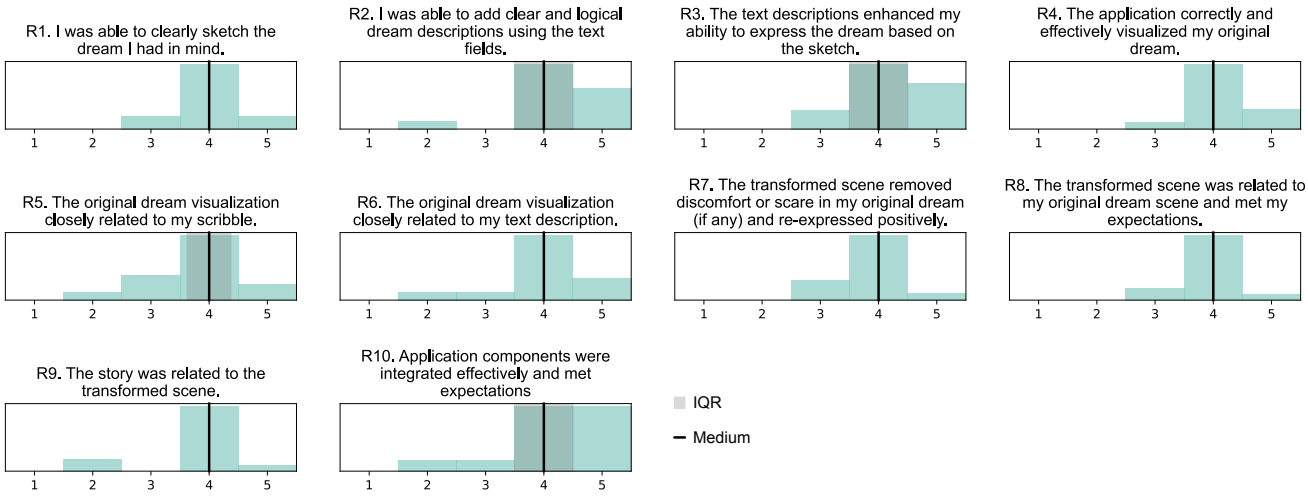
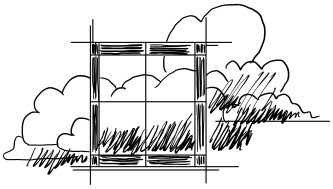
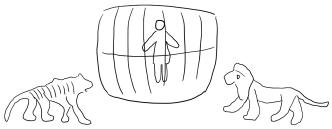
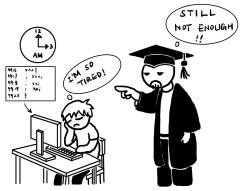
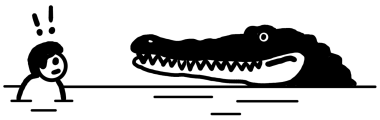
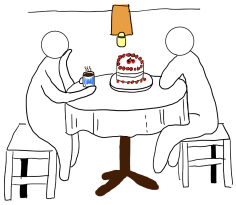
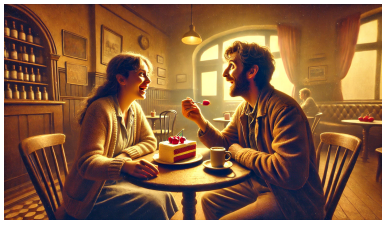


Figure 10: Questions and results from the application-specific functionality questionnaire in T2 (1 – Strongly disagree, 5 – Strongly agree).

but I felt sad upon waking up. LumaDreams turned her into an angel, telling me that every struggle I've faced would become a star behind her... It really touched me." In addition, the generated story added another layer of emotional depth, providing P4 with a meaningful

Table 1: Examples of original sketches, visualizations, and transformation outcomes from participants.

ID	Sketch	Visualization	Transformation
P1			
P6			
P8			
P10			
P14			

narrative that conveyed healing emotions and a positive perspective on their dream and life. This highlights how *LumaDreams* leveraged both visual and textual modalities to create positive meanings from dreams.

6.2.2 Improved Sleep for Frequent Nightmare Sufferers. Six participants who self-reported frequent nightmares associated the positive meaning-making process with perceived improvements in their sleep quality. P8 shared: "*I've had a recurring nightmare of getting lost in a forest since childhood... After using LumaDreams, I recorded this dream and explored the transformations it provided. I regenerated it several times for different inspirations and eventually felt positively influenced by the fireflies that guided me out of the forest. I haven't had this dream for a while now.*" As sleep improved, nightmare-suffering participants recalled fewer dreams as a secondary effect of deeper sleep. Interestingly, despite having fewer dreams to recall, many participants maintained or even increased engagement with *LumaDreams* by revisiting and journaling older dreams for transformation and exploration. P12 explained: "*Although I've been recalling fewer dreams recently, I recorded older ones deep in my memory to see what transformations LumaDreams would bring about.*"

6.2.3 Positive Mindset and Daily Empowerment. All participants reported that *LumaDreams* fostered a stronger sense of empowerment

through different aspects given the multi-dimensional understanding of daily empowerment. Seven participants mentioned that they had become accustomed to recalling and recording their dreams, noting that reviewing these records had led to empowerment in agency and control as self-reported. P7 shared: "*After seeing the dream of breaking up with my girlfriend again, I started thinking about the interpersonal strategies that I could have done to avoid making that mistake inspired by the story... I read some books and tried to embrace a more outgoing and open-minded version of myself.*" For seven participants, the positive meaning-making process acted as a powerful motivator to strengthen empowerment in efficacy and autonomy, as *LumaDreams* encouraged them to take actions they had previously feared or never considered in everyday life, which they described as solving real-life problems and positively influencing well-being. For instance, P7, who dreamed of their mentor criticizing their study progress, noted: "*LumaDreams transformed my sketch into a constructive collaboration with my mentor. After that, I started regularly communicating with my mentor about my progress and stress through messages — something I never had the courage to do before... I even rescheduled my working hours with my mentor, and now I feel relieved and refreshed.*"

Eight participants reported that *LumaDreams* fostered calm perspectives or positive mindsets. For instance, P8 shared: "*Reviewing both the original and transformed dreams, and thinking what has changed and why, helped me reflect on real-life emotions and build a positive mindset. In the transformation, I wear headphones to block out work distractions. This inspired me to mentally block out the ostracism and unwarranted accusations of others, ignore their voices, and listen to my heart.*" P12 also explained: "*The dream transformation, where I was meditating in the wilderness instead of constantly checking my phone while traveling due to fear of missing work messages and suspicion of errors in my completed tasks, helped me realize I could better control my emotions. It gave me a calm perspective in difficult situations, and I noticed that it began to influence how I handle real-life challenges — taking deep breaths before making decisions and maintaining hope for the best.*"

Notably, six participants highlighted that specific design features in *LumaDreams* reinforced their sense of empowerment. P12 appreciated the option to view the transformation first before the original dream while reviewing: "*Seeing the positive transformation before the original dream helped me feel less afraid of my nightmares and more ready to face them positively, this gives me confidence and control.*" The "glass-breaking effect," where users visually and aurally shattered negative dream scenes, was another subtle yet affecting feature that reinforced empowerment. P1 explained: "*The effect of breaking through negative dream scenes felt symbolic, like breaking my fears. It strongly reinforced the transformation.*" Additionally, the ability to review and reflect on positive transformations helped participants internalize these positive mindsets. P2 remarked: "*Reflecting on the transformed dreams regularly made positive meanings feel more permanent, and I felt like I was internalizing these shifts in my real-life thinking, ultimately contributing to my well-being and efficacy.*"

6.3 Theme 3. Perception and Trust in AI-driven Dream Transformation

This theme examines the participants' perceptions of the AI-driven experience provided within *LumaDreams*, how they developed trust in its AI-generated dreamscapes, and how these perceptions influenced their engagement with *LumaDreams*.

6.3.1 Authentic Dream Visualization and Transformation. All participants appreciated the accessibility of *LumaDreams*, powered by AI, which acted as a authentic source of dreamscape visualization and transformation. Twelve out of fourteen participants valued the dream visualizations in *LumaDreams*, viewing them as a crucial bridge between their initial, simple sketches and the final rich transformations. Thirteen participants agreed that without this step, the transformations might appear disconnected from their original input. Notably, all participants found the visualizations to be accurate, preserving the authenticity of their sketches while incorporating intricate details. P9 remarked: "*It was amazingly close to my original sketch*!" and P14 added: "*It contains so many details and textures.*" Participants also praised the AI's ability to interpret and enrich based on simple sketches and vague descriptions. P3 shared: "*My drawing skills are quite limited. I just sketched a few trees and people with simple text descriptions. I didn't expect it to interpret so much, like the deep forest and glowing elves — it was powerful and surprising.*"

When it comes to transformations, 13 participants expressed appreciation for the system's ability to identify elements to be transformed as situational meanings and creatively integrate them into positive dreamscapes, facilitating a unique positive meaning-making experience. For nightmares, P3 shared: "*I was surprised by how well it turned the scariest part of my nightmare, the weird castle, into a comfortable tree house with blossoming flowers.*" In neutral dreams, participants noted how *LumaDreams* added depth, making them more meaningful and uplifting. P10 said: "*I dreamed about a concert with only the band showing up... I liked that it added an audience, making the dream feel more realistic and somewhat uplifting.*" The participants also praised the expressiveness of the accompanying stories. P1 remarked: "*I'm amazed by how well it wrote the stories — detailed and added a new layer to the transformation.*" P10 added: "*The story provided more than just a description. It actually offered a vital context for me to understand the transformed dreamscape, making the experience feel more complete and immersive.*"

6.3.2 Human-AI Collaborative Dream Engagement. Twelve out of fourteen participants described how they adjusted their inputs when dissatisfied with the visualizations, transformations, or stories generated by AI. They experimented with modifying sketches and text descriptions to influence the AI interpretation. P10 explained: "*Sometimes it missed certain details or took the dream in an unexpected direction. When that happened, I modified my journal — made key parts bigger, added arrows, or included notes. It felt like communicating with AI, which piqued my curiosity and desire to explore further.*" Nine of twelve participants who made adjustments agreed that the AI in *LumaDreams* generally captured their intended meaning more accurately after one or two refinements.

This iterative process fostered dynamic and exploratory interactions, with participants agreeing that this collaborative approach was enjoyable and creatively stimulating.

6.3.3 Trust and Comfort in Using AI for Dream Meaning-making. In our study, all participants expressed trust in *LumaDreams* for effective dreamscape interpretation and transformation. Six participants with prior knowledge of AI attributed their trust to their understanding of generative AI. For example, P7 said: "*I know GenAI is built on vast data and strong processing, which helps it to understand things beyond human capability, giving me confidence in its results.*" On the other hand, six out of eight participants who were less familiar with AI developed trust in the system through direct interaction. P8 noted: "*It always provides positive transformations, so I trust it,*" and P12 added: "*I can feel and agree with the positive meanings it conveys.*"

Interestingly, when comparing their experience of sharing dreams with *LumaDreams* versus with family or friends, twelve out of fourteen participants felt more comfortable sharing with *LumaDreams*. Four participants mentioned that dreams often contain personal or sensitive content that can be difficult to share with others. P2 explained: "*Dreams are personal, and some content is inappropriate to disclose to friends.*" P14 added: "*If my dream contains overly scary content, it might not be suitable to share with others. I feel more comfortable expressing it to a computer.*" Participants like P4 also appreciated the non-judgmental nature of AI, noting that while friends may struggle to understand their dreams, *LumaDreams* provided a more neutral platform for dream sharing.

Despite the overall comfort and trust that participants expressed in using AI for dream transformation, four participants raised concerns about its use for more personal matters. For instance, P14 mentioned data security concerns: "*I think it's fine to use AI for dreams, but for more personal issues, such as intimate relationships, I'm not sure that my data would be fully secure.*" P3 raised concerns about potential bias, stating: "*I don't think AI can truly understand emotions like humans. Its creators shape the emotions it conveys, and if they have ulterior motives, the AI output could be influenced or manipulated.*" These concerns were key factors affecting participants' trust in using AI for more sensitive and personal purposes.

7 Discussion

In this section, we discuss how our work aligns with existing literature and present our insights into potential future research directions for AI-driven dreamscape transformation aimed at daily empowerment.

7.1 A Positive Dream Meaning-making Experience for Empowerment

Our findings suggest that *LumaDreams* fostered deep dream engagement through a positive meaning-making experience by encouraging users to journal their dreams, explore how AI-generated transformations can offer new, positive meanings, and finally bridge their original situational meanings to these new global meanings through revisit and reflection. This approach taps into a long and historical tradition of dream interpretation, where humans have sought meaning in dreams to better understand themselves or even predict future outcomes. Ancient civilizations such as Sumerians and Babylonians [94], and ancient Chinese [104] used symbolic dream systems to map dreams to future events or fortunes [80]. During the Middle Ages, *Al-Farabi* authored a treatise on dreams titled *On the Cause of Dreams*, where he was the first to distinguish between the nature and causes of dreams and their interpretations [30]. This work marks a shift in dream interpretation from religious and metaphysical contexts toward more theoretical approaches. In recent times, Freud's work on the unconscious [24] and Jung et al.'s exploration of archetypes [39] further framed dreams as gateways to deeper psychological states. However, traditional dream interpretation remained largely passive, often dictated by external authorities, and sometimes reinforced negative cognitive distortions, such as assuming worst-case outcomes.

In contrast, our work takes an active approach to dream interpretation, enabling users to actively reshape their dreams through a creative and reflexive process. This approach fosters moments of introspection and realization, transforming dream engagement into a meaningful and dynamic experience. This approach parallels existing therapeutic techniques such as image rehearsal therapy (IRT) [46] and Guided Imagery [57], which focus on the transformation of mental imagery for therapeutic benefits. Although these methods typically require professional intervention in structured settings, *LumaDreams* provides an accessible self-directed tool for daily use, offering an actively immersive process, encouraging users to connect deeply with their dreams through creativity and derive personal significance from them.

From this, we propose a design implication: approach dream engagement as an active and empowering process. *LumaDreams* serves as a bridge between passive dream reflection and active therapeutic intervention. As our study demonstrates, this positive dream meaning-making experience expands the role of dreamscapes as tools for self-exploration, offering a new paradigm where users actively shape the narratives of their subconscious experiences. This approach not only engages users with their dreams, but also provides a pathway to daily empowerment. By leveraging dreams for positive meaning-making, *LumaDreams* creates new possibilities for personal empowerment in everyday life.

7.2 Conscious AI Design and Subconscious Engagement: Empowerment vs. Dark Manipulation

In *LumaDreams*, GenAI opens new avenues for engaging with the subconscious minds of users through dream transformation. We adopted a Conscious GenAI approach, in which the AI was carefully fine-tuned to align with the emotional needs of users and provide meaningful interpretations. Although users often describe their dreams clearly, the emotional nuances can be complex. During our design process, we initially found that generic large-language models struggled to capture negative dream elements, sometimes producing irrelevant or counterproductive transformations. To address this, we fine-tuned the AI with dream-specific data to better identify and enhance key aspects, transforming them in manners that strengthen daily empowerment. This process represents a step toward responsible AI, where the technology is designed to empower rather than manipulate.

In writing about this approach, we originally intended to recommend that designers rely on fine-tuned models, as we did within *LumaDreams*. However, we began to reflect on the broader assumption that large models are inherently aligned with human values [31]. This led us to conduct an informal experiment where we prompted a large language model to adopt a negative role as an "evil dream interpreter." The results were alarming. When presented with a seemingly neutral dream about a cat chasing a butterfly, the AI produced a dark interpretation: "*The cat represents your predatory instincts and the butterfly your unfulfilled desires. Below the surface, this dream reflects your darker desires and dissatisfaction with life.*" This revealed a critical risk: AI systems could unintentionally reinforce negative cognitive patterns or even manipulate users' subconscious perceptions without ethical safeguards. Therefore, while progress has been made in aligning GenAI with human-centered outcomes, this experiment underscores the ongoing need for ethical vigilance in AI design.

We believe that this issue arises because most value alignment efforts in AI focus on overt concerns, such as algorithmic and cultural bias related to gender, occupation, location, or race [38, 62, 75, 76]. However, less attention is given to AI's subtle influence on subconscious thoughts. Previous research has shown how AI systems can manipulate human behavior through branding, recommendations, and nudging, often without users' conscious awareness [13]. Our findings emphasize that while AI can indeed empower users through positive dream meaning-making, it also holds the potential to manipulate or negatively influence the users' subconscious perceptions subtly.

Therefore, the potential for AI to interact with the subconscious highlights the need for a more comprehensive ethical framework. We propose that AI systems go beyond basic value alignment to incorporate deeper prosocial and culture-aware considerations [10, 63, 95], especially when engaging the subconscious minds of users. This involves designing systems that consider user's cultural and personal backgrounds, and intentionally promote positive emotional and psychological outcomes, guiding users toward self-reflection empowerment, and personal growth. In the case of *LumaDreams*, fine-tuning AI for positive dream meaning-making is an important initial step. However, fostering prosocial AI design will require ongoing research, transparent development practices, and collaboration within the AI ethics community to ensure that AI enhances, rather than exploits, the human experience — both consciously and subconsciously.

8 Limitations and Future Work

This study has several limitations. First, the sample size is relatively small and the analysis is mainly focused on self-reported user experience in our study. Future studies with a larger sample size will allow for more robust statistical validation of our findings. A more diverse participant pool could also offer valuable insights into *LumaDreams*' effects and user experience across different demographic and sociocultural contexts. However, previous research suggests that a minimum of 12 participants is sufficient for such studies [11], supporting the validity of our results despite this limitation. Second, we recognize that meaning-making is not always associated with positive affect and can often be challenging, uncomfortable, or confronting, particularly in the short term [61]. For example, in IRT experiences, repeatedly recalling scenes from a nightmare may intensify unpleasant emotions [82]. However, as no participants reported comparable negative experiences, we believe our work is valuable in that the meanings generated by *LumaDreams* can serve as realizations for users to build upon over time through revisits and reflections, ultimately strengthening empowerment. Third, while the sustained effects of *LumaDreams* over the fourteen-day study period are evident in both quantitative data and qualitative analysis, further validation of its long-term effectiveness is needed in our future study over an extended timeframe. Fourth, as *LumaDreams* primarily relies on users' dreamscape inputs without incorporating broader personal contexts, such as beliefs, customs, or cultural backgrounds, we acknowledge that the meaning-making process may remain homogenized despite the AI's creativity and randomness. This reflects a trade-off between general usability and preserving individuality, given computational constraints for training and testing personalized models, the study time-frame, and the aim of delivering accessible and pervasive positive meaning-making experiences. Lastly, we acknowledge the potential for algorithmic and cultural biases in the AI models used in *LumaDreams*. To mitigate this, we implemented bias detection algorithms and introspection mechanisms in the post-processing modules. However, to further address the limitations of our current implementation and deliver a more resonant and enriched user experience tailored to users' specific cultural preferences, we call for future work to address this at the model level. Drawing inspiration from recent research on culture-aware methodologies, datasets, and scoring metrics [10, 63], we envision future work to incorporate individual and contextual data into generative AI models, allowing a more belief-based, personalized and pervasive positive dream meaning-making experience.

9 Conclusion

In this paper, we presented *LumaDreams*, a mobile application that enables users to journal their dreamscapes through sketches and textual descriptions, which are then illustrated into detailed visualizations and transformed into positive, healing and empowering dreamscapes with images and stories. This interactive and bidirectional engagement enables users to actively reshape their dreams, transforming passive dream reflection into a dynamic tool for personal empowerment. Our 14-day field study demonstrates *LumaDreams*' effectiveness in promoting cognitive and emotional shifts and fostering positive mindsets through the positive meaning-making process, ultimately strengthening daily empowerment.

This work highlights the potential of dreams not only as spaces for introspective reflection but also as powerful mediums for active engagement and affective transformation. This approach opens up new possibilities for self-discovery and personal growth by encouraging users to co-create their dreamscapes. Furthermore, our findings highlight how interactive, positive dream meaning-making frameworks can strengthen empowerment in everyday life. We envision future work building upon this foundation to explore how dream-based systems can further enhance emotional

and psychological development through deeper, more tailored, and culture-aware dream interactions.

Acknowledgments

This project is supported by the "National Natural Science Foundation of China (Grant No. 62302094)." We would like to thank all the participants. ChatGPT-4o assisted in composing the teaser figure in this paper.

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