The Construction of Therapeutic Space in Emotional Wellness Apps: An Interaction Design Study Based on the Theory of the Production of Space

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Abstract

INTRODUCTION: In response to the global shortage of mental health resources, the design paradigm of emotional wellness apps is shifting from "functional tools" to "immersive spaces." However, existing research lacks a systematic framework to analyze the therapeutic mechanisms of "spatiality" in such applications.

OBJECTIVES: Based on Henri Lefebvre's theory of the production of space, this study employs an exploratory sequential mixed-methods approach to construct and preliminarily validate a model of digital therapeutic space in emotional wellness apps for empirical analysis.

METHODS: The study first conducted semi-structured interviews with 24 intensive users of three representative apps, "Chao Xi," "MoFlow," and "Xin Guang." Grounded theory was used for three-level coding to extract core categories and construct a theoretical model. Subsequently, based on qualitative coding results, the Spatial Narrative Experience Assessment Scale was developed and administered to 286 users. Descriptive statistics, correlation analysis, multiple linear regression, and Bootstrap methods were used to test model pathways, controlling for common method bias.

RESULTS: The results show: (1) The therapeutic space of emotional wellness apps is a systematic model comprising three main categories (physical space, social space, and spiritual space) and nine subcategories. (2) Qualitative analysis revealed a carrier-rule-output spatial logic. (3) After controlling for usage duration and mental health baseline, physical space ($\beta =$ 0.29, $p < 0.001$) and social space ($\beta = 0.38$, $p < 0.001$) significantly positively influenced spiritual space experience. Bootstrap tests indicated no significant difference in their effects (95% CI [-0.03, 0.21]), supporting a "Dual Engine Drive" mechanism. Common method bias was acceptable (first-factor explanation rate: 32.7%).

CONCLUSION: This study validates the operationalization of the theory of the production of space in interaction design research, providing a systematic theoretical model and empirical basis for the construction and evaluation of "digital therapeutic space." The derived "carrier-rule-output" framework offers actionable insights for the design of emotionally resonant digital environments.

1. Introduction

1.1. Research Background

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The World Health Organization's 2022 World Mental Health Report highlights that nearly one billion people worldwide suffer from mental health issues, with a significant gap in mental health service resources. Against this backdrop, emotional wellness mobile applications (apps) have rapidly developed as an important supplement

to traditional psychological services due to their accessibility, low cost, and privacy [1]. Their design paradigm is evolving from early "tool-based products" focused on emotion tracking to "digital therapeutic spaces" emphasizing immersive experiences and narrative journeys. This shift centers on transforming interaction design goals from implementing functions to constructing a digital environment where users can dwell and explore.

1.2 Theoretical Framework and Research Hypotheses

Based on a critical analysis of existing research, this study constructs an integrated theoretical framework. Using Lefebvre's theory of the production of space as the core meta-theory, it incorporates Dourish's embodied interaction theory and Bachelard's poetics of space to form a multidimensional perspective on digital therapeutic space. However, these philosophical and theoretical formulations are not directly applicable to empirical research. Thus, the core challenge of this study is to operationalize them into a mechanistic model that systematically analyzes the spatiality of interaction design in emotional wellness apps (Table 1).

Table 1: Analytical Framework for Digital Therapeutic Spaces Based on Spatial Production Theory

Spatial Triad	Theoretical Dimension	Operationalization	Core Connotation
Spatial Practice	Perceived Dimension	Physical Space	Interface Presentation and Sensory Channels
Representations of Space	Conceived Dimension	Social Space	Rule Systems and Power Structures
Representational Space	Lived Dimension	Spiritual Space	Emotional Experience and Meaning-Making

Based on the above, this study proposes the following core research questions:

(i) Based on in-depth user experiences, what identifiable interaction design elements (categories) constitute the "therapeutic space" of emotional wellness apps?

(ii) What logical relationships exist among these elements, and can they be integrated into a systematic theoretical model?

(iii) Can the relationships between core dimensions in this theoretical model be preliminarily validated through quantitative data?

Correspondingly, the following research hypotheses are proposed:

- H1: Using grounded theory, core categories representing the "digital therapeutic space" can be systematically derived from user interview data, and a structured theoretical model can be constructed.
- H2: In the constructed theoretical model, the perceived design of physical space has a significant positive impact on users' spiritual space experience.
- H3: In the constructed theoretical model, the perceived design of social space has a significant positive impact on users' spiritual space experience, and its effect is greater than that of physical space.

2. Literature Review

Current research on interaction design for emotional wellness apps primarily diverges into technical-functional and socio-cultural perspectives. From the technical-functional perspective, studies often focus on optimizing usability and specific user experiences. For instance, Monachelli et al. explored the incorporation of evidence-based techniques, such as gamification and personalization, to prolong user engagement in mHealth apps, highlighting the importance of design features for sustained use [2]. Similarly, Vhaduri & Simhadri investigated user concerns and architectural choices, particularly in audio-based mHealth apps, emphasizing the critical role of sensory channels and interface modalities in shaping the user experience [3]. Further extending this line of inquiry, Zheng et al. researched elderly-friendly medical app interfaces from a scene fusion perspective, focusing on adapting the physical interface design to specific user contexts and needs [4]. In a related vein, Yousheng Yao et al. optimized interaction processes for rural youth psychological apps based on Gross's emotion regulation theory, emphasizing functional adaptation and user experience [5]. Qiao Yang et al. also applied the SRK cognitive model to hierarchical tasks in elderly health management, focusing on interface optimization from a cognitive aging viewpoint [6]. While these studies offer valuable practical insights for feature and interface design, they predominantly treat the app as a functional tool and fail to address the underlying production mechanisms of apps as integrated social and therapeutic spaces.

From the socio-cultural perspective, research begins to consider the broader context and meaning of digital environments. Riji Yu et al. proposed field construction for VR spatial narrative but limited their focus to immersive experiences in virtual media without extending to daily spatial practices in mobile apps [7]. Yuxiang Zhao et al. emphasized socio-cultural field analysis in their "APP roaming method"[8], providing a methodological basis for revealing spatial power relations in apps, yet their theoretical framework remains centered on technical affordances, lacking systematic interpretation of the spatial triad dialectic.

Lefebvre's theory of the production of space provides a philosophical foundation for understanding the social production of digital space, bridging the gap between

technical and social views. This theory breaks through the limitations of traditional spatial views, proposing that space is not a neutral container but a product of social relations and a social construct that is produced [9]. Its core "spatial triad" —spatial practice (perceived space), representations of space (conceived space), and representational spaces (lived space)—offers a meta-theoretical support for this study. This framework aligns with analyzing the production process of digital therapeutic space, as digital space itself is a construct shaped by designers' conceptions, users' practices, and technological materiality [10].

However, directly applying this broad philosophical framework to specific digital environments requires critical examination and operationalization. Digital space possesses unique "digital avatar" characteristics, with materiality, sociality, and meaning-generation mechanisms differing from traditional physical spaces. Dourish's theory of embodied interaction provides an important supplement, emphasizing that meaning emerges from the embodied interaction between people and their environments [11]. This resonates with Lefebvre's lived space but places greater emphasis on the central role of the body in interaction, offering insights into users "embodied participation" in apps. Bachelard's emotional analysis of images like homes and nests in The Poetics of Space provides a poetic dimension for understanding how physical space evokes users' emotional resonance through metaphor [12]. Overall, existing research has not systematically deconstructed the therapeutic mechanisms of "spatiality" in emotional wellness apps by integrating these theoretical strands. Operationalizing Lefebvre's theory for health interaction design, informed by these complementary perspectives, is this study's primary theoretical breakthrough.

3. Method

3.1. Research Strategy and Design

To address the research questions, this study adopts an exploratory sequential mixed-methods design (QUAL → QUAN). The initial qualitative phase (semi-structured interviews, grounded theory) inductively constructs the theoretical model (addressing RQ1 & RQ2). The subsequent quantitative phase (questionnaire survey) then tests the core pathways within the model (addressing RQ3), providing complementary validation.

3.2. Case Selection and Research Subjects

(i) Case Selection: Using purposive sampling, three representative emotional wellness apps in the Chinese market with distinct design philosophies were selected (Table 2): "Chao Xi" (focusing on meditation and natural sounds), "MoFlow" (an emotion-tracking app combining AI and cognitive behavioral therapy), and "Xin Guang" (an AI life companion).

(ii) Research Subjects: Interview Subjects: 24 intensive users (8 per app) were recruited via social media and research institute mailing lists. Inclusion criteria: continuous use of the app for at least 6 months, with a weekly usage frequency of no less than 3 times. Sample size was determined based on the "theoretical saturation" principle of grounded theory. The final sample included 15 females and 9 males; average age 29.1 years (SD = 4.8); education: 79.2% had a bachelor's degree or higher.

(iii) Questionnaire Subjects: Questionnaires were distributed via a professional online survey platform (WJX Platform), using quota sampling to ensure representativeness. 326 questionnaires were collected; after excluding invalid responses (e.g., excessively short completion time < 3 minutes, logical contradictions), 286 valid questionnaires were obtained, with an effective rate of 87.7%. The valid sample included 58.7% females and 41.3% males; average age 27.8 years (SD = 5.2), reflecting a predominance of young adult users; usage duration: 6–12 months (42.3%), over 1 year (57.7%).

Table 2: App Information Summary Table

Number	APP Name	Major Function
1	Chao Xi	Enhances focus, improves sleep, and reduces stress through nature sounds and meditation.
2	MoFlow	Helps users log, analyze, and gain insights into emotions via AI-guided writing.
3	Xin Guang	Uses AI to analyze emotions, organize records, and provide personal insights.

3.3. Data Collection

Qualitative Data Collection
Semi-structured in-depth interviews were conducted. The interview outline was designed based on preliminary conceptions of the theory of the production of space but remained open. Core questions covered five dimensions:

- Introduction and background;
- Physical space experience (e.g., sensations and actions related to interface, senses, interactive elements);
- Social space experience (e.g., perceptions of data privacy, algorithm recommendations, community interaction);
- Spiritual space experience (e.g., emotional changes, new perspectives, impact on self-understanding);

Overall spatial metaphor (reasons for comparing the app to a place). Each interview lasted 45–75 minutes, was audio-recorded, and transcribed verbatim, resulting in approximately 220,000 words of transcript for analysis.

Table 3: Grounded Theory Three-Level Coding Table for the Emotional Health APP Spatial Narrative Interaction Model

Main Category (Selective Coding)	Subcategory (Axial Coding)	Initial Concept (Open Coding Example)
A Physical Space (Interface and interaction elements that users can perceive, and the physical carrier of space)	A1 Ceremonial Entrance	a1. Animation for the start-up call; a2. Daily check-in emoji selection; a3. Soft start-up sound; a4. Transition animation for "Enter the Heart Island"
	A2 Elastic Path	A2 Elastic Path a5. A fixed emotional first aid Enter the Heart Island a5. A fixed emotional first aid template; a6. A blank diary for free writing; a7. Guidance phrases that can be skipped; a8. Self-selected meditation topics
	A3 Emotional Landmark	a9. Virtual pet growth and evolution; a10. Monthly mood report; a11. Achievement badge system; a12. Heart Island scenery changes
	B1 Privacy and Security Boundary	b1. "Data only stored locally" commitment; b2. Anonymized sharing options; b3. Clear privacy policy explanation; b4. Disappearance of data security concerns
	B2 Algorithm Personalized Narrative	b5.AI Weekly emotional pattern summaries; b6."Guess You Like" music recommendations; b7. Insights report highlighting emotional connections to events; b8. Feeling understood
B Social Space (Rules, algorithms, and community culture that govern user behavior, and the invisible architecture of space)	B3 Community Support Atmosphere	b9. Receiving "heartwarming encouragement" from strangers; b10. Sharing emotions anonymously; a11. The sense of we're all the same; b12. Community rules prohibit malicious comments
		C Mental Space (The subjective experience, emotion and meaning generated by the user in the interaction, and the ultimate output of the space) C1 Emotional Release c1. A sense of relief after journaling; c2. A sense of relief after a good cry; c3. Inner peace after meditation; c4. A sense of security when emotions are accepted
		C2 Meaning Construction c5. Discover from the report that you're most prone to anxiety on Sunday nights; c6. Understand the connection between anxiety and creativity; c7. Develop a fresh perspective on past events
		C3 Self-identity reinforcement c8. Seeing your emotional journey reveals I'm growing ; c9. Shifting from I'm flawed we're all the same; b12. Community rules prohibit malicious comments
C Mental Space (The subjective experience, emotion and meaning generated by the user in the interaction, and the ultimate output of the space)	C1 Emotional Release	c1. A sense of relief after journaling; c2. A sense of relief after a good cry; c3. Inner peace after meditation; c4. A sense of security when emotions are accepted
	C2 Meaning Construction	c5. Discover from the report that you're most prone to anxiety on Sunday nights; c6. Understand the connection between anxiety and creativity; c7. Develop a fresh perspective on past events
	C3 Self-identity reinforcement	c8. Seeing your emotional journey reveals I'm growing; c9. Shifting from I'm flawed to I'm just going through tough times; c10. Enhanced self-acceptance

Quantitative Data Collection and Tool Development

Based on the grounded theory analysis results, the *Emotional Wellness APP Spatial Narrative Experience Assessment Scale* was self-developed. The scale includes three subscales with 22 items total, using a Likert 5-point scale (1 = strongly disagree, 5 = strongly agree).

(i) Physical Space Subscale (8 items): Dimensions include Ritualized Entrance (e.g., "The app's startup process has a sense of ritual, helping me calm down"), "Flexible Path, " and "Emotional Landmarks."

(ii)

(iii) Social Space Subscale (8 items): Dimensions include "Privacy Security Boundary"(e.g., "I trust this app's protection of personal data"), "Algorithmic Personalization Narrative, " and "Community Support Atmosphere."

(iv) Spiritual Space Subscale (6 items): Dimensions include "Emotional Catharsis"(e.g., "After using this app, my negative emotions are released"), "Meaning Construction, " and "Self-Identity Reinforcement."

A pre-test (n=52) showed the scale's overall Cronbach's α was 0.94, with subscale α coefficients of 0.88, 0.90, and

0.86, respectively. Confirmatory factor analysis indicated good model fit (χ^2/df = 2.38, CFI = 0.93, TLI = 0.91, RMSEA = 0.06), meeting psychometric standards. The questionnaire also collected demographic variables, app usage duration, and used the PHQ-4 ultra-brief anxiety and depression scale to measure users' mental health baseline as a control variable (Cronbach's α = 0.84 in this study).

3.4 Data Analysis Methods

- Qualitative Data Analysis: Strictly followed the grounded theory three-level coding process for interview transcripts. Steps included: open coding (line-by-line analysis of raw data, labeling, initially generating concepts); axial coding (discovering and establishing connections between conceptual categories, forming subcategories); selective coding (systematically handling relationships between core and subcategories, forming a "storyline", and constructing a theoretical framework). To ensure coding reliability, two researchers independently coded portions of the data, resolving disagreements through regular discussions. The final coding consistency coefficient was 0.86, indicating good reliability. *NVivo* 12 software assisted in managing the process.
- Quantitative Data Analysis: Used *SPSS* 26.0 and *PROCESS* macro (v4.1). Specific steps included: a. Common method bias (CMB) assessment: Procedural remedies were applied during questionnaire design, including guaranteeing respondent anonymity and counterbalancing item order. Statistically, Harman's single-factor test was conducted.
- Descriptive statistics and correlation analysis: Calculated means, standard deviations, and Pearson product-moment correlation coefficients for variables.
- Multiple linear regression analysis: Tested the impact of physical and social space on spiritual space, controlling for usage duration, age, gender, and PHQ-4 scores.
- Bootstrap confidence interval test: Used 5000 Bootstrap samples to calculate 95% confidence intervals for regression coefficients and their differences, testing effect robustness and H3.

4. Results

4.1. Qualitative Analysis Results: Grounded Theory Coding and Model Construction

Through progressive coding and analysis of 24 interview transcripts, this study ultimately constructed an Emotional Wellness APP Spatial Narrative Interaction Model comprising 3 main categories and 9 subcategories. The detailed three-level coding process, results, and representative original statement examples are shown in Table 3.

Through selective coding, "constructing digital therapeutic space through interaction design"was identified as the core storyline. The model's internal logical relationship is: physical space (A) is the direct carrier of user experience, social space (B) is the embedded behavioral rules and relational framework, and both work together as "antecedent variables" to catalyze and shape users' emotional and cognitive experiences in spiritual space (C) as the "outcome variable." This logical relationship provides a clear framework for subsequent quantitative validation, supporting research hypothesis H1.

4.2 Quantitative Validation Results

Common Method Bias and Descriptive Statistics

Common method bias test results showed five factors with eigenvalues greater than 1, with the first factor explaining 32.7% of the variance, below the 40% critical standard, indicating no severe common method bias.

Descriptive statistics and correlation analysis for research variables are shown in Table 4. The means for physical space (M = 3.88, SD = 0.69), social space (M = 3.75, SD = 0.74), and spiritual space (M = 3.94, SD = 0.65) were all above the theoretical median (3 points), indicating overall positive user perceptions of the three spaces. Skewness and kurtosis coefficients were within ±1, meeting normal distribution requirements. Pairwise correlation analysis showed significant correlations between all variables ($p < 0.01$), with the highest correlation between social and spiritual space (r = 0.67), preliminarily supporting the qualitative mode's hypothesis that social space is a core antecedent of spiritual space. Usage duration was positively correlated with all spatial dimensions, while PHQ-4 baseline scores were negatively correlated, indicating the necessity of controlling these variables in subsequent analyses.

Table 4: Descriptive Statistics and Variable Correlation Matrix (N=286)

Variable	Mean (M)	Standard Deviation (SD)	1	2	3	4	5
Physical Space	3.88	0.69	1				
Social Space	3.75	0.74	.62	1			
Spiritual Space	3.94	0.65	.57	.67	1		
Usage Duration	4.21	1.35	.28	.31	.35	1	
PHQ-4 Baseline	2.45	1.12	-.25	-.29	-.38	-.19	1

Note: $p < 0.05$, $p < 0.01$; Usage duration is a categorical variable (1 = less than 3 months, 2 = 3-6 months, 3 = 6-12 months, 4 = 1-2 years, 5 = over 2 years).

Regression Analysis: Impact of Spatial Dimensions on Spiritual Space

To directly test H2 and H3, multiple linear regression was conducted with spiritual space score as the dependent variable, physical and social space scores as independent variables, and usage duration, age, gender, and mental health baseline (PHQ-4 score) as controls.

The overall regression model was statistically significant ($F_{(6, 279)} = 45.82$, $p < 0.001$). The adjusted R^2 was 0.486, meaning physical space, social space, and control variables together explained 48.6% of the variance in spiritual space. According to Cohen's (1988) standards, this represents a large effect size in social sciences, indicating the theoretical model has strong explanatory power for spiritual space experience.

Specific regression coefficients are shown in Table 5. After controlling for other variables, social space ($\beta = 0.38$, $p < 0.001$) and physical space ($\beta = 0.29$, $p < 0.001$) both significantly positively predicted spiritual space. Thus, H2 and H3 were supported. All VIFs were below 2, indicating no severe multicollinearity.

Table5: Regression Analysis of Physical and Social Space on Spiritual Space (With Control Variables)

Predictive variable	B	SE	β	t	p	VIF
Constant	0.92	0.17		5.41	<.001	
Gender	-0.04	0.05	-0.03	-0.80	.424	1.08
Age	0.01	0.01	0.05	1.32	.188	1.12
Usage Duration	0.07	0.02	0.15	3.15	<.001	1.10
Physical Space	0.27	0.05	0.29	5.40	<.001	1.65
Social Space	0.33	0.04	0.38	7.82	<.001	1.68

Dependent variable: Spiritual Space; Note: B = unstandardized coefficient, SE = standard error, β = standardized coefficient.

Bootstrap sampling (5000 times) yielded 95% confidence intervals for physical space [0.18, 0.35] and social space [0.24, 0.42], neither including zero, further verifying the robustness of the regression coefficients.

Effect Comparison and Supplementary Analysis
Research hypothesis H3 predicted that social space's effect on spiritual space would be greater than physical space's. To test this statistically, Bootstrap (5000 samples) was used to calculate the standardized coefficient difference between social space ($\beta = 0.38$) and physical space ($\beta = 0.29$) and its 95% confidence interval. The results showed a coefficient difference of 0.09, with a 95% CI of [-0.03, 0.21]. Since this interval includes zero, the difference is not statistically significant ($p = 0.12$). Thus, H3 was not supported.

This finding revises the initial theoretical expectation, revealing that the construction mechanism of digital therapeutic space is not dominated by a single element but relies on a Dual Engine Drive model—requiring the synergistic effect of physical space's sensory immersion and social space's rule-based trust, both equally important. The trend of social space's numerically larger influence (βsocial

= 0.38 > βphysical = 0.29) provides a valuable direction for future research with larger samples.

Supplementary analysis found that usage duration positively moderated the path from social to spiritual space ($\beta = 0.11$, $p = 0.032$), meaning that as usage time increases, social space's positive impact on spiritual space strengthens.

5. Discussion

5.1 Operationalization of the Theoretical Framework and Model Validation

The theoretical breakthrough of this study lies in operationalizing Lefebvre's theory of the production of space from a philosophical framework into a testable model and providing its first systematic empirical validation in the context of emotional wellness apps. The validated "carrier-rule-output" framework posits a coherent causal logic: the perceptible design carrier (Physical Space) and the embedded governance rules (Social Space) function as synergistic antecedents that jointly enable the therapeutic output (Spiritual Space). Physical space facilitates sensory immersion and embodied interaction, while social space establishes trust and normative guidance. Their comparable influence (β social = 0.38, β physical = 0.29; difference n.s.) confirms a "Dual Engine Drive" mechanism, where therapeutic meaning emerges from their interplay, not from either dimension in isolation.

5.2 Dialogue with Existing Research and Theoretical Advancement

The conclusions of this study engage in deep dialogue with Dourish's theory of embodied interaction. The study finds that users' "bodily practices" in apps (e.g., swiping, tapping, writing) are not merely functional operations but processes where meaning "emerges" through interaction between people and their environments. For example, a respondent's description that sliding fingers on the screen while journaling feels like combing through one's emotions 'vividly embodies the view that cognition and emotion occur not just in the brain but through coupled interaction between the body and the environment. This provides a micro-foundation for understanding the generation of "spiritual space" and compensates for Lefebvre's insufficient attention to the embodied dimension.

Bachelard's poetics of space helps us understand how ritualized entrances and "emotional landmarks" evoke users' emotional resonance and belonging through metaphor and symbolism. This study finds that visual metaphors like Heart Island and "Growth Tree" are not merely decorative but poetic spaces carrying emotional memories and connecting past and present. As one respondent stated, "Every time I see my Heart Island bloom from desolation, I feel I am growing too." This poetic spatial experience transcends pure functionality, touching users' deep emotional needs.

Simultaneously, this study advances discussions on digital trust. It finds that trust is not only a product of privacy security but also the result of algorithmic transparency and community support. More importantly, the revealed "algorithmic narrative" mechanism has a dual effect: on one hand, it promotes users' meaning construction through personalized insights (e.g., emotion pattern recognition); on the other hand, it may trap users in emotional "filter bubbles" through overly personalized content recommendations, limiting cognitive flexibility and emotional growth. This finding importantly corrects the traditional design concept of "personalization as optimization." This tension between efficacy and autonomy mirrors concerns raised in persuasive computing research, such as the finding that highly persuasive app designs can significantly impair young children's ability to self-regulate and disengage from digital devices [13]. Thus, our conclusion aligns with the principles advocated by Li et al. in their systematic review, which emphasizes balancing algorithmic personalization with user autonomy and cognitive diversity [14].

5.3 Practical Implications and Ethical Reflection

Based on the "Dual Engine Drive" finding, interaction design for emotional wellness apps should adopt systematic collaborative strategies. At the physical space level, designers need to consciously integrate elements like ritualized entrances and emotional landmarks organically to construct a coherent and attractive spatial narrative journey, rather than piling functions in isolation. At the social space level, the key is to translate abstract "trust" into specific interactive experiences users can perceive and participate in, through visible data control panels, explainable algorithm mechanisms (e.g., "Why was this recommended to me?"), and friendly community guideline designs.

This "carrier-rule-output" logic translates into a clear design heuristic for practitioners: to consciously link tangible interface elements (the carrier) to transparent governance rules (the rule), explicitly targeting specific therapeutic outcomes (the output). A benchmarking example would be: to foster "Meaning Construction" (output), designers can create a reflective journaling feature with dynamic, context-sensitive prompts (carrier) coupled with an explainable algorithm that highlights emotional patterns without deterministic labeling (rule).

Particularly, designers need to treat "algorithmic narrative" as a core design object, rather than leaving it entirely to engineers' black boxes. By providing adjustable personalization settings and clear user autonomy guarantees, a healthy balance between algorithmic intelligent guidance and user self-control can be established. Designers can look to strategies in persuasive computing for inspiration, such as the principle of cultural tailoring[15] to ensure that algorithmic narratives are not only personalized but also

contextually and culturally sensitive, thereby fostering greater user acceptance and therapeutic efficacy.

To mitigate algorithmic "filter bubble" risks, we recommend adopting the principle of "cognitive diversity" as a design benchmark. For instance, the system could intentionally intersperse content that constructively reframes dominant user emotions (e.g., suggesting insights on "the adaptive function of stress" alongside stress-management tools), thereby promoting cognitive flexibility.

6. Conclusion

6.1 Main Findings

This study constructed and validated a theoretical model of therapeutic space in emotional wellness apps through systematic mixed methods. The research shows that therapeutic space is a systematic model comprising physical, social, and spiritual spaces, with an internal mechanism following a "carrier-rule-output" logic. Quantitative analysis confirmed that, after controlling for usage duration and mental health baseline, both physical and social spaces have significant and equally influential positive effects on spiritual space experience, supporting a "Dual Engine Drive" mechanism. The study also found that usage duration moderates the relationship between social and spiritual space, with social space's influence strengthening over time.

6.2 Theoretical Contributions and Practical Value

The theoretical contribution of this study lies in achieving a methodological leap for the theory of the production of space from philosophical speculation to design empiricism, and enriching the theoretical toolbox for digital environment experience research by integrating embodied interaction and spatial poetics perspectives. Practically, the proposed physical-social space synergy principle, systematic evaluation framework, and warnings about algorithmic ethics provide theoretical guidance and practical tools for the design and optimization of emotional wellness apps.

6.3 Research Limitations and Future Directions

This study has limitations. First, the sample primarily consists of Chinese users, and the quantitative sample is skewed toward younger, likely more digitally literate adults. This affects the generalizability of findings to older populations or diverse cultural contexts. Second, the cross-sectional design precludes causal inference. Third, although we controlled for key variables, potential confounders—such as prior experience with therapy and baseline digital literacy—were not measured and could influence the results. Future research should:

- Include more diverse demographic and cultural groups to test the model's boundary conditions;
- Employ longitudinal or experimental designs to establish causality;
- Measure and control for a wider array of user background variables.

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