TRIAL PROTOCOL

Effects of AI-Assisted Emotional Regulation on Psychological Wellbeing and Facial-State Perception

Protocol title	Effects of AI-Assisted Emotional Regulation on Psychological Wellbeing and Facial-State Perception
Protocol subtitle	A 42-Day Two-Arm Randomized Controlled Behavioral Intervention Study
Protocol version	Version 1.1
Document date	27 August 2026
Original ethics approval	25 May 2025
Ethics approval number	CUZ-RE-2025-05
Trial registration	Not prospectively registered. A subsequent registration inquiry was made to the Chinese Clinical Trial Registry (ChiCTR), but the submission could not be processed because the institution did not have an independently constituted ethics committee registered on the relevant national platform required for ChiCTR submission.
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Study status	Completed; first enrolment 17 July 2025; final follow-up completed 7 January 2026
Research site	School of Design Arts, Communication University of Zhejiang, 998 Xueyuan Street, Qiantang District, Hangzhou, Zhejiang 310018, People's Republic of China. Intervention and outcome-assessment activities were conducted remotely in participants' naturalistic settings.
Funding sources	National Social Science Fund of China, Youth Project, Grant No. 24CMZ080; and International Partnership

	Program of the Communication University of Zhejiang, 998 Xueyuan Street, Qiantang District, Hangzhou, Zhejiang 310018, People's Republic of China.
Data handling and analysis	S.Y. was responsible for data preparation, management of the analysis datasets, implementation of all statistical analyses using StataNow 19.5 MP, generation of statistical outputs, and interpretation of the findings.
AI intervention platform	MoodTalker was an existing third-party platform developed by Guangzhou Xinjiyuan Information Technology Co., Ltd. The platform developer had no role in study design, recruitment, intervention administration, data collection, outcome assessment, statistical analysis, interpretation, or manuscript preparation.
Facial-state assessment application	Facial-state assessments were conducted using 你今天真好看 (descriptive English translation: "You Look Good Today"), a commercially available AI-assisted skincare application developed and operated by Hangzhou C2H4 Internet Technology Co., Ltd.. The application was functionally independent of MoodTalker and was used only to generate facial skin-analysis reports.The platform developer had no role in study design, recruitment, intervention administration, data collection, outcome assessment, statistical analysis, interpretation, or manuscript preparation.

Important transparency note: This protocol was compiled retrospectively for journal submission and editorial peer review using the original ethics approval record, study materials, implementation records, and completed manuscript. It is not presented as a prospectively finalized or registered protocol.

Document History and Status

Version	Date	Prepared by	Description
1.1	27 August 2026	Research team	Retrospectively compiled protocol for journal submission, peer review, and trial registration

This document is not presented as a prospectively registered protocol. It records the study as implemented and distinguishes verified information from items requiring confirmation from contemporaneous source records.

Protocol Synopsis

Study title	Effects of AI-Assisted Emotional Regulation on Psychological Wellbeing and Facial-State Perception
Design	Two-arm, parallel-group, randomized controlled, minimal-risk behavioral intervention study
Setting	Communication University of Zhejiang and remote app-based participation
Population	Adults aged 18–30 years without severe psychiatric or dermatological conditions
Intervention	Daily use of MoodTalker, an AI-assisted conversational emotional-regulation system, for 42 days
Comparator	Maintenance of usual routine
Duration	42 days per participant, with weekly psychological assessment and daily mood recording
Primary outcome	Principal data-completeness-based psychological outcome: PANAS Positive Affect (PANAS-PA), analysed as the change from Week 3 to Week 6. This outcome and analysis window were selected after trial commencement, but before inspection of between-group outcome differences
Secondary outcomes	PANAS-NA, GAD-7, PHQ-9, Rosenberg Self-Esteem Scale, Brief Subjective Well-Being Scale for Chinese Citizens (SWBS-CC20), and daily mood rating
Exploratory outcomes	App-derived facial skin age and comprehensive skin score
Planned sample size	The planned sample size was approximately 60 participants based on recruitment feasibility and available resources; no formal a priori sample size calculation was conducted.
Actual sample	Actual sample: 63 participants randomized (intervention n = 39; control n = 24); 57 completed the 42-day follow-up. The principal PANAS-PA available-case analysis included 32 participants (intervention n = 23; control n = 9). The exploratory facial-state analysis included 30 participants (intervention n = 14; control n = 16).; facial-state subsample N=30
Ethics	Approved as minimal-risk human participant research (CUZ-RE-2025-05, 25 May 2025)
Consent	Oral informed consent obtained before participation; supplementary ethics clarification prepared

Registration	Not prospectively registered; explanation provided in Section 15

Part 1: Project Description

1. Project Summary

Psychological stress and negative affect may influence both mental wellbeing and facial skin condition through behavioral and neuroendocrine pathways. Artificial-intelligence-based conversational systems offer scalable emotional support, but most studies have relied primarily on self-reported psychological outcomes and have rarely examined concurrent app-based physiological or appearance-related indicators. This study evaluated a 42-day AI-assisted emotional-regulation intervention in adults aged 18–30 years. Participants were allocated to an intervention group using MoodTalker daily or to a control condition. Daily mood ratings and weekly psychological measures (PANAS, GAD-7, PHQ-9, self-esteem, and subjective well-being assessed using the SWBS-CC20) were collected. A subsample also completed repeated facial-state assessment using an independent mobile skin-analysis application. The principal data-completeness-based psychological analysis was to determine whether the AI-assisted intervention improved positive affect relative to the control condition. Secondary objectives examined anxiety, depressive symptoms, negative affect, self-esteem,subjective well-being, and daily mood. Facial skin age and comprehensive skin score were exploratory outcomes. The study was approved as minimal-risk human participant research before recruitment. Because the study was not prospectively registered, this protocol has been compiled retrospectively and will accompany a retrospective registry record and transparent disclosure in the manuscript.

The trial was not prospectively registered. A subsequent registration inquiry to ChiCTR could not be processed because the institution did not have an independently constituted ethics committee registered on the relevant national platform. The study had nevertheless received school-level ethics approval before participant recruitment.

2. Background and Rationale

Psychological stress is associated with anxiety, depressive symptoms, reduced positive affect, and impaired subjective wellbeing. Stress activates the hypothalamic – pituitary – adrenal axis and sympathetic nervous system and may influence cortisol secretion, immune activity, inflammation, epidermal barrier function, and wound healing [1][2][3]. These neuroendocrine and immune pathways form part of the proposed bidirectional brain – skin relationship and provide a biological rationale for examining psychological and facial-state outcomes within the same intervention framework. However, this theoretical relationship does not establish that changes in consumer application-generated facial indicators constitute validated physiological evidence.

Cognitive behavioral and mindfulness-based approaches are widely used to support emotional regulation, cognitive reframing, awareness of emotional experiences, and stress reduction[4][5]. Digital conversational agents may extend access to structured psychological support by offering remotely accessible, repeatable, and relatively low-marginal-cost interactions [6]. Preliminary studies of systems such as Woebot and Tess have examined conversational delivery of cognitive behavioral or psychological support, whereas Wysa has been evaluated as an empathy-oriented digital mental-wellbeing tool [7][8][9]. Systematic reviews and meta-analyses suggest that AI-based conversational agents may produce short-term improvements in some mental-health outcomes, but the evidence remains heterogeneous and is limited by short intervention periods, varying comparator conditions, incomplete safety evaluation, and inconsistent methodological quality [6][10][11].

Most previous evaluations of conversational mental-health systems have relied primarily on self-reported psychological outcomes. Psychological stress may influence visible or perceived skin condition through neuroendocrine, inflammatory, behavioral, and environmental pathways, but evidence directly linking improvement in psychological state to changes in commercial application-generated facial indicators remains limited [2][3]. Moreover, reviews of direct-to-consumer AI dermatology applications have identified insufficient clinical validation, limited algorithmic transparency, and inconsistent reporting of development and performance characteristics [12]. The present study therefore combined standardized psychological measures with exploratory app-derived facial-state indicators. Facial skin age and comprehensive skin score were treated as exploratory commercial application outputs rather than as validated dermatological, physiological, or diagnostic endpoints.

3. Objectives and Hypotheses

3.1 Principal Psychological Objective as Implemented

The principal psychological objective as implemented was to examine whether the intervention group showed a greater change in PANAS positive affect than the control group from Week 3 to Week 6. PANAS-PA and the Week 3-to-Week 6 analysis window were selected after trial commencement on the basis of data completeness, but before inspection of between-group outcome differences.

3.2 Secondary Objectives

- To compare longitudinal changes in negative affect, anxiety symptoms, depressive symptoms, self-esteem, and subjective well-being between groups.
- To describe and compare daily mood trajectories over the 42-day study period.
- To assess participant adherence to daily interaction and repeated assessments.

3.3 Exploratory Objective

To examine whether changes in psychological state are accompanied by favorable changes in app-derived facial skin age and comprehensive skin score.

3.4 Hypotheses

H1: The intervention group was expected to show a greater increase in PANAS positive affect than the control group, assessed using between-group differences in change scores.

H2 (exploratory): The intervention group was expected to show directionally more favorable changes in estimated skin age and comprehensive skin-condition scores than the usual-routine control group over the 42-day study period.

Facial-state indicators were collected daily from Day 0 through Day 42, yielding up to 43 assessment occasions per participant. Inferential analyses compared Day 0 with Day 42, whereas daily trajectories were interpreted descriptively.

4. Study Design

The study used a two-arm, parallel-group controlled design with repeated measurements over 42 days. Participants were randomly allocated to an AI-assisted emotional-regulation intervention group or a control group. Psychological outcomes were scheduled for weekly assessment during the 42-day intervention. In practice, most participants completed assessments at baseline, Week 3, and Week 6, and facial-state outcomes were analyzed in a smaller subsample with complete and readable assessment reports.

Random allocation was implemented during the study execution phase; however, as the study was not prospectively registered as a clinical trial, the randomization procedure was not pre-specified in a registered protocol. Participants were allocated according to a computer-generated random sequence. The final allocation included 39 participants in the intervention group and 24 participants in the control group. Due to the perceptible nature of the AI-based intervention, participant blinding was not feasible; therefore, the study was conducted using an open-label design.The study was designed with an intended 1:1 allocation ratio. Unrestricted simple randomization without blocking or stratification was used; consequently, the realized allocation was 39 participants in the intervention group and 24 participants in the control group.

5. Study Setting and Timeline

Participants were recruited from the Communication University of Zhejiang in Hangzhou, China. Intervention activities and outcome assessments were completed remotely in participants' naturalistic settings using online questionnaires, MoodTalker, and an independent commercial facial skin-analysis application.

Milestone	Date
Original ethics approval	25 May 2025
Recruitment advertising commenced	11 June 2025
First participant enrolled	17 July 2025
Last participant enrolled	21 November 2025
Last participant completed follow-up	7 January 2026
Data preparation completed	15 January 2026
Manuscript submitted	20 July 2026

6. Participants

6.1 Inclusion Criteria

- Age 18–30 years.
- No formal psychological counseling or mindfulness training within the previous six months.
- No severe dermatological condition, such as active severe acne, eczema, or psoriasis.
- Ability and willingness to use the required mobile applications and complete repeated assessments.

6.2 Exclusion Criteria

- PHQ-9 score ≥20 or GAD-7 score ≥15 at screening.
- History of major depressive disorder, bipolar disorder, schizophrenia, or another severe psychiatric disorder.
- Use of systemic corticosteroids, retinoids, or antidepressant medication within the preceding four weeks.
- Facial wounds, active infection, or recent cosmetic dermatological procedures.
- Regular mindfulness practice or meditation at least twice weekly for at least three consecutive months.
- Participation by minors.

6.3 Recruitment and Enrolment

Potential participants responded to campus-wide recruitment advertisements. Eligibility was assessed before enrolment. The first participant was enrolled on 17 July 2025 and the last participant was enrolled on 21 November 2025.

The research team retained records of participants who were ultimately enrolled in the study; however, complete screening logs for all individuals who responded to recruitment advertisements were not systematically maintained. Therefore, the CONSORT flow diagram primarily presents the numbers of enrolled participants, participants completing the study, and participants included in the final analyses.

6.4 Sample Size

The final enrolled sample included 63 participants (intervention n=39; control n=24). The study was designed as an exploratory controlled trial, and no formal a priori sample size calculation was conducted. Sample size determination was primarily based on recruitment feasibility, study duration, and participant availability. No post hoc statistical power calculation was performed.

The facial-state analysis included 30 participants (intervention n=14; control n=16) with complete and readable skin-assessment reports.

6.5 Withdrawal and Discontinuation Criteria

Participants could withdraw voluntarily at any time without consequence. Participation could also be discontinued if a participant experienced substantial emotional distress, requested professional psychological assistance, became unable to complete study procedures, or no longer wished to permit use of the collected data. Reasons for withdrawal were recorded where participants were willing to provide them.

7. Allocation, Blinding, and Contamination Control

7.1 Randomization

Participants were randomly allocated to the intervention and control groups using a computer-generated random sequence. As the study was not prospectively registered, details of the randomization procedure were not pre-specified in a public protocol.

7.2 Allocation Concealment

The computer-generated simple-randomization sequence was generated by H.X., who was not involved in participant recruitment or outcome assessment. S.Y. recruited and enrolled participants and implemented group assignments after baseline assessment according to the sequence. S.Y. had access to the sequence when assignments were implemented; therefore, no formal allocation-concealment mechanism was used.

7.3 Blinding

Participants were not blinded because of the perceptible nature of the intervention. Psychological outcomes were self-reported, and facial-state indices were automatically generated by the independent application. Statistical analyses used de-identified participant data; however, S.Y., who conducted the analyses, was aware of group allocation because between-group comparisons were required.

8. Interventions

8.1 Intervention Group: MoodTalker

Participants assigned to the intervention group used MoodTalker (Chinese name: 林间聊愈室), a commercially available AI-assisted conversational emotional-regulation application, for 42 consecutive days. Participants were instructed to complete at least one interaction per day. Interaction was available through text input and optional voice-related functions provided by the application.

From the participant-facing perspective, MoodTalker provided conversational emotional support, empathic responses, mindfulness-oriented prompts, cognitive reframing, positive-psychology exercises, and general

supportive dialogue. These functions were described on the basis of the application behavior observed by participants and the study materials used during intervention implementation.

Descriptions of the conversational workflow are functional descriptions based on observed application behavior and study materials. They should not be interpreted as independently verified descriptions of the proprietary server-side architecture. The research team did not have access to server-side model information, source code, model-training data, vector databases, algorithm documentation, parameter settings, psychological strategy-selection rules, or complete model-version records.

Accordingly, terms such as hierarchical AI architecture, semantic normalization module, emotion or intention recognition module, vector memory database, five-stage algorithmic workflow, and psychological strategy-selection module are not presented in this protocol as verified technical characteristics of the application. Any conceptual workflow used to explain participant-facing functions represents an interpretive functional framework rather than a documented reconstruction of the proprietary software architecture.

Publicly available application records indicate that MoodTalker underwent functional updates during the study period. The research team used the application as an end user and could not independently determine whether changes to the user interface, conversational model, or server-side functions occurred during individual participants' intervention periods.

8.2 Control Condition

Participants assigned to the control group did not receive the AI-assisted emotional-regulation intervention and were asked to maintain their usual daily routines. At the beginning of study implementation, they were additionally asked to complete a daily mood diary of approximately 50 – 200 Chinese characters. Because diary completion was sparse and inconsistent, this requirement was subsequently discontinued. The diary task was not treated as a structured comparator intervention or an outcome measure and was not included in the statistical analyses. Control participants continued to complete the daily numerical mood rating, weekly psychological assessments, and, where applicable, daily facial-state assessments.

8.3 Concomitant Care and Prohibited Activities

Participants were instructed not to initiate formal psychological counseling or structured mindfulness training during the 42-day intervention period. The use of medications and dermatological procedures relevant to the exclusion criteria was restricted.

Changes in psychological treatment, medication use, or dermatological interventions were monitored primarily through participant self-report. Participants were reminded during the study period to report any relevant changes.

8.4 Adherence

Both groups completed daily mood ratings.Adherence was assessed based on the number of completed daily mood ratings and available platform-use records. The mean number of completed daily mood ratings was 38.7 days in the intervention group and 33.5 days in the control group.

Daily mood-rating completion served as the primary adherence indicator.Adherence was defined as the number of days on which participants completed daily mood ratings. No minimum exposure threshold was pre-specified. Missing days were recorded according to actual completion status. When available, platform-use records were additionally considered to describe intervention engagement.

Completion of the 50–200-Chinese-character mood diary was not used as an adherence measure because this requirement was discontinued after low and inconsistent completion. For both groups, adherence was assessed primarily from completion of the daily numerical mood rating.

9. Outcome Measures

9.1 Main Psychological Outcome

Positive affect was assessed using the Positive Affect subscale of the Positive and Negative Affect Schedule (PANAS-PA).The principal comparison focused on between-group differences in change scores.

PANAS-PA was considered one of the main psychological outcomes of interest; however, it was not prospectively registered or formally designated as the sole primary endpoint before study initiation. Therefore, results were interpreted as representing the main psychological outcome rather than a pre-specified primary endpoint.

9.2 Secondary Psychological Outcomes

Measure	Definition
PANAS-NA	Negative affect; 10-item subscale; higher scores indicate stronger negative affect.
GAD-7	Seven-item anxiety symptom measure; total range 0–21; higher scores indicate greater anxiety.
PHQ-9	Nine-item depressive symptom measure; total range 0–27; higher scores indicate greater depressive symptoms.
Rosenberg Self-Esteem Scale	Ten-item measure; higher scores indicate greater self-esteem.
Brief Subjective Well-Being Scale for Chinese Citizens (SWBS-CC20)	Measure of cognitive subjective well-being; higher scores indicate greater subjective well-being.Items 4, 5, 6, 9, 10, 11, 13, 15, 17, 18, and 20 were reverse scored. Item scores were summed to yield a total score ranging from 20 to 120, with higher scores indicating greater subjective well-being.
Daily mood rating	Single-item rating from 0 (very poor) to 10 (excellent), recorded daily.

9.3 Exploratory Facial-State Outcomes

Facial-state outcomes were assessed using 你今天真好看 (descriptive English translation: “You Look Good Today”), a commercially available AI-assisted skincare application developed and operated by Hangzhou C2H4 Internet Technology Co., Ltd. The application was functionally independent of MoodTalker and was used exclusively for facial-state assessment.

The application generated two facial-state indicators used in the present study:

- Estimated skin age: an algorithm-derived estimate of facial skin age, with lower values indicating a younger estimated skin state.
- Comprehensive skin score: an application-generated composite score ranging from 0 to 100, with higher values indicating a more favorable overall skin-condition assessment.

Participants in the facial-state component completed an assessment on each day from baseline (Day 0) through the end of the intervention (Day 42), yielding up to 43 assessment occasions per participant. Participants were instructed to use the same application throughout the study, complete assessments at approximately the same time of day, and, where possible, maintain similar lighting, facial positioning, and imaging conditions.

At each assessment, participants captured an original facial photograph for processing by the application. The research team collected and retained both the original facial photograph and a screenshot of the corresponding application-generated assessment report. The numerical facial-state indicators used in the statistical analyses were extracted from these reports.

The original facial photographs and application-report screenshots were stored on restricted-access electronic storage managed by the research team and were linked to coded participant identifiers. Because facial photographs remain inherently identifiable even when filenames and associated records are coded, they were treated as sensitive identifiable research data and were excluded from public data sharing.

The research team did not have access to the application's proprietary image-processing algorithm, training data, parameter settings, score-construction procedures, or server-side version records. Publicly available application records indicate that the application underwent multiple updates during the study period. Participant-level application-version information was not systematically retained, and it could not be confirmed that all participants used an identical version throughout the assessment period.

No independent validation of the estimated skin age or comprehensive skin score was conducted in the present study. These outcomes were therefore treated as exploratory commercial application outputs rather than as validated dermatological measurements, physiological biomarkers, or clinical diagnostic indicators.

10. Schedule of Enrolment, Interventions, and Assessments

Activity	Screening / Baseline	Daily Days 1–42	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6 / End
Eligibility assessment	X							
Oral informed consent	X							
Group allocation	X							
MoodTalker intervention		Daily (intervention group)						
Control condition		Throughout study						
Daily mood rating		Daily						
PANAS	Baseline		X	X	X	X	X	X
GAD-7	Baseline		X	X	X	X	X	X
PHQ-9	Baseline		X	X	X	X	X	X
Self-esteem	Baseline		X	X	X	X	X	X
SWBS-CC20 subjective well-being	Baseline		X	X	X	X	X	X
Facial-state assessment	Baseline	Daily						Post-intervention

11. Data Collection and Management

11.1 Data Sources

- Online baseline and weekly questionnaires.
- Daily self-reported mood ratings.
- MoodTalker interaction/adherence records, where available.
- Original facial photographs collected from Day 0 through Day 42.
- Screenshots of the corresponding assessment reports generated by the 你今天真好看 application.
- Numerical estimated skin-age and comprehensive skin-score values extracted from the saved application reports.

11.2 Data Quality

S.Y. checked questionnaire completeness and facial-report readability before analysis. Facial-state analyses were restricted to participants with complete and readable assessment reports.

S.Y. conducted data-quality control procedures, including assessment of questionnaire completion, detection of potential abnormal values, and review of facial-assessment report completeness. As data were primarily collected through online systems, manual double data entry was not performed.

11.3 Confidentiality and Data Security

S.Y. organized questionnaire data, daily mood ratings, application-generated numerical outcomes, and statistical-analysis datasets using coded participant identifiers. Direct identifiers and consent-related communication records were not included in the statistical-analysis dataset.

Original facial photographs and application-report screenshots were stored in a dedicated password-protected and encrypted folder on a computer under the custody of S.Y., who served as the primary data custodian. Direct access to the identifiable facial-image folder was restricted to S.Y. DingTalk and WeChat consent-related records contain potentially identifiable information and are maintained separately from the coded analysis dataset. They are used only to document the consent process and are not included in statistical analysis or public data sharing.

Although coded filenames were used where practicable, original facial photographs were recognized as inherently identifiable visual data and were not regarded as anonymized information. Original facial photographs, identifiable report screenshots, and identifiable consent communications will not be deposited in a public repository, included in publications, or disclosed in response to routine data requests.

A fixed retention period for the original facial photographs was not specified at study initiation. This is acknowledged as a limitation of the original data-management arrangements. A current-dated supplementary data-retention and destruction plan will therefore be adopted and submitted for institutional confirmation.

Subject to institutional confirmation, identifiable facial photographs, identifiable application-report screenshots, and consent-related records will be retained for five years after publication of the study or formal closure of the research project, whichever occurs later. At the end of the approved retention period, these materials will be securely deleted from the research computer and any authorized backup media.

If an external hard drive is used as a backup, the drive will be encrypted, password protected, stored in a physically secure location under the custody of S.Y., and used only for authorized research-data backup. Identifiable data will not be transferred to an unencrypted external hard drive or retained indefinitely.

De-identified numerical research data and statistical documentation may be retained separately for research-integrity and reproducibility purposes, subject to institutional ethical and privacy requirements.

11.4 Data Availability

De-identified numerical data and statistical code may be made available from the corresponding author upon reasonable request, subject to institutional ethical approval, the scope of participant consent, and applicable privacy restrictions. Original facial photographs and identifiable application-report screenshots will not be publicly shared because they contain inherently identifiable and potentially sensitive participant information.

12.Quality Assurance

Questionnaire assessments were administered using standardized instructions. The same online questionnaire format and scoring procedures were used at the corresponding scheduled assessment points. S.Y. conducted scale scoring, including reverse-scored items, according to the applicable instrument instructions and reviewed questionnaire datasets for completeness, valid score ranges, internal consistency of coding, and apparent abnormal values before statistical analysis.

For the facial-state component, participants received standardized instructions concerning assessment timing, facial positioning, and lighting conditions. S.Y. reviewed the original facial photographs and application-generated reports for completeness and readability, extracted the numerical values used in the analysis, and checked those values against the corresponding saved screenshots where available. However, application-version changes and variations in illumination, imaging devices, temperature, humidity, and other naturalistic conditions could not be fully controlled.

Study records were assigned coded participant identifiers. Data coding, range checking, outcome derivation, and the identification of missing observations were reviewed before analysis. S.Y. was responsible for data preparation, management of the analysis datasets, implementation of all statistical analyses, generation of statistical outputs, and interpretation of the results. C.X. and H.X. contributed to validation and review of the analyzed information and checked consistency between the statistical outputs, tables, figures, and reported findings.

Manual double data entry was not performed because questionnaire responses were captured directly through electronic systems. This reduced errors associated with manual transcription but did not eliminate errors arising from participant entry, incomplete questionnaires, or extraction from third-party application reports. S.Y. therefore subjected the electronic data to completeness, plausibility, and consistency checks before analysis.

No independent Data and Safety Monitoring Board was established. The study involved a small, minimal-risk, non-pharmacological behavioral intervention, did not include invasive procedures or clinical treatment, and did not involve interim efficacy analyses or formal early-stopping rules. Participant concerns and safety events were handled by the research team under the supervisory responsibility specified in the project-management section.

Because this protocol was compiled after completion of the study, no formal prospective protocol-deviation log was maintained. Deviations and implementation differences identifiable from the ethics documents, questionnaire records, application reports, study logs, and completed manuscript were documented retrospectively. These included incomplete scheduled assessments, unequal data completeness between groups, the absence of formal allocation concealment, and the post-commencement selection of Weeks 3 and 6 as the principal psychological analysis window. The Week 3-to-Week 6 analysis window was selected on the basis of data completeness before examination of between-group outcome differences.The initially requested control-group mood-diary task was discontinued during implementation because of low and inconsistent completion. It was not retained as a standardized comparator intervention or included in the statistical analyses.

13. Statistical Analysis Plan

13.1 General Principles

All statistical analyses were conducted by S.Y. using StataNow 19.5 MP. Statistical tests were two-sided with an alpha level of 0.05. Effect sizes and 95% confidence intervals were reported where applicable.

13.2 Psychological Outcomes

Psychological outcomes were analyzed using change-score approaches. The principal psychological analysis compared changes from Week 3 to Week 6. Individual change scores were calculated as Week 6 minus Week 3. Participants with valid observations at both time points for the relevant outcome were included in the corresponding available-case analysis.Effect sizes (Cohen’s d) and 95% confidence intervals were reported where applicable. Psychological outcomes were analyzed using change-score approaches. The principal psychological analysis compared changes from Week 3 to Week 6. Individual change scores were calculated as Week 6 minus Week 3. Participants with valid observations at both time points for the relevant outcome were included in the corresponding available-case analysis.Effect sizes (Cohen’s d) and 95% confidence intervals were reported where applicable.

Week 3 and Week 6 were selected prior to inspecting inter-group outcome differences, as these time points offered the highest degree of data completeness. Since this analysis was not pre-specified in a registered protocol, it should be viewed as a primary data-completeness-driven analysis rather than a confirmatory one.The decision to focus on Weeks 3 and 6 and to treat PANAS-PA as the principal data-completeness-based psychological outcome was made after trial commencement, owing to greater data completeness at these assessment points, but before inspection of between-group outcome differences.

13.3 Daily Mood

The mean daily mood score across the 42-day period was calculated for each participant and compared between groups. Time-series plots of group means were used descriptively.Daily mood analysis was considered exploratory and descriptive.

13.4 Facial-State Outcomes

Daily group means from Day 0 to Day 42 were calculated to descriptively illustrate trajectories in estimated skin age and comprehensive skin-condition scores. Inferential analyses focused on changes from Day 0 to Day 42. Within-group changes were evaluated using paired-samples t-tests, and between-group differences in change scores were examined using independent-samples t-tests. Nonparametric bootstrap resampling with 1,000 iterations was used to estimate 95% confidence intervals. Daily trajectories were descriptive and were not treated as confirmatory longitudinal analyses.

13.5 Missing Data and Analysis Population

All 63 participants were randomized. Psychological outcome analyses used available cases with valid observations at both Week 3 and Week 6 for the corresponding outcome. The principal PANAS-PA analysis included 32 participants, comprising 23 of 39 participants in the intervention group and 9 of 24 participants in the control group. Participants with missing data at either time point were excluded only from the corresponding analysis, and no missing values were imputed. Analyses retained participants in their originally assigned groups, but the available-case analyses were not intention-to-treat analyses.

13.6 Multiplicity and Exploratory Analyses

Multiple psychological outcomes and exploratory facial-state outcomes were examined. No formal multiplicity adjustment was planned or performed. Given the exploratory nature of the study, findings were interpreted

based on the consistency of results, effect sizes, and confidence intervals rather than isolated P values alone. Facial-state outcomes were considered exploratory due to the smaller subsample size and the lack of independent validation of the commercial assessment algorithm.

13.7 Interim Analyses and Stopping Rules

No interim analyses were performed, and no formal trial-level stopping guidelines were prespecified. Participants could discontinue individual participation at any time. Safety-related discontinuation procedures are described in Section 13.

14. Safety and Adverse Events

The study was considered minimal risk and did not involve medication, invasive procedures, or medical treatment. Potential risks included temporary emotional discomfort, fatigue from repeated questionnaires, privacy concerns, and distress during emotionally focused conversations.

Participants were allowed to stop interactions or withdraw from the study at any time. Individuals with severe baseline anxiety or depressive symptoms were excluded.

No serious adverse events were reported during the study period. One participant in the usual-routine control group withdrew because of anxiety-related concerns. Because this participant did not receive the AI intervention, the withdrawal was not attributed to the AI intervention. No other adverse events or unintended effects were reported in either group.If participants experienced significant emotional discomfort, researchers advised them to discontinue participation and seek professional psychological support when appropriate.Adverse events were monitored through participant self-report and researcher communication; no formal independent safety-monitoring board was established because the study was minimal risk.

15. Follow-up

The planned participant follow-up ended at Day 42. No additional scheduled post-trial follow-up assessment was conducted. Participants who reported significant emotional discomfort were advised to discontinue participation and seek professional psychological support. The final participant completed follow-up on 7 January 2026.

16. Ethics and Informed Consent

The study received ethics approval from the School of Design Arts, Communication University of Zhejiang on 25 May 2025 (Approval No. CUZ-RE-2025-05), before participant recruitment and enrolment commenced.

Before baseline assessment and group allocation, researchers remotely explained the study purpose, procedures, random assignment, voluntary nature of participation, right to withdraw, potential emotional discomfort, privacy protections, collection of psychological information, and intended academic use of the research data.

Remote informed consent was obtained through one of three communication channels: DingTalk, WeChat, or telephone. For participants contacted through DingTalk or WeChat, consent-related communications and participant confirmation were retained as time-stamped electronic chat records. For participants contacted by telephone, oral agreement was obtained during an unrecorded telephone call. The telephone calls were not audio-recorded, and no verbatim recording or transcript of those conversations is available.

Participants enrolled in the facial-state component were explicitly informed that the research team would collect and retain both the original facial photographs and screenshots of the application-generated reports. They were also informed that these materials would be used for research purposes and would not be publicly disclosed.

The recruitment information, participant information summary, oral-consent explanation, and consent-documentation procedure are included as protocol appendices. Where the exact wording of the original explanation was not retained, the relevant appendix is explicitly identified as a retrospective reconstruction based on the ethics record, electronic communications, study procedures, and available implementation records.

No consent record has been backdated. The research team has not retrospectively created telephone recordings, transcripts, or individual 2025 consent forms. Any supplementary authorization obtained after completion of the study will bear the actual current date and will be described as supplementary authorization for continued storage or use of previously collected data.

17. Trial Registration and Protocol Transparency

The trial was not prospectively registered. Following the journal's technical assessment, the research team contacted the Chinese Clinical Trial Registry (ChiCTR). ChiCTR indicated that the submission could not be processed because the Communication University of Zhejiang did not have an independently constituted ethics committee registered on the relevant national platform required for ChiCTR submission. The absence of prospective registration is transparently acknowledged. School-level ethics approval had nevertheless been obtained before participant recruitment (Approval No. CUZ-RE-2025-05, 25 May 2025).

This protocol was also compiled retrospectively. It should be uploaded with a transparent version date and should not be represented as a prospectively finalized protocol.

18.Excepted Outcomes and Significance

At study initiation, the AI-assisted emotional-regulation intervention was expected to produce directionally favorable changes in positive affect and related psychological outcomes compared with maintenance of usual routines. Potential favorable changes were also anticipated for negative affect, anxiety symptoms, depressive symptoms, self-esteem, subjective wellbeing, and daily mood. Given the exploratory design and the absence of a formal a priori sample-size calculation, no specific effect magnitude was assumed.

Facial-state assessments were expected to provide preliminary exploratory evidence regarding whether psychological emotional regulation might be accompanied by changes in app-derived skin age and comprehensive skin-condition scores. These measures were not expected to provide validated dermatological diagnoses or definitive evidence of biological mechanisms.

Because this protocol was compiled retrospectively, these expected outcomes are presented as a general statement of the study rationale at initiation and were not reconstructed from the observed statistical results. No observed effect estimates, confidence intervals, P values, or statements of statistical significance are included in this section.

19.Dissemination and Publication Policy

Study findings will be submitted for publication in a peer-reviewed academic journal and may be presented at relevant academic conferences. Results will be reported regardless of whether the observed findings are statistically significant. Reports will describe null findings, missing data, participant withdrawals, adverse events, protocol limitations, and exploratory results where applicable.

Subject to the availability of participant contact information and applicable ethical and privacy restrictions, a brief plain-language summary of the overall study findings may be made available to participants upon request after completion of the editorial and publication process. The summary will contain aggregated findings only and will not include individual psychological scores, application records, facial reports, or other identifiable information.

S.Y. is responsible for preparation of the original manuscript draft and formal analysis. C.X. is responsible for methodological supervision, project administration, critical review, and correspondence with the journal. H.X. contributed to investigation, resources, project administration, validation, and manuscript review. All listed authors will review and approve the final report and will accept responsibility for the integrity of their respective contributions.

Authorship will be based on substantial contributions to the study, participation in drafting or critical revision, approval of the final version, and accountability for the work. Technical assistance that does not satisfy the full authorship criteria will be acknowledged with the contributor’ s permission.

Only aggregated or de-identified information will be included in publications and presentations. Identifiable facial photographs, identifiable application screenshots, private AI conversation content, names, contact details, and other direct identifiers will not be published or shared.

The full participant-level dataset will not be placed in a public repository because it contains potentially sensitive psychological, conversational, and facial-state information and is subject to institutional ethical and privacy restrictions. De-identified data and statistical code may be made available by the corresponding author upon reasonable request, subject to the scope of participant consent, institutional approval, privacy review, and applicable data-protection requirements.

20. Project Timeline

Time	Activity
May 2025	Ethics review, ethics approval on 25 May 2025, and finalization of study materials.
June-July 2025	Recruitment advertising and participant screening. The exact date on which advertising commenced should be verified from the original recruitment materials.
17 July-21 November 2025	Participant enrolment and baseline assessment. The first participant was enrolled on 17 July 2025 and the last participant was enrolled on 21 November 2025.
July 2025-7 January 2026	Staggered delivery of the 42-day interventions and completion of participant follow-up.
8-15 January 2026	Data preparation, coding, completeness review, and data cleaning.
January-July 2026	Statistical analysis, interpretation, preparation of figures and tables, and manuscript drafting.
20 July 2026	Initial manuscript submission.
27 July 2026	Preparation of Version 1.0 of the retrospectively compiled trial protocol.
August-September 2026	Editorial revision, preparation of the CONSORT checklist, protocol review, and revision of related manuscript materials.

Timeline clarification. *The date 11 June 2025 should be retained only if the original recruitment advertisement or another contemporaneous record confirms that recruitment advertising began on that date. It should not be described as the first participant-enrolment date. The verified first-enrolment date reported in the manuscript is 17 July 2025.*

21.Problems Anticipated and Methodological Constraints

Because this protocol was compiled retrospectively, this section documents both foreseeable methodological problems and problems identified during study implementation. It should not be interpreted as a prospectively registered risk assessment.

Online assessment and missing data. Remote questionnaire administration was expected to increase accessibility but also created a risk of missed or incomplete assessments. Data completeness differed across participants and between study groups. Consequently, available-case analyses included substantially fewer participants than the randomized sample and may be affected by attrition bias if missingness was related to participant characteristics, group assignment, or intervention response.

Unequal group allocation and absence of allocation concealment. Although the intended allocation ratio was 1:1, the final allocation was 39 participants in the intervention group and 24 participants in the control group. No formal allocation-concealment mechanism was implemented. These features may have produced baseline imbalance, reduced statistical precision, and increased the possibility of selection or implementation bias. The findings should therefore not be interpreted as equivalent to those of a fully concealed confirmatory randomized trial.

Open-label intervention. Participants could not be blinded because intervention-group participants directly used MoodTalker. The research team also had access to assignment information during study implementation. Expectancy, behavioral, performance, and self-report biases may therefore have influenced subjective psychological outcomes.

Commercial intervention-platform changes. MoodTalker was a commercially available third-party platform and underwent functional updates during the study period. The research team did not have access to server-side model records, model-version histories, algorithm documentation, parameter settings, or update logs. Participants may therefore have received functionally non-identical platform versions, limiting intervention reproducibility and preventing attribution of outcomes to a specific model configuration.

Commercial facial-assessment application. Facial-state outcomes were generated using a proprietary commercial application that underwent multiple updates during the study period. Participant-level application-version information was not retained, and the research team could not inspect or independently validate the image-processing algorithm, training data, or score-construction procedures. In addition, facial photographs were captured in naturalistic settings without strict control of illumination, imaging devices, temperature, or humidity. These factors may have introduced measurement heterogeneity and limit the reproducibility, biological interpretation, and clinical validity of the facial-state findings. The outcomes were therefore treated as exploratory commercial application outputs.

Small sample size. No formal a priori sample-size calculation was conducted. The randomized sample was modest, and the facial-state analysis was based on a smaller subsample. Statistical estimates may therefore be imprecise, vulnerable to extreme observations, and insufficiently generalizable to broader clinical or community populations.

Absence of prospective trial registration. The study was not registered before participant enrolment. The absence of prospective registration limits independent verification of the originally intended outcomes and analyses and increases the potential risk of selective outcome reporting. All primary, secondary, and exploratory designations should therefore be described transparently and should not be presented as prospectively registered specifications.

Post-commencement selection of the principal analysis window. Although psychological assessments were scheduled across the six-week period, the principal change-score analysis focused on Weeks 3 and 6 because these assessment points had the greatest data completeness. This decision was made after trial commencement but before inspection of between-group outcome differences. The decision nevertheless introduced analytical flexibility and limits confirmatory interpretation. The principal analysis should therefore be described as post-commencement, data-completeness-driven, and exploratory.

Consent documentation and identifiable-data retention. Remote consent was obtained through DingTalk, WeChat, or unrecorded telephone calls. Time-stamped electronic records were available for consent-related communications conducted through DingTalk or WeChat, whereas telephone calls were not audio-recorded and no

verbatim transcripts were retained. This limits independent verification of the exact wording used in telephone-based consent discussions.Participants in the facial-state component were informed that original facial photographs would be collected and retained. However, a specific retention period was not established at study initiation. The absence of a predetermined deletion date represents a limitation of the original data-management arrangements. A current-dated retention and destruction plan was therefore developed after study completion and will not be represented as a prospectively specified procedure.

22. Project Management and Responsibilities

Function	Responsible person or entity	Responsibility
Principal investigation and participant coordination	Sun Yuyu (S.Y.)	Coordination of study implementation, participant communication, data collection, data curation, preparation of study materials, and formal analysis.
Methodological supervision and correspondence	Cao Xiaoxiao (C.X.)	Methodological oversight, project supervision, validation, manuscript review, funding acquisition, and correspondence with the journal.
Co-investigation and validation	Hou Xiangyu (H.X.)	Investigation, project administration, provision of research resources, validation, and critical review of the manuscript.
Ethics and safety oversight	S.Y. served as the initial contact for participant concerns, with supervisory oversight and escalation by C.X.	Monitoring participant concerns, documenting withdrawals and adverse events, advising participants to discontinue participation when appropriate, and recommending professional support where necessary.
Data custody	S.Y.	Maintenance of coded research data, separation of direct identifiers from analysis files, access control, data preparation, and responses to authorized data requests.
Random-sequence generation	H.X.	Generation of the computer-based simple randomization sequence before participant enrolment. This researcher was not involved in participant recruitment or outcome assessment.
Recruitment and enrolment	S.Y.	Distribution or coordination of recruitment information, eligibility assessment, enrolment, baseline assessment, and confirmation of oral informed consent.
Allocation implementation	S.Y.	Implementation of group

		assignments after completion of baseline assessment according to the computer-generated sequence.
Formal statistical analysis	S.Y.	Preparation of analysis datasets, implementation of all statistical analyses using StataNow 19.5 MP, generation of tables and figures, and interpretation of results.
Data and output verification	C.X. and H.X.	Review of data coding, consistency of reported sample sizes, scale definitions, tables, figures, and correspondence between the statistical outputs and manuscript.
Final reporting	S.Y., C.X., and H.X.	S.Y. prepared the original draft; C.X. supervised and critically revised the report; H.X. contributed validation and critical review. All authors are responsible for reviewing and approving the final manuscript and retrospectively compiled protocol before submission.
MoodTalker platform provider	Guangzhou Xinjiyuan Information Technology Co., Ltd.	Provider of the existing third-party AI conversational platform. The provider had no role in study design, recruitment, data collection, statistical analysis, interpretation, or publication decisions.
Facial-state application provider	Hangzhou C2H4 Internet Technology Co., Ltd. (杭州以息互联网科技有限公司)	The provider had no role in the psychological intervention, study design, statistical analysis, interpretation, or publication decisions.
Facial-state assessment administration	S.Y.	Provision of standardized assessment instructions, collection of participant-saved reports or screenshots, report-readability checks, data extraction, coding, and preparation of the facial-state analysis data set.
Facial-state algorithm and application updates	Hangzhou C2H4 Internet Technology Co., Ltd.	The application provider independently controlled the proprietary algorithm, application updates, and server-side functions. The research team had no control over or access to these technical processes.

Custody of identifiable facial data and consent records	S.Y.	Maintenance of the encrypted facial-image folder and available consent-related communication records; control of access permissions; separation of identifiable materials from the coded analysis dataset; maintenance of any authorized encrypted backup; response to authorized access requests; and secure deletion at the end of the approved retention period.

PART 2: ADMINISTRATIVE INFORMATION

P2.1 Budget

The study was conducted with support from the National Social Science Fund of China Youth Project (Grant No. 24CMZ080) and the International Partnership Program of the Communication University of Zhejiang. The available funding supported research activities permitted under the respective awards, including preparation of study materials, participant coordination, data collection and management, data processing and statistical analysis conducted by S.Y., and preparation and dissemination of research outputs.

No funds were received from the developer or operator of MoodTalker or from the developer or operator of the facial-state assessment application. Neither application provider supplied study-specific financial support, equipment, preferential access, analytical services, or other material benefits.

Because this protocol was prepared for journal peer review after completion of the study, a detailed item-by-item financial statement is not reproduced in this document. Detailed budget allocations, expenditure records, reimbursement documents, and supporting financial materials are maintained in the relevant institutional and project-administration records and may be made available for authorized administrative or editorial review where applicable.

P2.2 Other Support for The Project

The project received financial support from the following two sources:

Funding organization or program	**Award information**	**Nature of support**
National Social Science Fund of China, Youth Project	Grant No. 24CMZ080	Support for research activities conducted within the approved scope of the funded project.
International Partnership Program of the Communication University of Zhejiang	Not applicable (no award number assigned)	Institutional support for international research collaboration, research implementation, and preparation and dissemination of academic outputs within the approved project

		scope.

Note. *No project or award number was assigned to the International Partnership Program of the Communication University of Zhejiang.*

The funding organizations had no role in participant recruitment, group allocation, intervention delivery, outcome assessment, data analysis, interpretation of the findings, preparation of the manuscript, or the decision to submit the findings for publication.

S.Y. was responsible for data preparation, implementation of the statistical analysis plan in StataNow 19.5 MP, generation of statistical outputs, and interpretation of the findings.

No other financial, commercial, or in-kind support specifically associated with this study was received.

P2.3 Collaboration With Other Scientists or Reasearch Institutions

The study was conducted by investigators affiliated with the School of Design Arts, Communication University of Zhejiang. No formal scientific collaboration, data-sharing partnership, or research agreement was established with another university, hospital, clinical institution, or commercial technology company for the conduct of this study.

MoodTalker was used as an existing third-party AI conversational platform. The research team did not collaborate with the platform developer in designing, adapting, or implementing the intervention. The developer did not provide access to proprietary server-side architecture, source code, model parameters, version histories, conversation-processing records, or internal algorithm documentation and had no role in study design, recruitment, data collection, statistical analysis, interpretation, or publication.

The facial-state assessment application was an independent third-party commercial tool and was not developed or modified for this study. No collaboration or data-analysis agreement was established with its developer or operator. The research team did not receive privileged access to the proprietary facial-analysis algorithm and did not request or receive interpretative assistance from the application provider.

Data preparation and all statistical analyses, including the StataNow 19.5 MP computations, were conducted by S.Y. within the research team.

P2.4 Links to Other Projects

The study received administrative and financial support through the two funding programs identified in Section P2.2. However, it was not conducted as a substudy of another clinical trial, was not part of a multicenter trial, and did not share participant recruitment, intervention allocation, or participant-level datasets with another research project.

No other scientific project depended upon the completion or findings of this study, and no participant data collected in this study were prospectively designated for use in a separate linked project. Any future secondary analysis would require consistency with the scope of participant consent, institutional ethical requirements, and applicable privacy restrictions.

Beyond the funding relationships disclosed above, no additional links to other projects are applicable.

P2.5 Curriculum Vitae of The Investigators

One-page curriculum vitae summaries for the principal investigator and co-investigators, including relevant academic qualifications, institutional affiliations, research experience, publications, and current research responsibilities, are maintained with the project's administrative records. They may be provided to the journal, ethics reviewers, or other authorized reviewers upon reasonable request.

If required as part of the protocol submission package, the curriculum vitae will be supplied as separate administrative appendices rather than incorporated into the main protocol text.

P2.6 Other Research Activities of The Investigators

The investigators may have participated in other academic or institutionally supported research activities during the period in which this study was conducted. These activities were administratively and scientifically separate from the present study and did not share its participant sample, group allocation, identifiable participant information, private AI conversation content, or facial-state records.

No concurrent research activity created a known financial or professional conflict affecting the design, conduct, analysis, interpretation, or reporting of this study. Information concerning the investigators' other research projects, funding sources, project durations, and research commitments is maintained in their institutional research and curriculum vitae records and may be supplied for authorized review upon request.

No other investigator research activity requiring specific disclosure as a linked component of this study is applicable.

P2.7 Financing and Insurance

The financial support for the study is described in Sections P2.1 and P2.2. The study did not receive commercial sponsorship, and neither third-party application provider assumed financial, legal, or regulatory responsibility for the research. The investigators and the Communication University of Zhejiang retained responsibility for the academic conduct and reporting of the study within the scope of the applicable institutional arrangements.

No study-specific clinical-trial or research-participant insurance policy was purchased. The study was classified and conducted as a minimal-risk, non-pharmacological behavioral study. It did not involve administration of medicines, invasive procedures, biological-specimen collection, or experimental medical devices. Participation primarily involved use of an existing AI conversational application, completion of online psychological assessments, and, for the facial-state component, use of a commercially available facial-assessment application.

The absence of study-specific insurance did not remove the investigators' responsibility to respond to participant distress or safety concerns. Participants could discontinue participation at any time. Participants reporting significant psychological discomfort were advised to stop the study procedures and seek appropriate professional psychological or medical support. One participant in the usual-routine control group withdrew because of anxiety-related concerns; the withdrawal was not attributed to the AI intervention because the participant had not received that intervention. No other adverse events or unintended effects were reported.

No contractual indemnity, compensation arrangement, or insurance coverage was provided by MoodTalker or the facial-state application provider. Any applicable institutional responsibilities remained subject to the policies and regulations in effect at the Communication University of Zhejiang.

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APPENDICES

The following appendices provide the study-flow information, assessment schedule, participant-facing materials, measurement instruments, facial-assessment instructions, ethics documentation, and safety procedures relevant to the study. Where an appendix was compiled retrospectively from available study records, this status is explicitly identified. No participant-information, consent, ethics, or safety document has been backdated.

Appendix 1. Study Flow Diagram

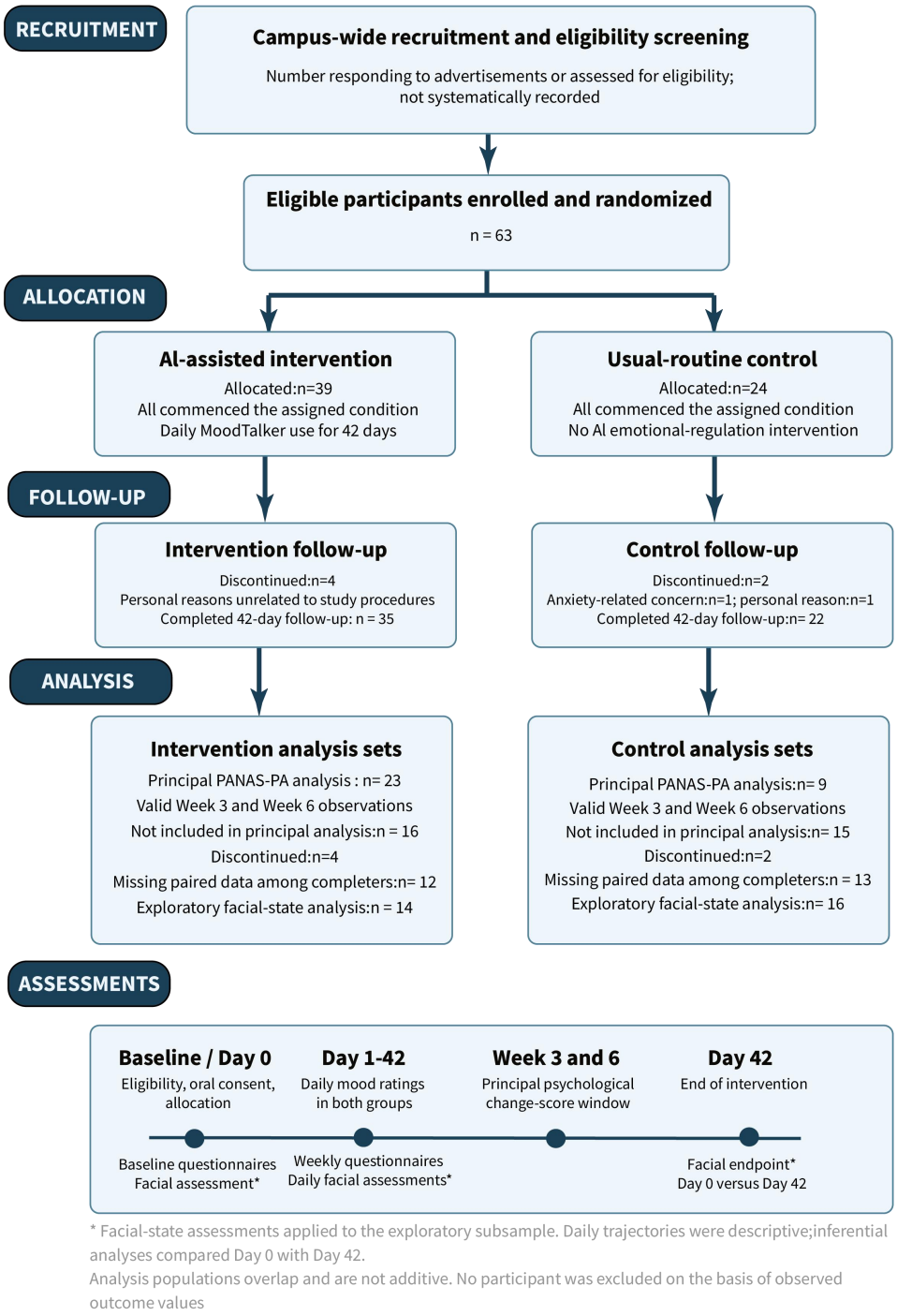


Figure A1. Participant flow through enrolment, allocation, follow-up, and analysis

Note. Complete counts of individuals who responded to recruitment advertisements and underwent eligibility screening were not systematically retained. Accordingly, the flow diagram begins with the 63 participants who were enrolled and randomized. Analysis populations differed according to outcome-specific data availability.

Appendix 2. Schedule of Enrolment, Interventions, and Assessments

Document status: Retrospectively compiled on 29 August 2026 from the ethics record, questionnaire schedule, study procedures, and available implementation records, and revised after review of two contemporaneous participant record guides created on 16 July 2025 and modified on 13 September 2025. The tables distinguish scheduled assessments, guide-specific daily tasks, and completed analysis time points; they are not represented as a prospectively finalized schedule.

Related protocol : Version 1.1, 27 August 2026

Study duration : 42 days per participant; staggered enrolment from 17 July to 21 November 2025; final follow-up completed 7 January 2026

Symbols : X = scheduled once; Daily = scheduled each day; Ongoing = monitored throughout the period

Table A2.1. Schedule as implemented

Study activity	Screening / pre-enrolment	Day 0 / baseline	Days 1-42	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6 / Day 42
Recruitment and eligibility screening	X								
Remote informed consent	X								
Baseline psychological assessment		X							
Computer-generated random allocation		X after baseline							
Guide A: MoodTalker conversation and chat screenshot			Daily; about 10 min						
Guide B: 50-200-character mood diary*			Daily						
Daily mood rating			Daily; 1-10						
PANAS		X		X	X	X	X	X	X
GAD-7		X		X	X	X	X	X	X
PHQ-9		X		X	X	X	X	X	X
Rosenberg Self-Esteem Scale		X		X	X	X	X	X	X
SWBS-CC20		X		X	X	X	X	X	X

Study activity	Screening / pre-enrolment	Day 0 / baseline	Days 1-42	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6 / Day 42
Facial-state assessment (subsample)		X	Daily, including Day 42						Endpoint *
Adverse-event and withdrawal monitoring			Ongoing						Review
End-of-study assessment / study completion									X

Note. *Psychological measures were scheduled at baseline and weekly, although data completeness varied across occasions. Facial-state assessment was scheduled daily from Day 0 through Day 42, yielding up to 43 observations per participant. The retained guides do not state group labels; the task-to-group mapping in Table A2.2 is inferential and requires verification from contemporaneous allocation communications. *The Week 6/Day 42 entry is the same Day 42 end-point, not an additional facial assessment.*

Table A2.2. Daily operational tasks documented in the contemporaneous participant guides

Operational task	Guide A: AI-conversation version	Guide B: mood-diary version	Protocol implication
Daily emotional activity	Use MoodTalker (participant-facing guide name: 林间疗愈室) for about 10 minutes; discuss the day's mood or thoughts.	Write a 50-200-Chinese-character mood diary describing the day's mood.	The comparator should not be described solely as 'usual routine' if Guide B was assigned to that group; the group mapping must be verified.
Emotional-content record	Save and submit a screenshot of the AI conversation.	The guide requests a written mood diary. Its closing reminder nevertheless still refers to a 'conversation screenshot,' an internal template inconsistency.	Chat screenshots and/or mood-diary text are participant-generated sensitive emotional data and must be disclosed as collected materials.
Facial-state capture	Daily use of 你今天真好看 under a white light source and at a fixed angle.	Same instruction.	Standardization was requested, but naturalistic lighting, device, and angle variation could not be fully controlled.
Facial materials submitted	Application-generated skin-report screenshot plus the original photograph used for the assessment.	Same instruction.	The guide states that original photographs would be collected confidentially and used only with explicit agreement.
Daily mood rating	One integer from 1 to 10, with five labelled score	Same instruction.	All appendix references to a 0-10 scale are corrected to 1-10. The retained guide

Operational task	Guide A: AI-conversation version	Guide B: mood-diary version	Protocol implication
	bands.		does not support a zero response option.
End-of-day submission	Send the conversation screenshot, skin-report screenshot, and mood score to the research lead.	Closing reminder uses the same three-item wording despite the earlier diary instruction.	The inconsistency is preserved and disclosed; it should not be silently harmonized as evidence of identical implementation.

Source note: *Both files were created on 16 July 2025, one day before first enrolment, and modified on 13 September 2025 during the trial. They are therefore contemporaneous operational materials, but the retained metadata cannot establish that the same wording was sent to every participant from the first day of recruitment. The official Chinese spelling of the MoodTalker participant-facing name also requires verification: the guides use 林间疗愈室, whereas the current main protocol uses 林间聊愈室.*

Table A2.3. Relationship between scheduled assessments and completed analyses

Outcome / process	Scheduled observations	Completed analysis time points	Analysis status and transparency note
PANAS positive affect (PANAS-PA)	Baseline and Weeks 1-6	Change from Week 3 to Week 6; available cases with both observations	Principal data-completeness-based psychological outcome. The outcome and window were selected after trial commencement because these occasions had the greatest completeness, but before inspection of between-group outcome differences.
PANAS-NA, GAD-7, PHQ-9, self-esteem, and SWBS-CC20	Baseline and Weeks 1-6	Change from Week 3 to Week 6 for each outcome; available cases	Secondary exploratory analyses. Missing values were not imputed, and analysis populations could differ by outcome.
Daily mood rating	Once daily on Days 1-42	Mean of each participant's available daily ratings across the 42-day period; group trajectories described	Exploratory and descriptive; daily mood completion also served as the primary adherence indicator.
Estimated skin age and comprehensive skin score	Once daily from Day 0 through Day 42 in the facial-state subsample	Inferential comparison of Day 0 with Day 42; Day 0-42 trajectories displayed descriptively	Exploratory commercial application outputs; not validated dermatological, physiological, or diagnostic endpoints.
Adherence	Daily during the 42-day period	Number of completed daily mood ratings; platform-use records considered where available	No minimum exposure threshold was pre-specified. Missing days were recorded as not completed.

Outcome / process	Scheduled observations	Completed analysis time points	Analysis status and transparency note
Safety and withdrawal	Monitored throughout participant communication and study procedures	Descriptive review of withdrawals and reported adverse events	No independent Data and Safety Monitoring Board or formal interim stopping rule was used because the study was small, non-pharmacological, and minimal risk.

Interpretive note: *All 63 participants were randomized (intervention n=39; control n=24). Outcome-specific analysis samples were smaller because data completeness differed across measures and occasions. The principal PANAS-PA available-case analysis included 32 participants (intervention n=23; control n=9), and the facial-state analysis included 30 participants (intervention n=14; control n=16).*

Appendix 3. Participant Information Summary

Appendix 3A. Chinese version / 附录 3A：参与者信息说明（中文）

文件状态：本说明于 2026 年 8 月根据伦理审批记录、电子沟通、研究流程和问卷记录回顾性重建，并于审阅两份同时期《受试者记录指南》后修订。两份指南创建于 2025 年 7 月 16 日、修改于 2025 年 9 月 13 日，能够证明部分每日操作要求，但不包含完整的研究目的、随机分组、自愿参加、退出权利和全部风险说明，因此不能替代完整的参与者信息说明或知情同意材料，也不能证明同一措辞曾发送给每位参与者。

研究名称	人工智能辅助情绪调节对心理福祉与面部状态感知的影响
研究机构	浙江传媒学院设计艺术学院
主要研究者	孙钰榆（S.Y.）
指导教师/通讯作者	曹晓晓副教授；caoxiaoxiao@cuz.edu.cn
伦理批准	CUZ-RE-2025-05；批准日期：2025 年 5 月 25 日
研究周期	每位参与者 42 天

1. 为什么开展这项研究?

本研究旨在了解：连续 42 天使用人工智能辅助对话进行情绪调节，是否可能影响青年参与者的积极情绪、消极情绪、焦虑和抑郁症状、自尊、主观幸福感及每日心情。研究还探索心理状态变化是否伴随商业面部状态评估应用生成的“皮肤年龄”和“综合皮肤评分”变化。后两项仅作为探索性应用输出，不是医学诊断、皮肤科检查或经本研究验证的生理指标。

2. 为什么邀请你参加?

研究面向 18-30 岁的成年人。参加前，研究人员将根据年龄、近期心理咨询或正念训练经历、心理与皮肤健康状况、近期用药或医美情况及移动应用使用条件进行资格筛查。基线 PHQ-9 得分不低于 20 分或 GAD-7 得分不低于 15 分者不纳入研究，并建议在需要时寻求专业支持。

3. 参加研究是否自愿?

完全自愿。你可以拒绝参加，也可以在研究期间随时停止某项程序或退出研究，不会因此受到处罚。若你愿意，可以说明退出原因；不愿说明也不影响退出。若你希望停止继续使用已收集的数据，可向研究团队提出，研究团队将依据同意范围、学校要求及适用的隐私规定处理。

4. 如果参加，需要做什么?

完成资格筛查、远程知情同意和基线心理测评。

在基线测评后，按照计算机生成的随机序列分入实验组或对照组；不能自行选择组别。

指南 A 要求每天使用 MoodTalker 约 10 分钟，分享当天的心情、感受或想法，并在对话后保存和提交聊天内容截图。指南使用的中文名称为“林间疗愈室”；主 protocol 现写作“林间聊愈室”，正式名称仍需核实并统一。

指南 B 要求每天撰写 50-200 字的心情日记。文件本身没有标注组别；根据其不包含 MoodTalker 任务的内容，推断其可能对应另一组/比较条件，但这一对应关系应以当时的分组沟通记录核实。因此，不宜仅将比较条件描述为“维持日常生活且无行为任务”。

两份指南均要求每天使用 1-10 分记录当日整体心情，而非 0-10 分；同时按研究安排完成 PANAS、GAD-7、PHQ-9、Rosenberg 自尊量表和 SWBS-CC20 等在线心理测评。

面部状态评估要求在白色光源、固定角度下使用“你今天真好看”应用完成评估，保存应用生成的肤质报告截图，并提交 APP 分析前拍摄的原始测肤照片。指南说明原始照片应由研究负责人保密收集，并仅在参与者明确同意的情况下用于研究分析。

5. 可能有哪些不适或风险?

在谈论情绪或完成心理问卷时，可能出现暂时性情绪不适。

每日使用应用和反复填写问卷可能造成疲劳或时间负担。

心理数据、沟通记录和面部照片涉及隐私；面部照片即使使用编号命名，仍属于可识别的敏感资料。

AI 聊天截图或 50-200 字心情日记可能包含私人经历、情绪和其他敏感信息；它们属于研究收集的参与者生成内容，而不只是依从性记录。

MoodTalker 和面部评估应用均为第三方商业应用，其界面、功能或算法可能更新；研究团队不能访问或验证其服务器端算法。

原指南要求“客观打分，请避免极端情绪长期出现”。该提示可能影响参与者的评分选择，应视为潜在测量偏倚，而不能作为量表的正式计分规则。

如果你感到明显不适，请立即停止 AI 对话、问卷或面部评估，并联系研究人员。研究团队不提供临床诊断、心理治疗或急诊服务；如需专业帮助，应联系合适的心理咨询、精神卫生或医疗机构。发生紧急危险时，应立即联系当地急救或紧急服务。

6. 参加研究可能有什么益处?

你可能通过日常记录或情绪调节练习增加对自身情绪的觉察，但不能保证获得直接个人收益。研究结果可能帮助理解人工智能辅助情绪支持的可行性及其局限。

7. 资料如何收集、保存和使用?

研究资料包括在线问卷、1-10 分每日心情评分、AI 聊天截图或 50-200 字心情日记，以及面部评估部分的原始照片、报告截图和从报告中提取的数值。

分析数据使用编码后的参与者编号。姓名、联系方式和知情同意沟通记录不进入统计分析数据集。

原始面部照片和可识别的应用报告截图保存在由 S.Y.管理的密码保护、加密文件夹中；可识别面部资料的直接访问权限限于 S.Y.。钉钉和微信的知情同意记录与分析数据分开保存。

论文和会议报告仅呈现汇总或去标识化结果。原始面部照片、可识别截图、AI 聊天内容、心情日记、姓名和联系方式不会公开发表，也不会存入公共数据库。

去标识化数值数据和统计代码仅可能在合理请求、机构伦理批准、原同意范围及隐私审查允许的情况下，由通讯作者提供。

8. 关于保存期限的透明性说明

研究开始时没有为原始面部照片规定固定保存期限，这是原数据管理安排的局限。以下内容是研究完成后制定的当前补充方案，并非 2025 年预先规定的程序：在获得学校确认的前提下，可识别面部照片、可识别应用报告截图和知情同意记录拟保存至论文发表或项目正式结项（以较晚者为准）后 5 年，之后从研究电脑及获准的备份介质中安全删除。

9. 费用、补偿与保险

现有研究记录未显示向参与者支付专门报酬，也未购买本研究专门的临床试验或研究参与者保险。研究属于最小风险、非药物、非侵入性行为研究。本段为回顾性透明说明，不宣称逐字复制 2025 年的参与者说明。

10. 有问题时联系谁?

研究问题、退出请求或资料使用问题：请联系孙钰榆（S.Y.），可使用招募时采用的钉钉、微信或电话沟通渠道。学术与通讯联系：曹晓晓副教授，邮箱 caoxiaoxiao@cuz.edu.cn。

本研究已于参与者招募前获得浙江传媒学院设计艺术学院批准（CUZ-RE-2025-05，2025 年 5 月 25 日）。现有材料中未记录独立伦理办公室的参与者投诉邮箱，因此本说明不虚构该联系方式。

Appendix 3B. English translation

Document status: Retrospectively reconstructed in August 2026 from the ethics approval record, electronic communications, study procedures, and questionnaire records, and revised after review of two contemporaneous Participant Record Guides. The guides were created on 16 July 2025 and modified on 13 September 2025. They document some daily operational tasks but do not contain a complete explanation of study purpose, random assignment, voluntariness, withdrawal rights, or all risks. They therefore do not replace a full participant information sheet or consent record and cannot establish that identical wording was sent to every participant.

Study title	Effects of AI-Assisted Emotional Regulation on Psychological Wellbeing and Facial-State Perception
Institution	School of Design Arts, Communication University of Zhejiang
Principal investigator	Sun Yuyu (S.Y.)

Supervisor / corresponding author	Associate Professor Cao Xiaoxiao; caoxiaoxiao@cuz.edu.cn
Ethics approval	CUZ-RE-2025-05; approved 25 May 2025
Participation period	42 days per participant

1. Why is this study being conducted?

This study examines whether 42 days of AI-assisted conversational emotional regulation may influence positive affect, negative affect, anxiety and depressive symptoms, self-esteem, subjective well-being, and daily mood in young adults. It also explores whether psychological changes are accompanied by changes in commercial application-generated estimated skin age and comprehensive skin score. These facial-state measures are exploratory application outputs, not medical diagnoses, dermatological examinations, or physiological measures validated by this study.

2. Why have you been invited?

The study is intended for adults aged 18-30 years. Before enrolment, the researcher will assess eligibility based on age, recent psychological counselling or mindfulness training, psychological and dermatological history, recent medication or cosmetic procedures, and ability to use the required mobile applications. Individuals with a baseline PHQ-9 score of 20 or higher or a GAD-7 score of 15 or higher are not eligible and will be advised to seek professional support when appropriate.

3. Is participation voluntary?

Yes. You may decline to participate, stop any study procedure, or withdraw at any time without penalty. You may provide a reason for withdrawal if you wish, but you are not required to do so. If you ask that previously collected data no longer be used, the request will be handled in accordance with the scope of consent, institutional requirements, and applicable privacy obligations.

4. What will participation involve?

Complete eligibility screening, remote informed consent, and baseline psychological assessments.

After baseline assessment, be assigned by a computer-generated random sequence to the intervention group or the control group; participants cannot choose their group.

Guide A instructs participants to use MoodTalker for about 10 minutes daily, discuss the day's mood, feelings, or thoughts, and save and submit a screenshot of the conversation. The guide uses the Chinese name 林间疗愈室, whereas the current main protocol uses 林间聊愈室; the official spelling should be verified and harmonized.

Guide B instructs participants to write a 50-200-Chinese-character daily mood diary. The file does not state a group label. Guide B was originally provided to participants assigned to the control group and requested a daily mood diary of approximately 50–200 Chinese characters. Because completion was sparse and inconsistent, the diary requirement was subsequently discontinued. Guide B is retained in this appendix as an original participant-facing document, but the diary task was not maintained as a standardized comparator intervention and was not included in the statistical analyses. The comparator should not be described solely as usual routine if Guide B was assigned to it.

Both guides use a daily mood rating from 1 to 10, not 0 to 10. Participants also complete the scheduled PANAS, GAD-7, PHQ-9, Rosenberg Self-Esteem Scale, and SWBS-CC20 assessments.

Facial-state assessment is performed under a white light source and at a fixed angle using 你今天真好看 ('You Look Good Today'). Participants save the application-generated skin-report screenshot and submit the original photograph captured before application analysis. The guides state that original photographs are collected confidentially and used for research only with explicit agreement.

5. What discomforts or risks are possible?

Temporary emotional discomfort while discussing emotions or completing psychological questionnaires.

Fatigue or time burden from repeated questionnaires and daily application use.

Privacy risks associated with psychological information, communication records, and facial photographs. Facial photographs remain sensitive identifiable data even when filenames use participant codes.

AI chat screenshots or 50-200-Chinese-character mood diaries may include private experiences, emotions, and other sensitive participant-generated content; they are not merely adherence records.

MoodTalker and the facial-state application are third-party commercial products whose interfaces, functions, or algorithms may change. The research team cannot access or validate their proprietary server-side algorithms.

The original guide asks participants to rate objectively and avoid prolonged extreme ratings. This instruction may influence responses and is a potential measurement-bias limitation, not a formal scoring rule.

If you experience substantial discomfort, stop the AI conversation, questionnaire, or facial-state assessment and contact the researcher. The research team does not provide clinical diagnosis, psychotherapy, or emergency care. If professional help is needed, contact an appropriate counselling, mental-health, or medical service. In an immediate emergency, contact local emergency services.

6. Are there benefits?

Daily recording or emotional-regulation exercises may increase awareness of your emotions, but no direct personal benefit can be guaranteed. The findings may contribute to understanding the feasibility and limitations of AI-assisted emotional support.

7. How will information be collected, stored, and used?

Study information includes online questionnaires, daily mood ratings from 1 to 10, AI-conversation screenshots or 50-200-Chinese-character mood diaries, and, for the facial-state component, original photographs, report screenshots, and numerical values extracted from the reports.

Analysis records use coded participant identifiers. Names, contact details, and consent communications are not included in the statistical-analysis dataset.

Original facial photographs and identifiable application-report screenshots are stored in a password-protected and encrypted folder managed by S.Y. Direct access to the identifiable facial-image folder is restricted to S.Y. DingTalk and WeChat consent records are stored separately from analysis data.

Publications and presentations use aggregated or de-identified results. Original facial photographs, identifiable screenshots, AI chat content, mood diaries, names, and contact details will not be published or placed in a public repository.

De-identified numerical data and statistical code may be made available by the corresponding author only after a reasonable request and subject to institutional ethical approval, the scope of consent, and privacy review.

8. Transparency note concerning data retention

A fixed retention period for original facial photographs was not specified when the study began. This is a limitation of the original data-management arrangements. The following is a current supplementary plan prepared after study completion and is not represented as a procedure specified in 2025: subject to institutional

confirmation, identifiable facial photographs, identifiable application-report screenshots, and consent-related records will be retained for five years after publication or formal project closure, whichever is later, and then securely deleted from the research computer and any authorized backup media.

9. Payment, compensation, and insurance

The available records do not document study-specific payment to participants or a study-specific clinical-trial or research-participant insurance policy. The study was classified as minimal-risk, non-pharmacological, and non-invasive. This paragraph is a retrospective transparency statement and is not represented as verbatim 2025 participant-facing wording.

10. Who can be contacted?

For study questions, withdrawal requests, or questions about data use, contact Sun Yuyu (S.Y.) through the DingTalk, WeChat, or telephone channel used for recruitment. For academic correspondence, contact Associate Professor Cao Xiaoxiao at caoxiaoxiao@cuz.edu.cn.

The study was approved before recruitment by the School of Design Arts, Communication University of Zhejiang (CUZ-RE-2025-05; 25 May 2025). The available records do not identify a separate participant-complaints email for an independent ethics office; none has been invented for this appendix.

Appendix 3C. Contemporaneous Participant Record Guide A

AI-conversation version - original Chinese participant-facing material

Document status: Contemporaneous operational material reproduced as a page-for-page facsimile from the retained Word file. File metadata records creation on 16 July 2025 and modification on 13 September 2025. The document does not state a randomized group label. Its association with the AI-intervention group is an inference from the requirement to use MoodTalker and must be verified against contemporaneous allocation communications. Because it was modified during the trial, it cannot by itself establish that identical wording was sent to every participant from first enrolment onward.

Retained filename	附录：受试者记录指南.docx
Created	16 July 2025 (document metadata)
Last modified	13 September 2025 (document metadata)
Key daily task	Approximately 10 minutes of MoodTalker conversation plus submission of a chat screenshot
Material status	Operational guide; not a complete participant information sheet or consent form

The following four pages reproduce the retained Chinese guide without textual correction. Highlighting, numbering, screenshots, wording, and internal inconsistencies are preserved. The facsimile is included as source evidence; the English translation appears in Appendix 3E.

Appendix 3C - retained Guide A, original page 1 of 4

附录：受试者记录指南

亲爱的志愿者，感谢你参与这项重要的研究！你的点滴记录都对我们理解情绪与状态的联系非常宝贵。以下是每日需要完成的温馨小任务：

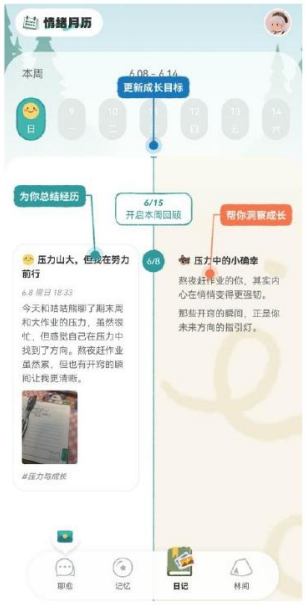
[你需要做什么？]

1. 与 AI 伙伴聊聊心事

·每天请使用我们的“林间疗愈室”APP，进行大约 10 分钟的对话。

·聊什么？分享你当天的心情、感受或任何想说的想法都可以。

·别忘了：完成对话后，请截图保存你的聊天内容（就像下方示例图一样），方便我们了解你的分享。



Appendix 3C - retained Guide A, original page 2 of 4

2. 记录你的“今日面容”

·每天请使用“你今天真好看”APP，在白色光源、固定角度下拍摄一张肤质分析图（这对数据一致性很重要哦）。

·请记得：拍摄完成后，截图保存 APP 生成的肤质报告页面（参考下方示例图）。

3. 提供“原汁原味”的测肤图

除了 APP 的截图报告，我们还需要你提供当天的原始测肤照片（即 APP 分析前拍摄的那张照片）。

如何导出？请参考下方图示指南进行操作。

Appendix 3C - retained Guide A, original page 3 of 4

请放心：**这些原始照片将由研究负责人严格保密收集，只有在你明确同意的情况下才会用于研究分析，绝不会对外泄露。**

4. 为今日心情打个分

根据你当天的整体感受，请用 1-10 分给自己当天的心情状态打个分：

分数段	心情状态
1-2 分	非常低落
3-4 分	有些低落

Appendix 3C - retained Guide A, original page 4 of 4

5-6 分	一般般
7-8 分	比较愉悦
9-10 分	非常愉悦

客观打分，请避免极端情绪（非常低落/非常愉悦）长期出现噢！。

重要提醒：每天结束时，请将以上三项截图（对话截图、肤质报告截图、心情分数）一起发送给研究负责人。

你的认真记录是研究成功的关键！再次感谢你的付出与贡献！

Appendix 3D. Contemporaneous Participant Record Guide B

Mood-diary version - original Chinese participant-facing material

Document status: Contemporaneous operational material reproduced as a page-for-page facsimile from the retained Word file. File metadata records creation on 16 July 2025 and modification on 13 September 2025. The document does not state a randomized group label. Its possible association with the comparator group is an inference from the 50-200-Chinese-character mood-diary task and the absence of a MoodTalker instruction; this mapping must be verified from contemporaneous allocation communications. Because the file was modified during the trial, it cannot by itself establish that identical wording was sent to every participant.

Retained filename	附录：受试者记录指南_副本.docx
Created	16 July 2025 (document metadata)
Last modified	13 September 2025 (document metadata)
Key daily task	A 50-200-Chinese-character mood diary
Material status	Operational guide; not a complete participant information sheet or consent form

The following four pages reproduce the retained Chinese guide without textual correction. The closing instruction still refers to a 'conversation screenshot' although this version instructs a mood diary. That internal inconsistency is preserved rather than silently corrected. The English translation appears in Appendix 3E.

Appendix 3D - retained Guide B, original page 1 of 4

附录：受试者记录指南

亲爱的志愿者，感谢你参与这项重要的研究！你的点滴记录都对我们理解情绪与状态的联系非常宝贵。以下是每日需要完成的温馨小任务：

[你需要做什么？]

1. **编辑 50-200 字的心情日记**

主要包含当日心情记录，如：“今天读了一本好书，收获颇丰，很开心”或“今日运气好像不太好，有点倒霉，不开心”。我们无需展示细节，但希望能得到真实的心情反馈～

2. **记录你的“今日面容”**

·每天请使用“你今天真好看”APP，在白色光源、固定角度下拍摄一张肤质分析图（这对数据一致性很重要哦）。

·请记得：拍摄完成后，截图保存 APP 生成的肤质报告页面（参考下方示例图）。

Appendix 3D - retained Guide B, original page 2 of 4

2. 提供“原汁原味”的测肤图

除了 APP 的截图报告，我们还需要你提供当天的原始测肤照片（即 APP 分析前拍摄的那张照片）。

如何导出？请参考下方图示指南进行操作。

Appendix 3D - retained Guide B, original page 3 of 4

请放心：**这些原始照片将由研究负责人严格保密收集，只有在你明确同意的情况下才会用于研究分析，绝不会对外泄露。**

3. 为今日心情打个分

根据你当天的整体感受，请用 1-10 分给自己当天的心情状态打个分：

分数段	心情状态
1-2 分	非常低落
3-4 分	有些低落

Appendix 3D - retained Guide B, original page 4 of 4

5-6 分	一般般
7-8 分	比较愉悦
9-10 分	非常愉悦

客观打分，请避免极端情绪（非常低落/非常愉悦）长期出现噢！。

重要提醒：每天结束时，请将以上三项截图（对话截图、肤质报告截图、心情分数）一起发送给研究负责人。

你的认真记录是研究成功的关键！再次感谢你的付出与贡献！

Appendix 3E. English Translation of the Contemporaneous Participant Record Guides

Translation status: Uncertified English translation prepared for editorial and peer-review purposes. The original Chinese facsimiles in Appendices 3C and 3D are authoritative. The translation preserves operational wording and material inconsistencies. Application-interface screenshots are reproduced in the original Chinese and are described rather than fully translated pixel by pixel.

Guide A: AI-conversation version

Opening

Dear volunteer, thank you for participating in this important study. Each of your records is valuable to our understanding of the relationship between emotions and state. The following are the small daily tasks you need to complete.

1. Talk with your AI partner

Use the '林间疗愈室' application every day and have a conversation for approximately 10 minutes.

You may share your mood, feelings, or anything you would like to say that day.

After the conversation, save a screenshot of the chat content so that the research team can understand what you shared.

2. Record today's facial state

Use 你今天真好看 every day to capture a skin-analysis image under a white light source and at a fixed angle; the guide states that this is important for data consistency.

After capture, save a screenshot of the skin-report page generated by the application.

3. Provide the original skin-test photograph

In addition to the report screenshot, provide the original skin-test photograph captured before application analysis. Follow the illustrated guide to export it.

The guide states that original photographs will be collected confidentially by the research lead, used for research analysis only with the participant's explicit agreement, and not disclosed externally.

4. Rate today's mood

Based on the day's overall experience, give the day's mood state one score from 1 to 10.

Score band	Mood state
1-2	Very low
3-4	Somewhat low
5-6	Average
7-8	Relatively pleasant
9-10	Very pleasant

Verbatim meaning of the reminder: 'Rate objectively; please avoid extreme emotions (very low/very pleasant) appearing for a long period.' This reminder may influence rating behavior and is reported as a methodological limitation, not a validated scoring rule.

End-of-day reminder: send the above three screenshots - conversation screenshot, skin-report screenshot, and mood score - together to the research lead.

Guide B: mood-diary version

Opening

The opening thanks the volunteer and explains that daily records are valuable for understanding the relationship between emotions and state.

1. Write a 50-200-Chinese-character mood diary

Record the day's mood, for example, feeling happy after reading a good book or feeling unlucky and unhappy.

The guide says that detailed disclosure is not required but that genuine mood feedback is desired.

2. Facial-state and original-photograph tasks

The white-light, fixed-angle facial capture, skin-report screenshot, original photograph, confidentiality assurance, and 1-10 mood-rating instructions are substantively the same as in Guide A.

Preserved inconsistency

Although Guide B replaces the AI-conversation task with a mood diary, its closing reminder still asks for the same three screenshots and names a 'conversation screenshot.' The retained file does not explain whether this is a template residue, whether a diary screenshot was intended, or whether participants received additional clarification. No single interpretation is imposed retrospectively.

Implications for the protocol appendices

The contemporaneous participant-facing daily mood scale is 1-10; the earlier 0-10 wording is corrected.

Guide A documents an approximately 10-minute daily MoodTalker interaction and collection of chat-content screenshots.

Guide B documents a structured 50-200-Chinese-character daily mood diary; if this was the comparator task, the comparator was not purely usual routine.

Both guides document white-light and fixed-angle instructions, report screenshots, and collection of original facial photographs.

Neither guide is a full participant information sheet or consent form, and neither retained filename states a randomized group label.

Appendix 4. Oral Informed-Consent Script and Documentation Procedur

Appendix 4A. Chinese consent explanation / 附录 4A：中文知情同意说明

文件状态：本脚本于 2026 年 8 月根据伦理记录、钉钉/微信沟通记录、研究流程及实施材料回顾性重建，并在审阅两份同时期《受试者记录指南》后修订。两份指南能够证明参与者曾收到部分每日操作要求，但它们不是完整知情同意书，也不能单独证明参与者已明确同意研究团队收集 AI 聊天截图、心情日记或面部资料。实际同意范围只能依据保留的时间戳沟通记录或同时期记录判断。不得补签、倒签或将本脚本描述为 2025 年逐字原稿。

研究人员开场说明

你好，我是本研究的研究人员孙孙钰榆。我们正在开展“人工智能辅助情绪调节对心理福祉与面部状态感知的影响”研究。研究由浙江传媒学院设计艺术学院开展，并已获得伦理批准（CUZ-RE-2025-05，

2025 年 5 月 25 日）。在你决定是否参加前，我会说明研究目的、流程、可能风险、隐私保护和退出权利。请在理解后自由决定，并可随时提出问题。

需要向参与者说明的内容

1. 研究目的

本研究希望了解连续 42 天使用人工智能辅助对话进行情绪调节，是否与积极/消极情绪、焦虑和抑郁症状、自尊、主观幸福感及每日心情变化有关；同时探索心理变化是否伴随商业应用生成的面部状态指标变化。面部指标不属于医学诊断。

2. 随机分组

完成基线测评后，你将按照计算机生成的随机序列分入两种日常任务之一，不能自行选择。保留的指南 A 要求每天使用 MoodTalker 约 10 分钟并提交聊天截图；指南 B 要求每天撰写 50-200 字心情日记。两份文件未写组别名称，因此其与实验组/比较组的对应关系应以当时的分组沟通记录核实。

3. 研究任务

研究持续 42 天。每天根据收到的指南完成 AI 对话及截图或 50-200 字心情日记，使用 1-10 分记录当日整体心情，并按安排完成 PANAS、GAD-7、PHQ-9、Rosenberg 自尊量表和 SWBS-CC20。

4. 面部状态评估

若参加面部状态评估部分，需要在白色光源、固定角度下使用“你今天真好看”应用完成评估，保存应用肤质报告截图，并提交 APP 分析前拍摄的原始面部照片。研究组将从报告中提取皮肤年龄和综合皮肤评分。原始面部照片可识别身份，属于敏感资料。

5. 可能风险

可能出现短暂情绪不适、问卷疲劳和隐私风险。AI 聊天截图、心情日记和面部照片可能包含敏感信息。原指南关于避免长期极端评分的提示也可能影响作答选择。如果感到明显不适，可以立即停止并联系研究人员；需要时应寻求专业心理或医疗支持。本研究和 MoodTalker 均不替代临床诊断、心理治疗或急诊服务。

6. 自愿参加与退出

参加完全自愿。你可以拒绝参加、停止任何程序或随时退出，不会受到处罚。若愿意，可以说明退出原因。有关已收集资料是否继续使用的请求，将按同意范围、学校要求和隐私规定处理。

7. 隐私和资料使用

分析数据使用参与者编号；姓名、联系方式和同意沟通记录与分析数据分开保存。论文只报告汇总或去标识化结果。原始面部照片、可识别截图、AI 聊天内容、心情日记及联系方式不会公开。

8. 联系方式

研究问题或退出请求可通过本次招募使用的钉钉、微信或电话联系孙钰榆。学术与通讯联系为曹晓晓副教授，caoxiaoxiao@cuz.edu.cn。

理解检查与提问

研究人员应询问：你是否理解上述研究目的、42 天流程和随机分组？你是否理解可能的不适、隐私风险和随时退出的权利？你现在是否有任何问题？应在回答问题后再请求同意。

参加研究的最终确认

你是否已理解上述研究目的、流程、可能风险和隐私保护?

你是否有机会提出问题，并已获得可以理解的回答?

你是否理解参加完全自愿，且可以在任何时候停止或退出?

你是否同意参加这项 42 天研究，并同意研究团队按照上述说明收集、分析和汇总报告你的研究数据?

只有在参与者对以上问题作出明确肯定回答后，才能记录其同意并进入基线测评。沉默、未回复或仅完成问卷不得视为同意。

敏感情绪内容与面部资料的单独确认

若研究任务涉及 AI 聊天截图或 50-200 字心情日记，应另行询问:

“你是否同意研究团队为上述研究目的收集并保存你的 AI 聊天截图或心情日记，并理解这些材料可能包含私人经历和敏感情绪内容、不会公开发表或存入公共数据库？”

若参与者参加面部状态评估部分，还应另行询问:

“你是否同意研究团队为上述研究目的收集并保存你的原始面部照片和应用生成报告截图，并理解这些资料可识别你的身份、不会公开发表或存入公共数据库？”

参与者只有明确表示同意后，方可收集相应敏感材料。不同意时，不应以沉默、完成任务或一般研究同意替代明确确认。两份操作指南只能证明曾提出提交要求，不能单独证明已取得上述单独同意。

钉钉/微信建议确认文字

一般研究同意：我已阅读并理解研究说明，有机会提问，知道参加完全自愿且可随时退出。我同意参加这项 42 天研究，并同意研究团队按说明收集、分析和汇总报告研究数据。
敏感情绪内容同意：我同意研究团队为所述研究目的收集并保存我的 AI 聊天截图或心情日记。我理解这些材料可能包含私人经历和敏感情绪内容，不会公开发表或存入公共数据库。
面部状态评估同意（仅适用于参加该部分者）：我同意研究团队为所述研究目的收集并保存我的原始面部照片和应用报告截图。我理解这些资料可识别我的身份，不会公开发表或存入公共数据库。

Appendix 4. Remote Informed-Consent Script and Documentation Procedure

Appendix 4B. English translation

Document status: Retrospectively reconstructed in August 2026 from the ethics record, DingTalk/WeChat communications, study procedures, and implementation materials, and revised after review of two contemporaneous Participant Record Guides. The guides document some participant-facing daily tasks but are not complete consent forms and do not by themselves establish explicit consent for collection of AI-chat screenshots, mood diaries, or facial materials. Actual consent scope must be determined from retained time-stamped communications or contemporaneous records. Existing records must not be supplemented or backdated as historical records.

Researcher opening statement

Hello, I am Sun Yuyu, a researcher on the study 'Effects of AI-Assisted Emotional Regulation on Psychological Wellbeing and Facial-State Perception.' The study is conducted by the School of Design Arts, Communication University of Zhejiang, and received ethics approval (CUZ-RE-2025-05; 25 May 2025). Before you decide whether to participate, I will explain the purpose, procedures, possible risks, privacy protections, and your right to withdraw. Please decide freely after you understand the information, and ask any questions you may have.

Information to be explained

1. Purpose

The study examines whether 42 days of AI-assisted conversational emotional regulation are associated with changes in positive and negative affect, anxiety and depressive symptoms, self-esteem, subjective well-being, and daily mood. It also explores whether psychological changes are accompanied by changes in commercial application-generated facial-state indicators. The facial indicators are not medical diagnoses.

2. Random assignment

After baseline assessment, you will be assigned to one of two daily tasks by a computer-generated random sequence and cannot choose the assignment. Retained Guide A requires approximately 10 minutes of daily MoodTalker use and submission of a chat screenshot. Retained Guide B requires a 50-200-Chinese-character daily mood diary. The files do not state group labels, so their intervention/comparator mapping must be verified from contemporaneous allocation communications.

3. Study tasks

The study lasts 42 days. Each day, complete the AI conversation and screenshot or the 50-200-Chinese-character mood diary specified in the guide received, provide one daily mood rating from 1 to 10, and complete the scheduled PANAS, GAD-7, PHQ-9, Rosenberg Self-Esteem Scale, and SWBS-CC20 assessments.

4. Facial-state component

If you participate in the facial-state component, use 你今天真好看 ('You Look Good Today') under a white light source and at a fixed angle, save the application-generated skin-report screenshot, and submit the original photograph captured before application analysis. The research team extracts estimated skin age and comprehensive skin score from the report. Original facial photographs can identify you and are sensitive data.

5. Possible risks

Possible risks include temporary emotional discomfort, questionnaire fatigue, and privacy concerns. AI-chat screenshots, mood diaries, and facial photographs may contain sensitive information. The retained guide's request to avoid prolonged extreme ratings may also influence response choices. If you experience substantial discomfort, you may stop immediately and contact the researcher. Seek professional psychological or medical

support when needed. Neither this study nor MoodTalker replaces clinical diagnosis, psychotherapy, or emergency care.

6. Voluntary participation and withdrawal

Participation is voluntary. You may decline, stop any procedure, or withdraw at any time without penalty. You may provide a reason if you wish. Requests concerning continued use of already collected data will be handled according to the scope of consent, institutional requirements, and privacy obligations.

7. Privacy and data use

Analysis records use participant codes; names, contact details, and consent communications are stored separately. Publications will contain only aggregated or de-identified results. Original facial photographs, identifiable screenshots, AI-chat content, mood diaries, and contact details will not be made public.

8. Contact

For study questions or withdrawal, contact Sun Yuyu through the DingTalk, WeChat, or telephone channel used for recruitment. For academic correspondence, contact Associate Professor Cao Xiaoxiao at caoxiaoxiao@cuz.edu.cn.

Check understanding and invite questions

The researcher should ask: Do you understand the study purpose, the 42-day procedures, and random assignment? Do you understand the possible discomforts, privacy risks, and your right to withdraw at any time? Do you have any questions? Questions should be answered before consent is requested.

Final confirmation for study participation

Have you understood the study purpose, procedures, possible risks, and privacy protections explained above?

Have you had an opportunity to ask questions and received answers you can understand?

Do you understand that participation is voluntary and that you may stop or withdraw at any time?

Do you agree to participate in the 42-day study and permit the research team to collect, analyse, and report your study data in aggregated form as described above?

Consent may be documented only after the participant gives an explicit affirmative response to all questions. Silence, non-response, or questionnaire completion alone must not be treated as consent.

Separate confirmation for sensitive emotional content and facial materials

When a study task requires an AI-chat screenshot or a 50-200-Chinese-character mood diary, ask separately:

'Do you agree that the research team may collect and retain your AI-chat screenshots or mood diaries for the research purposes described above, and do you understand that these materials may contain private experiences and sensitive emotional content and will not be publicly disclosed or placed in a public repository?'

For a participant in the facial-state component, also ask separately:

'Do you agree that the research team may collect and retain your original facial photographs and application-report screenshots for the research purposes described above, and do you understand that these materials can identify you and will not be publicly disclosed or placed in a public repository?'

The corresponding sensitive materials may be collected only after explicit agreement. Silence, task completion, or general study consent must not be substituted for the relevant confirmation. The operational guides document a submission request but do not by themselves prove that separate consent was obtained.

Suggested DingTalk/WeChat confirmation text

General study consent: I have read and understood the study information, had an opportunity to ask questions, and understand that participation is voluntary and that I may withdraw at any time. I agree to participate in the 42-day study and permit the research team to collect, analyse, and report the study data in aggregated form as described
Sensitive emotional-content consent: I agree that the research team may collect and retain my AI-chat screenshots or mood diary for the stated research purposes. I understand that these materials may contain private experiences and sensitive emotional content and will not be publicly disclosed or placed in a public repository.
Facial-state component consent (only for participants in this component): I agree that the research team may collect and retain my original facial photographs and application-report screenshots for the stated research purposes. I understand that these materials can identify me and will not be publicly disclosed or placed in a public repository.

Appendix 4. Remote Informed-Consent Script and Documentation Procedure

Appendix 4C. Consent documentation procedure

Document status: This procedure describes how existing consent evidence is to be identified and presented in the retrospective protocol file after review of the contemporaneous Participant Record Guides. The guides document operational submission requests but are not, by themselves, proof of explicit informed consent. This procedure does not authorize creation of substitute historical records, reconstruction of telephone transcripts, or backdating of any signature or confirmation.

1. DingTalk or WeChat consent

Provide or explain the participant information through the same remote communication channel used for recruitment.

Invite questions and respond before requesting consent.

Request an explicit written confirmation of general study consent. Where the assigned task includes AI-chat screenshots or mood diaries, identify any separate confirmation concerning collection of that sensitive emotional content. If the person is in the facial-state component, identify the separate facial-data confirmation.

Retain the time-stamped chat record showing the study explanation and the participant's affirmative confirmation. Store it separately from the coded statistical-analysis dataset.

Do not edit the timestamp, participant response, or historical message content. Any current supplementary authorization must carry its actual current date and be labelled as supplementary.

2. Telephone consent

Explain the study using the consent topics in Appendix 4A and confirm that the participant has had an opportunity to ask questions.

Obtain an explicit oral affirmative response to general study participation and, where applicable, separate affirmative responses concerning collection of AI-chat screenshots or mood diaries and collection and retention of original facial photographs and report screenshots.

The telephone calls used during the study were not audio-recorded, and no verbatim recordings or transcripts are available. Do not create a reconstructed transcript or a participant-signed 2025 form after the event.

Any contemporaneous researcher note that already exists may be retained as supporting documentation. A new note prepared in 2026 may describe the available evidence but must be dated in 2026 and clearly labelled as retrospective.

3. Minimum fields for indexing existing consent evidence

Participant code	Coded study identifier; do not place the participant's name in the analysis dataset
Communication channel	DingTalk / WeChat / telephone
Date and time	Use the original electronic timestamp or date from an existing contemporaneous record
Researcher	Researcher who provided the explanation or obtained the confirmation, if documented
General study consent	Explicit affirmative confirmation documented: Yes / No / not verifiable from retained record
Emotional-content records	Not applicable / explicit confirmation for AI-chat screenshots or mood diary documented / not verifiable from retained record
Facial-state component	Not applicable / explicit affirmative confirmation documented / not verifiable from retained record
Questions or concerns	Briefly reference the existing record; do not reconstruct unrecorded dialogue
Evidence location	Restricted record location or file reference; do not copy identifiable content into the analysis dataset

4. Record-integrity statement

For DingTalk and WeChat, the available time-stamped electronic communication is the primary evidence of consent. For telephone consent, the study did not create audio recordings or verbatim transcripts. The retained Participant Record Guides support that participants were instructed to submit certain materials, but a task instruction is not equivalent to a documented affirmative consent response. The protocol appendix therefore reports the limitation transparently. No missing individual consent record should be replaced with a newly created historical-looking form. Any later confirmation or authorization must be voluntary, current-dated, and described as supplementary rather than original consent.

5. Separation and access

Consent-related communications may contain names, account details, telephone numbers, or other direct identifiers. They are maintained separately from the coded analysis dataset and used only to document the consent process or respond to an authorized ethics, editorial, or institutional review. They must not be included in publications or routine data-sharing responses.

6. Translation statement

The Chinese text in Appendix 4A is the operative language reconstruction for a Chinese-speaking participant population. Appendix 4B is an English translation prepared for editorial and peer-review purposes. If a discrepancy is identified, the Chinese reconstruction and the available contemporaneous Chinese communications should be reviewed together; neither reconstruction overrides the original time-stamped records.

Appendix 5. Positive and Negative Affect Schedule (PANAS)

Document status: *The 20 Chinese affect descriptors and five response anchors below are reproduced from the instrument table supplied by the research team for protocol compilation. The supplied transcription contained the apparent typographical error "热性的" in Item 9; this has been corrected to "热情的" (enthusiastic), consistent with the retained Chinese PANAS wording. The English descriptors, administration notes, and scoring rules were added in August 2026 for protocol review and have not been backdated. The exact time-reference sentence displayed in the original online form was not available in the materials supplied for this appendix and is therefore not presented as a verbatim instruction.*

A5.1 Instrument and Response Format

The study used the 20-item Chinese Positive and Negative Affect Schedule. Participants selected one response for each affect descriptor using a five-point scale: 1 = 几乎没有 (very slightly or not at all), 2 = 比较少 (a little), 3 = 中等程度 (moderately), 4 = 比较多 (quite a bit), and 5 = 极其多 (extremely). The PANAS was scheduled at the weekly psychological-assessment occasions during the 42-day study. The principal data-completeness-based analysis used the Week 3 and Week 6 observations.

Chinese version used in the study; English descriptors are supplied for protocol review.

No.	题目 / Item	1 几乎没有	2 比较少	3 中等程度	4 比较多	5 极其多
1	感兴趣的 (Interested)					
2	心烦的 (Distressed)					
3	精神活力高的 (Excited)					
4	心神不宁的 (Upset)					
5	劲头足的 (Strong)					
6	内疚的 (Guilty)					
7	恐惧的 (Scared)					
8	敌意的 (Hostile)					
9	热情的 (Enthusiastic)					
10	自豪的 (Proud)					
11	易怒的 (Irritable)					
12	警觉性高的 (Alert)					
13	害羞的 (Ashamed)					
14	备受鼓舞的 (Inspired)					
15	紧张的 (Nervous)					
16	意志坚定的 (Determined)					
17	注意力集中的 (Attentive)					

No.	题目 / Item	1 几乎没有	2 比较少	3 中等程度	4 比较多	5 极其多
18	坐立不安的 (Jittery)					
19	有活力的 (Active)					
20	害怕的 (Afraid)					

A5.2 Scoring

Positive Affect (PANAS-PA): Items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19 were summed. The possible subscale score ranged from 10 to 50, with higher scores indicating greater positive affect.
Negative Affect (PANAS-NA): Items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20 were summed. The possible subscale score ranged from 10 to 50, with higher scores indicating greater negative affect.
No PANAS items were reverse-scored. PANAS-PA and PANAS-NA were analyzed as separate subscales; a combined 20-item total score was not used.

A5.3 Missing Data and Analysis

For the principal change-score analysis, participants required a valid PANAS subscale score at both Week 3 and Week 6. A participant missing the relevant subscale score at either time point was excluded only from that corresponding analysis. No missing PANAS value was imputed, and no retrospective item-level imputation rule was introduced during protocol compilation. Analyses retained participants in their originally assigned groups but were available-case rather than intention-to-treat analyses.

A5.4 Sources

The instrument structure and scoring follow Watson, Clark and Tellegen (1988). The Chinese item wording corresponds to the 20-item version examined for use in Chinese populations by Huang, Yang and Ji (2003). Full citations are included in the protocol References.

Appendix 6. Generalized Anxiety Disorder-7 and Patient Health Questionnaire-9

Appendix 6A：GAD-7 Chinese version used in the study

序号	题目	完全 没有	有几 天	一半以 上天数	几乎 每天
1	在过去两周内，您有多少时间会感到紧张、焦虑或不安?				
2	过去两周，您难以控制自己不去担忧各种事情的情况频繁吗?				
3	在过去两周，您是否因为担心而出现坐立不安、难以放松的状况?				
4	过去两周，您是否因为焦虑而感到容易疲倦?				
5	在过去两周，焦虑是否导致您难以集中精力做事情?				
6	过去两周，您是否比平常更容易生气或烦躁?				
7	在过去两周，您是否因为焦虑出现入睡困难、睡眠浅或多梦的问题?				

Appendix 6B：PHQ-9 Chinese version used in the study

序号	题目	完全没有	有几天	一半以上天数	几乎每天
1	在过去两周内，您有多少时间存在情绪低落、沮丧或绝望的感觉?				
2	过去两周内，您对平日感兴趣的活动失去兴趣或愉悦感的频率如何?				
3	在过去两周，您睡眠出现入睡困难、睡眠浅、早醒等问题的频率是?				
4	过去两周，您感到疲倦或没有活力的天数大概有多少?				
5	在过去两周内，您是否因为食欲不振或过度进食，导致体重出现明显变化?				
6	过去两周，您是否存在对自己失望、觉得自己是失败者或让家人失望的想法?				
7	在过去两周，您难以集中精力做事情，如阅读、工作或看电视的情况发生频率是?				
8	过去两周，您是否比平常动作缓慢，或坐立不安、烦躁多动，影响日常活动?				
9	在过去两周，您是否存在不如死掉或用某种方式伤害自己的念头?				

Appendix 6C. Administration, Scoring, and Screening Rules

The GAD-7 and PHQ-9 were administered through the standardized online questionnaire at the psychological-assessment time points specified in Appendix 2. Both instruments asked participants to report the frequency of relevant symptoms during the preceding two weeks. Because the questionnaires were administered repeatedly during the 42-day study period, the recall periods of consecutive weekly assessments overlapped. This feature should be considered when interpreting within-participant changes over time.

For both instruments, each item was rated using the following four response categories: 0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day.

The GAD-7 total score was calculated by summing the seven item scores, yielding a possible range of 0–21. Higher scores indicated greater anxiety-symptom severity. Conventional descriptive categories were 0–4, minimal anxiety; 5–9, mild anxiety; 10–14, moderate anxiety; and 15–21, severe anxiety.

The PHQ-9 total score was calculated by summing the nine item scores, yielding a possible range of 0–27. Higher scores indicated greater depressive-symptom severity. Conventional descriptive categories were 0–4, minimal depression; 5–9, mild depression; 10–14, moderate depression; 15–19, moderately severe depression; and 20–27, severe depression.

For eligibility screening in this trial, individuals with a GAD-7 score of 15 or higher or a PHQ-9 score of 20 or higher were excluded. These thresholds were used as trial-specific safety and eligibility criteria and were not regarded as clinical diagnoses. The questionnaires were research screening and outcome instruments and were not substitutes for evaluation by a qualified mental-health professional.

Appendix 6D. Missing Data and Safety-Sensitive Responses

No item-level value was imputed retrospectively. When a valid total score could not be calculated from the retained questionnaire record, the corresponding scale score was treated as missing. For a comparison between two assessment occasions, the participant was included for that outcome only when a valid score was available at both relevant time points.

PHQ-9 Item 9 concerns thoughts of death or self-harm and was therefore treated as a safety-sensitive item. Questionnaire collection was conducted for research purposes and was not represented as a continuously monitored crisis-detection service. Any psychological distress, self-harm concern, or other safety issue communicated directly to the research team was handled in accordance with the Safety and Psychological-Distress Response Procedure provided in Appendix 12.

The GAD-7 and PHQ-9 scores were used to quantify symptom severity and change over time. They were not used independently to establish a psychiatric diagnosis or to provide clinical treatment recommendations.

Appendix 6E. Instrument and Document-Status Statement

The Chinese item wording and response categories presented in Appendices 6A and 6B were transcribed from the retained version of the online questionnaire used in the study. They were not newly administered or retrospectively altered on the basis of the study results. This appendix was compiled retrospectively for transparent reporting of the completed study and was not backdated.

The designation “GAD-7” should be retained only if the seven administered items correspond to the standard GAD-7 content. If the archived questionnaire demonstrates that materially modified anxiety items were administered, the instrument should instead be described as a study-specific seven-item anxiety-symptom questionnaire, and standard GAD-7 severity categories should not be applied.

Instrument References

Spitzer, R. L., Kroenke, K., Williams, J. B. W., and Löwe, B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Archives of Internal Medicine 166, 1092–1097 (2006).

Kroenke, K., Spitzer, R. L., and Williams, J. B. W. The PHQ-9: validity of a brief depression severity measure. Journal of General Internal Medicine 16, 606–613 (2001).

Tong, X., An, D., McGonigal, A., Park, S. P., and Zhou, D. Validation of the Generalized Anxiety Disorder-7 among Chinese people with epilepsy. Epilepsy Research 120, 31–36 (2016).

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Appendix 7. Rosenberg Self-Esteem Scale

Appendix 7A：RSES Chinese version used in the study

序号	题目	非常符合	符合	不符合	很不符合
1	我感到自己是一个有价值的人，至少与其他人在同一水平上				
2	我感到自己有许多好的品质				
3	归根到底，我倾向于认为自己是一个失败者。				
4	我能像大多数人一样把事情做好。				
5	我感到自己值得骄傲的地方不多。				
6	我对自己持肯定态度。				
7	总的来说，我对自己是满意的。				

8	我希望我能为自己赢得更多尊重。				
9	我确实是时常感到自己毫无用处。				
10	我时常认为自己一无是处。				

Appendix 7B. Administration and Response Coding

The Rosenberg Self-Esteem Scale was administered through the standardized online questionnaire at the psychological-assessment time points specified in Appendix 2. Participants indicated the extent to which each statement described them using four response categories: very consistent, consistent, inconsistent, and very inconsistent.

For the coding system used in this study, responses to positively worded Items 1, 2, 4, 6, and 7 were scored as follows: very inconsistent = 1, inconsistent = 2, consistent = 3, and very consistent = 4. Negatively worded Items 3, 5, 8, 9, and 10 were reverse scored: very consistent = 1, consistent = 2, inconsistent = 3, and very inconsistent = 4.

The order in which the response categories appeared on the questionnaire should not be interpreted as the numerical coding order. The coding described above must correspond to the coding retained in the study dataset.

Appendix 7C. Total Score and Interpretation

The ten decoded item scores were summed to produce a total score ranging from 10 to 40. Higher total scores indicated higher global self-esteem. The scale score was treated as a continuous research outcome.

No universal diagnostic threshold was applied. The RSES was not used to diagnose a mental disorder or to determine eligibility for clinical treatment. Changes in the total score were interpreted as changes in self-reported global self-esteem within the context of this study.

No missing item was imputed retrospectively. When a valid total score could not be calculated from the retained questionnaire record, the score for that assessment occasion was treated as missing. A participant was included in a comparison between two assessment occasions only when a valid score was available at both relevant time points.

Appendix 7D. Instrument and Document-Status Statement

The Chinese item wording and response categories reproduced above were taken from the retained online questionnaire used in the study. The appendix documents the version administered to participants and does not represent a newly created post-study translation. The scoring description was compiled retrospectively from the questionnaire and analysis records and was not backdated.

Before submission, the research team verified the item order, reverse-scoring key, and numerical coding against the retained questionnaire and analysis dataset. No score was retrospectively recoded solely to obtain a more favorable result.

Instrument Reference

Rosenberg, M. Society and the Adolescent Self-Image. Princeton University Press, Princeton, NJ (1965).

Appendix 8. Brief Subjective Well-Being Scale for Chinese Citizens (SWBS-CC20)

Appendix 8A：SWBS-CC20 Chinese version used in the study

序号	题目	很不同意	不同意	有点不同意	有点同意	同意	非常同意
1	社会给人们提供了越来越多的出路						
2	随着年龄的增加，我从生活中领悟到了许多哲理，这使我变得意志坚定、更有能力						
3	我确定的生活目标多数能够给我以激励，而不是泄气						
4	我经常感到自己每天只是在得过且过						
5	我不清楚自己一生所做的事情有什么意义						
6	我经常感到自己躯体一些部位特别不舒适						
7	与旁边的人相比，我很满足						
8	我对家里的经济状况感到满意						
9	我经常因为一些琐事而烦心						
10	我很为自己的健康状况感到苦恼						
11	我常常感到自己难以与别人建立友谊						
12	我比较满意自己的性格						
13	我感到好像大部分人的朋友都比我多						
14	和家人在一起，我感到特别快乐						
15	我的运气比别人差						
16	我相信社会会不断发展						
17	与旁人相比，我感到自己挺吃亏						
18	遇到不愉快的事情时，很长时间我都无法振作精神						
19	我感到欣慰的是，这些年自己的想法变得越来越成熟						
20	我有时感到很难与家人（包括父母、孩子、爱人等）沟通						

Note . *The SWBS-CC20 consists of 20 items rated from 1 to 6. Items 4, 5, 6, 9, 10, 11, 13, 15, 17, 18, and 20 are reverse scored. Item scores are summed to yield a total score ranging from 20 to 120, with higher scores indicating greater subjective well-being.*

Appendix 8B. Administration and Response Coding

The Brief Subjective Well-Being Scale for Chinese Citizens consists of 20 items and is referred to in this protocol as the SWBS-CC20. It was administered through the standardized online questionnaire at the psychological-assessment time points specified in Appendix 2.

Each item was rated on a six-point Likert-type scale:

1 = strongly disagree

2 = disagree

3 = slightly disagree

4 = slightly agree

5 = agree

6 = strongly agree

Items 4, 5, 6, 9, 10, 11, 13, 15, 17, 18, and 20 were negatively worded and were reverse scored. For these items, the recoded score was calculated as 7 minus the original item score. Accordingly, an original response of 1 was recoded as 6, 2 as 5, 3 as 4, 4 as 3, 5 as 2, and 6 as 1.

Appendix 8C. Total Score and Interpretation

After reverse scoring the negatively worded items, all 20 item scores were summed. The raw total score ranged from 20 to 120, with higher scores indicating greater subjective well-being.

The SWBS-CC20 assesses subjective well-being across culturally relevant domains, including physical-health experience, psychological-health experience, goal and value experience, self-acceptance, satisfaction and abundance, growth and development, confidence in society, psychological balance, interpersonal adaptation, and family atmosphere. In this trial, the total score was used as the principal SWBS-CC20 outcome unless otherwise specified.

The SWBS-CC20 score was treated as a continuous research measure. No clinical diagnostic threshold was applied, and the instrument was not used to diagnose a mental disorder or determine the need for clinical treatment.

No missing item was imputed retrospectively. When a valid total score could not be calculated from the retained questionnaire record, the corresponding assessment was treated as missing. For a comparison between two assessment occasions, a participant was included only when a valid score was available at both relevant time points.

Appendix 8D. Instrument Identity and Document-Status Statement

The instrument used in this study was the 20-item Brief Subjective Well-Being Scale for Chinese Citizens (SWBS-CC20). It was not the five-item Satisfaction With Life Scale commonly abbreviated as SWLS. All references to “SWLS” in earlier drafts of the manuscript or protocol should therefore be replaced with “SWBS-CC20” where they refer to the instrument reproduced in this appendix.

The Chinese item wording and response categories presented above were transcribed from the retained online questionnaire used in the study. The questionnaire was not newly administered or rewritten after the study results became known. This appendix was compiled retrospectively to document the completed study and was not backdated.

The reverse-scoring key and total-score calculation were verified against the retained questionnaire and analysis dataset. No alternative weighting or retrospective item selection was introduced.

Instrument References

Xing, Z. J. Developing the Brief Subjective Well-Being Scale for Chinese Citizens [in Chinese]. Chinese Journal of Behavioral Medical Science 12, 703–705 (2003).

Huang, L. Q., and Xing, Z. J. A nationwide study on the Subjective Well-Being Scale for Chinese Citizens (SWBS-cc). International Journal of Applied Psychology 9, 117–127 (2019).

Appendix 9. Daily Mood-Rating Item

Document status: The original participant-facing Chinese instruction and the 1-10 response format were verified from retained study materials and research-team records. This appendix was compiled in August 2026 to document administration and analysis. It has not been backdated and should not be interpreted as a separately validated instrument.

A9.1 Participant-Facing Item

Original Chinese instruction (verbatim): 请如实记录当日心情。

English translation for protocol review: Please truthfully record your mood for the day.

Response format: Participants entered one whole-number rating from 0 to 10, where 0 indicated very poor mood and 10 indicated excellent mood. Higher values therefore represented a more favorable self-rated mood for that day.

A9.2 Administration

The item was completed once daily by participants in both the intervention and usual-routine control groups on Days 1-42. The same online recording format was used throughout the study. A missed daily entry remained missing; no numerical value was imputed for an uncompleted day.

A9.3 Scoring and Analysis

The recorded integer was used directly as the daily item score. Under the retained study coding scheme, higher numerical values were interpreted as indicating a more favorable self-rated mood for that day. No items were reverse-scored. For participant-level summaries, the mean daily mood score was calculated as the sum of all available daily scores divided by the number of completed daily ratings. The number of completed days was retained as an adherence and data-completeness indicator. Group-level time-series plots were descriptive, and the daily mood analysis was exploratory rather than a confirmatory clinical endpoint.

A9.4 Interpretation

This was a study-specific single-item rating and was not presented as a validated psychometric scale. No diagnostic threshold or clinical cut-off was applied. Results should be interpreted as subjective daily mood reports and not as a measure of a psychiatric disorder or as a substitute for a validated multi-item outcome instrument.

Appendix 10. Facial-State Assessment Operating Instructions

Document status: The facial-assessment instructions reproduced below are present in two retained participant guides. Retained file metadata identifies creation on 16 July 2025 and modification on 13 September 2025; the facial-assessment wording is the same in both guides. The Chinese excerpts are reproduced verbatim. The English translations and explanatory implementation notes were added in August 2026 for protocol review and have not been backdated. The retained files establish the content of the guides but do not independently prove that identical wording was sent to every participant on every assessment day.

A10.1 Application and Assessment Schedule

Facial-state assessments were completed using 你今天真好看 (descriptive English translation: "You Look Good Today"), a commercially available AI-assisted skincare application developed and operated by Hangzhou C2H4 Internet Technology Co., Ltd. (杭州以息互联网科技有限公司). The application was independent of MoodTalker and was used only for the facial-state component. Participants in this component completed one assessment each day from baseline (Day 0) through Day 42, yielding up to 43 assessment occasions per participant.

A10.2 Verbatim Participant-Facing Chinese Instructions

Daily facial assessment: 每天请使用“你今天真好看”APP，在白色光源、固定角度下拍摄一张肤质分析图（这对数据一致性很重要哦）。

Save the application report: 请记得：拍摄完成后，截图保存 APP 生成的肤质报告页面（参考下方示例图）。

Provide the original photograph: 除了 APP 的截图报告，我们还需要你提供当天的原始测肤照片（即 APP 分析前拍摄的那张照片）。如何导出？请参考下方图示指南进行操作。

Confidentiality statement: 请放心：这些原始照片将由研究负责人严格保密收集，只有在你明确同意的情况下才会用于研究分析，绝不会对外泄露。

A10.3 English Translation for Protocol Review

Daily facial assessment: Each day, please use the “You Look Good Today” application to take a skin-analysis photograph under white lighting and from a fixed angle. This is important for data consistency.

Save the application report: After completing the photograph, please take and save a screenshot of the skin-condition report page generated by the application, referring to the example image provided in the guide.

Provide the original photograph: In addition to the screenshot of the application report, please provide the original facial photograph taken before the application performed its analysis. Please follow the illustrated instructions in the participant guide to export the photograph.

Confidentiality statement: The original photographs will be collected and kept confidential by the research lead. They will be used for research analysis only with the participant's explicit consent and will not be publicly disclosed.

A10.4 Operational Implementation

1. Timing. Participants were asked to complete one assessment daily from Day 0 through Day 42 and, where practicable, at approximately the same time of day.

2. Imaging conditions. Participants were asked to use white lighting and a fixed facial-camera angle. They were also encouraged, where practicable, to use the same application and maintain similar facial positioning and imaging conditions across days.

3. Image capture. At each assessment, the participant captured the original facial photograph used by the application for its automated analysis.

4. Report capture. After the application generated the facial skin-analysis report, the participant saved a screenshot of the report page.

5. Submission and retention. Participants were instructed to provide both the original facial photograph and the corresponding report screenshot to the research lead as part of the daily study record.

6. Readability check. S.Y. checked whether submitted report screenshots were sufficiently complete and readable for extraction of the numerical outcomes.

A10.5 Application Outputs and Use in the Study

The application-generated report provided the estimated skin-age and comprehensive skin-score values used in the study. S.Y. extracted and coded these numerical values from the saved reports. Daily values from Day 0 through Day 42 were used to describe trajectories, whereas the inferential comparison focused on Day 0 and Day 42. The original photographs were retained as identifiable source materials but were not independently analyzed using a separate validated facial-analysis algorithm.

A10.6 Confidentiality, Storage, and Access

Participants in the facial-state component were explicitly informed that the research team would collect and retain both the original facial photographs and the application-report screenshots. These materials were stored in a dedicated password-protected and encrypted folder on a computer under the custody of S.Y. Direct access to the identifiable facial-image folder was restricted to S.Y. Coded participant identifiers were used where practicable, but the original facial photographs were treated as inherently identifiable visual data. They are excluded from public data sharing and will not be reproduced in publications or presentations. Retention and secure-destruction arrangements are described in Section 11.3 of this protocol.

A10.7 Standardization and Interpretation Limitations

The instructions requested white lighting and a fixed angle, but the study was conducted in participants' naturalistic settings. Lighting intensity, imaging device, camera settings, facial positioning, temperature, humidity, and application version were not experimentally controlled or independently verified at every assessment. The research team did not have access to the application's proprietary image-processing algorithm, training data, parameter settings, score-construction procedures, or server-side version records. The estimated skin-age and comprehensive skin-score values must therefore be interpreted as exploratory commercial-application outputs rather than validated dermatological, physiological, or diagnostic measurements.

A10.8 Missing or Unusable Assessments

A missed assessment, unavailable original photograph, missing report screenshot, or unreadable report remained missing in the study record. No facial-state value was imputed from a photograph when the corresponding application-generated numerical report was unavailable or unreadable. The inferential facial-state analysis was restricted to participants with complete and readable Day 0 and Day 42 reports.

Appendix 11. Ethics Approval Documentation

Appendix 11A：Cover page

Ethics approval body: School of Design Arts, Communication University of Zhejiang

Approval number: CUZ-RE-2025-05

Approval date: 25 May 2025

Approval status: Approved before participant recruitment

First participant enrolled: 17 July 2025

Appendix 11B：Original Chinese ethics approval，original page 1 of 2

人类参与研究伦理审核备案说明

项目名称：
《基于人工智能情绪调节的面部状态改善数字疗法研究》

项目执行负责人：孙钰榆
指导教师：曹晓晓 副教授
所在单位：浙江传媒学院设计艺术学院

一、研究内容说明

本研究为基于人工智能情绪干预的人类行为观察研究，主要通过 AI 对话、情绪记录、自评量表及面部状态数据采集，探索情绪调节对心理状态及面部状态变化的可能影响。

研究过程中不涉及：

1. 药物、医疗器械或侵入式操作；
2. 生物样本采集；
3. 医疗治疗行为；
4. 高风险心理诱导；
5. 未成年人受试者。

本研究属于低风险（minimal risk）的人类参与研究。

二、受试者保护措施

1. 所有参与者均为自愿参与，并在参与前获知研究内容；

Appendix 11B：Original Chinese ethics approval，original page 2 of 2

2. 参与者可随时退出研究；
3. 所有数据均以匿名方式进行统计与分析；
4. 研究数据仅用于学术研究用途，不对外公开个人隐私信息；
5. 面部图像及相关数据不用于商业用途或个人身份识别。

三、研究伦理说明

本研究符合学术研究中的基本伦理原则，包括自愿参与、知情同意、隐私保护与数据匿名化原则。项目研究风险较低，不涉及临床医学干预。

经审核，同意该研究作为低风险人类参与研究进行备案。

备案编号：CUZ-RE-2025-05

（盖章）
浙江传媒学院
设计艺术学院

日期：2025 年 6 月 05 日

Appendix 11C：English translation，original page 1 of 2

Human Participant Research Ethics Review Record

Project Title:
"Research on AI-Based Emotional Regulation and Digital Facial-State Improvement"

Principal Investigator: Sun Yuyu
Supervising Professor: Cao Xiaoxiao, Associate Professor
Institution: School of Design Arts, Communication University of Zhejiang

1. Research Description
This study is a human behavioral observational study based on AI-assisted emotional intervention. The research mainly explores the potential effects of emotional regulation on psychological states and facial-state changes through AI conversations, emotional records, self-report scales, and facial-state data collection.

The study does not involve:
1. Drugs, medical devices, or invasive procedures;
2. Biological sample collection;
3. Medical treatment interventions;
4. High-risk psychological induction;
5. Minor participants.

This study is classified as a minimal-risk human participant study.
2. Participant Protection Measures

Appendix 11C：English translation，original page 2 of 2

1. All participants voluntarily participated and were informed of the research content before participation;
2. Participants were allowed to withdraw from the study at any time;
3. All data were analyzed anonymously;
4. Research data were used solely for academic research purposes and no personal private information was publicly disclosed;
5. Facial images and related data were not used for commercial purposes or personal identification.

3. Ethics Statement

This study complies with the fundamental ethical principles of academic research, including voluntary participation, informed consent, privacy protection, and data anonymization. The project presents low risk and does not involve clinical medical intervention.

After review, this study is approved as a minimal-risk human participant research project for institutional ethics record filing.

Approval No.: CUZ-RE-2025-05

(Official Seal)

School of Design Arts

Communication University of Zhejiang

Date: __25__ / __05__ / 2025

Appendix 12. Safety and Psychological-Distress Response Procedure

Document status: *No separate contemporaneous written safety SOP was retained. This procedure was retrospectively reconstructed in August 2026 from the ethics materials, participant-communication and withdrawal records available to the investigators, and research-team verification. It summarizes the response approach reported by the investigators as used during the study. It is not evidence that a standalone written SOP existed before recruitment and has not been backdated.*

A12.1 Purpose and Scope

The purpose of this procedure is to document how the research team responded, or would have responded if required, when a participant reported psychological distress, anxiety-related concerns, fatigue or discomfort associated with repeated assessments, privacy concerns, or a wish to discontinue participation. The study was a minimal-risk, non-pharmacological behavioral study. MoodTalker and the research team did not provide clinical diagnosis, psychotherapy, emergency intervention, or crisis services.

A12.2 Identification of a Concern

A concern could come to the research team's attention through a participant's direct message in DingTalk or WeChat, a telephone conversation, a request to pause or withdraw, or another communication during follow-up. Questionnaire responses and daily mood ratings were research outcomes and were not treated as clinical diagnoses. The study did not use automated crisis detection, continuous clinical surveillance, or real-time review by a mental-health professional, and the AI system was not relied upon to identify or manage clinical risk.

A12.3 Response Steps

1. Receive and acknowledge the concern. S.Y., as the principal participant-contact person, acknowledged the participant's report and obtained only the information needed to understand the immediate concern and the participant's wish regarding continued participation.

2. Pause study activities when appropriate. The participant was advised that they could stop the AI-guided conversation, questionnaire, facial-state assessment, or all study activities without penalty. No participant was required to continue an interaction that caused discomfort.

3. Assess urgency through direct communication. The researcher clarified whether the concern appeared to involve transient discomfort, a request for support, or an urgent threat to the participant's immediate safety. This communication was not a clinical diagnostic assessment. If a participant had reported imminent danger, an inability to remain safe, or an immediate risk of self-harm, the participant would have been instructed to contact local emergency services or attend the nearest emergency department and, where feasible, to seek assistance from a trusted family member or other support person.

4. Escalate within the study team. S.Y. informed C.X. of material psychological-distress or safety concerns. C.X. provided supervisory oversight and determined whether further institutional or ethics-related notification was required. H.X. could assist with project administration and verification where necessary but did not provide clinical treatment.

5. Recommend appropriate professional support. When a participant reported significant or persistent psychological discomfort, the participant was advised to discontinue the relevant study activity and seek qualified psychological or medical support. The researchers did not represent this recommendation as a diagnosis or provide clinical counselling.

6. Respect withdrawal and data-use choices. A participant could withdraw from some or all study procedures at any time. The research team documented the participant's decision and handled already collected data in accordance with the consent information, ethics approval, and the participant's expressed data-use preference where applicable.

7. Document the event. Where records were available, S.Y. documented the coded participant identifier, date, communication channel, nature of the concern, action taken, withdrawal status, and follow-up outcome. Direct identifiers and detailed private communications were kept separate from the statistical-analysis dataset.

A12.4 Privacy-Related Concerns

If a participant raised a concern about facial photographs, application-generated reports, screenshots, or consent-related communications, new collection could be paused while the participant's preference was clarified. Identifiable facial data and consent records were maintained separately from coded analysis data. Direct access to the encrypted folder containing identifiable facial materials was restricted to S.Y.; any authorized backup was to remain encrypted and access-controlled.

A12.5 Oversight and Monitoring

No independent Data and Safety Monitoring Board was established because the study was small, minimal risk, non-pharmacological, and did not include invasive procedures, clinical treatment, interim efficacy analyses, or formal early-stopping rules. This did not remove the investigators' responsibility to respond to participant concerns, document withdrawals and adverse events, and recommend professional assistance when appropriate.

A12.6 Recorded Safety Outcome

No serious adverse events were reported during the study period. One participant in the usual-routine control group withdrew because of anxiety-related concerns. Because this participant had not received the AI-assisted intervention, the withdrawal was not attributed to the AI intervention. No other adverse events or unintended effects were reported in either group. This statement reports the available study record and does not imply that an independent clinical safety-monitoring system was in place.

Appendix 13. Investigator Signature Page

By signing below, the investigators confirm that this retrospectively compiled protocol accurately reflects the study as implemented, based on the available study records.

Principal Investigator	Sun Yuyu
Signature / Date	
Supervising Professor	Cao Xiaoxiao
Signature / Date	
Other Investigator	Hou Xiangyu
Signature / Date