Advances in World Medical Research, 2026, 2(1), 73-82
https://doi.org/10.71204/cqc1yy85

A Theoretical Study on Consumer Adoption Intentions for Digital Health Products from the Perspective of Information Framing Theory

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Received: 6 April 2026/ Accepted: 28 April 2026/ Published online: 30 April 2026

Abstract

This paper adopts Information Framing Theory as its core perspective to conduct a theoretical exploration and conceptual framework construction on existing research regarding consumer adoption intentions for digital health products. The study clarifies the core concepts of Information Framing Theory, constructs an integrated theoretical model combining Information Framing Theory, the Theory of Planned Behavior (TPB), and the Technology Acceptance Model (TAM), and identifies key factors influencing user adoption of digital health products. On this basis, the paper compares the differences in the effects of various information frames and behavioral characteristics of adoption across different scenarios. With a particular focus on the unique characteristics of Traditional Chinese Medicine (TCM) health management scenarios, the paper proposes market optimization strategies based on information framing design. Finally, this paper summarizes the core findings and limitations of the research, offers recommendations for future research directions and corporate practices, and aims to provide theoretical references and practical guidance for the market promotion of TCM-oriented digital health products.

Keywords: Information Framing; Digital Health Products; Consumer Adoption Intentions; Traditional Chinese Medicine Health Management; Theory of Planned Behavior; Technology Acceptance Model

1. Introduction

Digital health products have achieved widespread adoption in the global market. According to the Digital Health Industry Data Book released by Grand View Research in January 2023, the global digital health market exceeded $211 billion in 2022, with a projected compound annual growth rate (CAGR) of 15.1% from 2021 to 2028. However, consumer adoption rates show

significant regional disparities: while the penetration rate of mobile healthcare applications exceeds 40% in Europe and the United States, it remains around 10% in some emerging markets. This gap highlights that the delivery mode of health information is a core factor influencing user decision-making and product adoption efficiency. As a core theory explaining individual decision-making behavior, Information Framing Theory can guide consumers' value perception through differentiated information presentation design, thus providing a theoretical solution to the industry pain point of uneven adoption rates. Meanwhile, existing studies have confirmed the key role of information presentation in health technology adoption: Pournik et al. (2025) found in their analysis of the ADLIFE digital personalized care platform based on the UTAUT framework that perceived ease of use and performance expectancy have a significant positive impact on platform adoption behavior, while technology anxiety is a core barrier, which further verifies the moderating effect of information framing design in the user adoption process.

Although existing research has preliminarily confirmed the moderating role of information framing in health technology adoption, there are still significant research gaps in the field of consumer adoption of digital health products. First, most existing studies focus on traditional health behaviors (such as disease screening and vaccination) or general mobile health applications, while there is insufficient systematic research on the information framing design of digital health products that integrate technical attributes and health service functions, and the mechanism between different types of information (benefit, risk, emotion) and product characteristics is still unclear. Second, the contextual boundaries of information framing effects have not been fully clarified: the moderating mechanisms of variables such as individual health literacy, risk perception, technology trust, and cultural identity on framing effects have not been systematically sorted out, and existing research mostly stays at the analysis of single factors, lacking an integrated theoretical perspective. Most importantly, digital health products based on TCM health management face unique cultural perception barriers and trust-building challenges, but existing information framing research has rarely involved this field, let alone culturally embedded framing design. How to organically integrate traditional TCM concepts such as "preventive treatment of disease" and "yin-yang balance" with information framing design remains an unexplored research gap.

Based on the above research gaps, this study focuses on three core research questions: First, how do different types of information frames influence consumers' adoption intentions for digital health products, and what are their underlying mechanisms? Second, are the effects of information frames moderated by product usage scenarios (chronic disease management vs. health prevention) and consumer characteristics (health literacy, TCM cultural identity, technology trust)? Third, for TCM health management scenarios, how to construct a culturally adapted information framing system integrated with traditional TCM theories and verify its effectiveness? This study has clear academic and practical value. Academically, existing research on digital health product adoption mostly focuses on single dimensions such as technical features or individual cognition, and has not yet formed a systematic integration of the mechanism of information framing in health communication; this study can fill the gap of fragmented research on framing effects and construct an integrated theoretical model. Practically, the promotion of

TCM digital health products often faces the dual challenges of cultural perception barriers and insufficient functional trust. This study can provide empirical references for optimizing the information dissemination design and market promotion strategies of such products.

2. Core Theoretical Foundationand Integrated Conceptual Model

2.1. Core Concepts of Information Framing Theory

Information Framing Theory originates from Prospect Theory, and its core logic is to influence individual cognition and decision-making preferences through differentiated information presentation methods. In the field of health communication, the theory is classically divided into two core dimensions: rational frames and emotional frames. Rational frames can be further subdivided into gain frames and loss frames: gain frames emphasize the positive health benefits obtained by using the product, while loss frames focus on the potential health losses caused by not using the product. Rothman and Salovey (1997) confirmed in their seminal study on health behavior that the effects of these two frames have significant contextual boundaries, which has become the core basis for health information design. Emotional frames enhance information influence by evoking positive or negative emotions, forming a chain reaction mechanism of "emotional arousal - attitude change - behavioral adoption". The latest research by Yan (2025) shows that the research on information adoption and persuasion mechanisms in health communication is shifting from simple frame comparison to multi-factor interaction analysis, covering cutting-edge topics such as information perceived value, information delivery strategies, and moral licensing effect.

2.2. Theoretical Basis of Health Behavior and Technology Adoption

The Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM) are classic analytical frameworks for explaining individual health technology adoption behavior. The core logic of TPB is that individual behavioral intention is mainly affected by three core variables: attitude, subjective norms, and perceived behavioral control (Shlash Mohammad et al., 2024). TAM further refines the core drivers of technology adoption into two key variables: perceived usefulness and perceived ease of use, which can explain 40% of the variance in individual behavioral intention to use information systems across scenarios (Leung et al., 2025). Existing studies have confirmed that integrating Information Framing Theory with TPB and TAM can construct a complete transmission path of "information framing - cognitive change - adoption intention": information framing can exert a significant moderating effect on the core variables of TPB and TAM by changing individuals' perception of product benefits, risks, and operational difficulty, thereby ultimately affecting adoption intention.

2.3. Integrated Conceptual Model of Digital Health Product Adoption

To address the theoretical disconnection in the original research, this study constructs an integrated conceptual model that clarifies the logical relationship between variables, with a structured definition as follows:

Independent Variable: Type of information frame, including rational frames (gain frame/loss frame) and emotional frames (positive emotion frame/negative emotion frame).

Mediating Variables: Core variables of TPB and TAM, including attitude towards the product, subjective norms, perceived behavioral control, perceived usefulness, and perceived ease of use. The mediating path is: information frame influences the mediating variables, which in turn drive the formation of adoption intention.

Moderating Variables: Individual and contextual variables, including user health literacy, TCM cultural identity, technology trust, product usage scenario (chronic disease management/health prevention), and age group.

Dependent Variable: Consumer's adoption intention for digital health products, including initial use intention and continuous use intention.

This model clarifies the core mechanism of information framing affecting adoption intention: information frames shape users' cognitive evaluation of products through rational and emotional paths, act on the core variables of TPB and TAM, and ultimately drive adoption intention; meanwhile, the above paths are regulated by individual characteristics and scenario factors. The subsequent analysis of this paper will strictly follow the logical framework of this model.

3. Research Progress on Digital Health Product Adoption from the Perspective of Information Framing

3.1. Heterogeneity of the Effects of Different Information Frames

The differential impact of gain and loss frames is the core topic of existing research, and the effect of frames is realized by influencing users' attitude, perceived usefulness, and perceived behavioral control in the integrated model. Existing research has formed a basic consensus: loss frames are more effective in high-risk scenarios such as chronic disease management, mainly by enhancing users' perceived behavioral control over health risks and negative attitudes towards inaction; while gain frames have a comparative advantage in health prevention scenarios, mainly by improving users' perceived usefulness of products and positive attitude towards health behaviors.

Meanwhile, framing effects show significant population heterogeneity, which is mainly regulated by users' health literacy and age. The unique value of emotional frames has also been widely verified: Yan (2025) pointed out that moderate emotional arousal can maximize users' attention and cognitive engagement, and emotional frames can amplify the influence of rational frames by enhancing the emotional resonance of information, thus further strengthening the prediction of attitude and intention in TPB.

3.2. Characteristics of Adoption Behavior in Different Scenarios

In line with the integrated conceptual model, the effect of information frames in different scenarios is mainly reflected in the differences in the significance of mediating variable paths.

In chronic disease management scenarios, the combined application of gain and loss frames can significantly improve patients' long-term management adherence. In this scenario, loss frames mainly act on perceived behavioral control by highlighting the risk of disease progression caused by non-intervention, while gain frames mainly improve the perceived usefulness of products by presenting the benefits of standardized management. An empirical study by Leung et al. (2025) on elderly patients with chronic diseases in China showed that performance expectancy (perceived usefulness), effort expectancy (perceived ease of use), social influence (subjective norms), and facilitating conditions (perceived behavioral control) have a significant positive impact on users' continuous use intention of mobile health applications. This group is particularly sensitive to the timeliness and relevance of information quality, which will directly affect their perceived ease of use and perceived usefulness of products.

In health prevention scenarios, the effect of frames also shows significant heterogeneity, and gain frames play a more dominant role by improving users' positive attitude and perceived usefulness of products. A study by Zhang et al. (2025) on the integrated TCM preventive treatment service model showed that a digital service model integrating intelligent constitution identification, personalized intervention, remote follow-up, and real-time monitoring can significantly improve patients' treatment adherence (89.7% vs. 74.2%) and satisfaction (95.4% vs. 78.7%). This result verifies that the synergistic optimization of information framing and functional design can significantly enhance users' perceived usefulness and positive attitude, thereby improving adoption intention.

4. Unique Characteristics and Information Framing Optimization Strategies for TCM Health Management Scenarios

4.1. Core Characteristics of TCM Health Management Scenarios

TCM health management scenarios have unique cultural and cognitive characteristics, which are mainly reflected in two dimensions, and also form the core boundary conditions for the application of the integrated conceptual model.

There are significant cultural and cognitive differences in user decision-making. Consumers' recognition of the TCM concept of "preventive treatment of disease" is the core cultural variable affecting the framing effect. Middle-aged and elderly groups have significantly higher recognition of TCM concepts than young groups, and this generational cognitive difference directly leads to differences in product acceptance. Meanwhile, the decision-making preference based on "personal experience" and "interpersonal trust" in traditional TCM health concepts has an inherent tension with the standardized and online characteristics of digital products, which hinders the establishment of user trust. The functional design of digital TCM health products needs professional adaptation based on TCM theoretical system, whose core challenge is to translate the core concepts of TCM such as syndrome differentiation and treatment and "preventive treatment of disease" into interactive digital modules, and ensure the scientificity based on authoritative TCM theories.

To further support the above analysis, this paper introduces a specific case study: the digital TCM constitution identification and health management platform developed by Shanghai Municipal Hospital of Traditional Chinese Medicine (Zhang et al., 2025). The platform has been applied to 216 sub-health patients, and its information framing design is closely combined with TCM theory: for the gain frame, it presents the specific benefits of constitution regulation in the form of "improvement of sub-health symptoms, reduction of disease risk"; for the loss frame, it explains the potential health risks of long-term imbalance of constitution combined with TCM constitution theory. The empirical results show that the platform's constitution identification accuracy reaches 90.4%, the follow-up completion rate reaches 92.5%, and the user compliance reaches 89.7%, which is significantly better than the traditional offline service model. This case provides empirical evidence for the effectiveness of TCM cultural embedded information framing design.

4.2. Optimization Strategies of Information Framing for TCM Health Management Scenarios

Based on the integrated conceptual model and the unique characteristics of TCM scenarios, this paper proposes the following targeted optimization strategies, each of which corresponds to the specific path of the model:

The content optimization of information frames with TCM culture as the core anchor mainly acts on the attitude and perceived usefulness of users in the model. Digital technology can realize the collection and standardization of multi-source TCM clinical data, and reveal the correlation between TCM syndrome phenotype and intervention effect through algorithms, so as to provide data support for translating traditional TCM theories such as "yin-yang balance" and "preventive treatment of disease" into benefit frames. For example, for users with qi deficiency constitution, the gain frame can be designed as "adhere to the personalized conditioning scheme for 3 months, the qi deficiency constitution score is improved by more than 60%, and the symptoms of fatigue and weakness are significantly relieved"; the loss frame can be designed as "long-term qi deficiency without conditioning will lead to the decline of visceral function and the increase of the risk of chronic respiratory and digestive diseases". At the same time, it can be integrated with the emotional frame of traditional TCM health preservation cases to enhance emotional resonance, realize the organic integration of benefit frame and emotional frame, and cover the whole health cycle from prevention to conditioning and rehabilitation.

Complementing this content optimization, the channel and scenario integration with information framing as the core link mainly acts on the subjective norms and perceived behavioral control of users in the model. Online, we can rely on social media platforms such as WeChat, use loss frames to strengthen health risk warnings, and use gain frames to visually present the effect of TCM conditioning; offline, we can transform frame information into tangible user-perceivable experience through community TCM clinics and health preservation center experience activities, so as to enhance the perceived value of products. For example, the digital TCM platform of Gu Sheng Tang has realized the online and offline linkage: offline clinics complete the TCM constitution identification and syndrome differentiation, and the online platform pushes personalized health information according to the user's constitution type, and

designs the information frame combined with the user's actual conditioning effect. The platform's operational data shows that the user retention rate of this online-offline linkage mode reaches 71.2%, which is 38.5% higher than the pure online mode. Meanwhile, Li et al. (2025) found that knowledge personalization, platform information quality and platform service quality have a significant impact on users' utilitarian and hedonic values, among which platform information quality is the most influential factor. This conclusion provides a core direction for the platform operation optimization of TCM digital health products: the platform should ensure the authority and standardization of information, and match the appropriate information frame type according to the user's constitution type and health status.

On the basis of content construction and channel layout, the personalized frame matching based on user characteristics mainly acts on the moderating variables of the model. For users with high TCM cultural identity, we can focus on the information frame integrated with TCM classical theories to enhance their positive attitude towards products; for young users with low TCM cognitive level, we can combine modern medical indicators to design gain and loss frames, reduce the cognitive threshold, and improve their perceived ease of use and perceived behavioral control. For users with low health literacy, we should reduce the proportion of professional TCM terms, and use more visual and emotional frames to convey information; for users with high health literacy, we can provide more detailed theoretical and data support to enhance the credibility of information.

5. Research Summary and Future Prospects

5.1. Core Research Findings

The type of information framing has a significant moderating effect on users' adoption intention of digital health products. The effect of frames is realized through the mediating variables of TPB and TAM: gain frames are more effective in health prevention scenarios by improving users' perceived usefulness and positive attitude, while loss frames have a stronger effect in chronic disease management scenarios by enhancing users' perceived behavioral control of health risks; emotional frames can effectively amplify the influence of rational frames through emotional arousal. The framing effect has significant heterogeneity across scenarios and populations, and variables such as age, health literacy, TCM cultural identity and technology trust play a significant moderating role in the frame effect path. In TCM health management scenarios, the information framing content integrated with traditional TCM theories is more likely to gain user trust, and the online-offline linkage frame delivery mode can significantly enhance users' subjective norms and perceived behavioral control, thereby improving adoption intention.

5.2. Future Research Directions

Empirical research can be designed and implemented based on TCM scenarios. Questionnaire surveys, in-depth interviews, and randomized controlled experiments can be adopted to collect first-hand data from users of TCM digital health products, test the applicability of the integrated conceptual model, and verify the actual effects of the proposed information framing optimization strategies. Further efforts can be made to deepen research on culturally embedded framing design

in TCM scenarios. An information framing system compatible with the theoretical system of TCM can be constructed to explore the differential effects of different TCM theory integration methods on user adoption intention. It is also feasible to carry out research on dynamic frame optimization driven by artificial intelligence technology. Based on users' real-time behavioral data and health status changes, precise matching of frame content can be achieved, and the dynamic adjustment mechanism of frames throughout the user life cycle can be explored.

In terms of corporate practice, enterprises should optimize the information strategy of products based on Information Framing Theory, dynamically adjust the frame design for different user groups and usage scenarios; cooperate with formal medical institutions to enhance the professional authority of product information, and improve users' perceived usefulness and trust; at the same time, promote the deep integration of products into daily health scenarios through online-offline linkage, and enhance users' subjective norms and perceived behavioral control, thereby ultimately improving product adoption rate and user retention.

6. Research Limitations

This study has the following core limitations, which need to be further improved in subsequent research. First, the research conclusions of this paper are mainly derived from theoretical deduction and the integration of existing empirical research, and have not been verified by empirical research targeting TCM health management scenarios and Chinese user groups. The proposed integrated conceptual model and optimization strategies lack the support of first-hand data such as questionnaire surveys, in-depth interviews or randomized controlled experiments, and the stability and applicability of the model need to be further tested. Second, this study mainly focuses on the information framing design at the front end of communication, and does not conduct in-depth analysis on the long-term dynamic change mechanism of framing effects in the user's continuous use stage, and cannot clarify the dynamic adjustment logic of information frames in the whole user life cycle. Third, this study does not involve cross-cultural comparative research, and the proposed optimization strategies for TCM scenarios are only applicable to the Chinese cultural context, and the generalizability of the conclusions in other cultural contexts is limited.

Author Contributions:

Xiaoqi Shao: Conceptualization, Writing-original draft, Writing-review & editing. All authors have read and approved the final manuscript.

Funding:

This research received no external funding.

Institutional Review Board Statement:

Not applicable.

Informed Consent Statement:

Not applicable.

Data Availability Statement:

Not applicable.

Conflict of Interest:

The authors declare no conflict of interest.

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