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I-CReST 2025: 121-084 – Exploring the Adoption of Digital Health Applications: A Conceptual Model Based on the Unified Theory of Acceptance and Use of Technology (UTAUT)

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ABSTRACT

The advancement of digital technologies in healthcare has led to the spread of digital health applications to improve patient well-being, monitor health, and improve healthcare services. Despite the benefits of such applications, the adoption of digital health applications remains conflicting among users. This article proposes a conceptual framework for understanding user acceptance of digital health applications based on the Unified Theory of Acceptance and Use of Technology (UTAUT). Through the integration of the key constructs from UTAUT—performance expectancy, effort expectancy, social influence, and facilitating conditions, along with variables specifically related to the healthcare context such as health literacy and perceived health risk, this work aims to provide a comprehensive conceptual understanding of the factors influencing behavioural intention to use digital health applications. This insight can enlighten the development of targeted interventions to encourage acceptance of such applications. The model is projected to offer policymakers, industry players, and scholars strategies to foster the acceptance of digital health applications, improving the uptake of digital health innovations.

Keywords: Digital health application; user acceptance; UTAUT; health literacy; behavioural intention

1. INTRODUCTION

The digital transformation of healthcare is one of the most significant advancements of the 21st century, transforming the delivery of medical services, the way people manage health information, and the empowerment of the patient role. Digital health applications, including mobile health (mHealth) apps, wearable technologies, and telemedicine platforms, have emerged as key tools in promoting health monitoring, chronic disease management, and overall wellness. These applications allow individuals to monitor vital signs, receive medication reminders, consult with healthcare professionals remotely, and access tailored health information all from their digital devices [1].

Despite the widespread availability and potential benefits of digital health technologies, their adoption remains varied and inconsistent. While some individuals are lenient about embracing these innovations, others remain hesitant or disengaged. These differences and inconsistencies have raised critical questions among researchers, developers, and policymakers about what drives or deters the adoption of digital health applications.

Several factors contribute to the varying levels of adoption. For instance, users' perceived usefulness of the technology, its ease of use, social influence, and the presence of supportive infrastructure have all been cited as critical determinants of acceptance [2]. Additionally, unique healthcare-related variables such as health literacy and perceived vulnerability to health risks have emerged as critical components influencing users' engagement with digital health solutions, yet have not been thoroughly examined [3], [4].

The COVID-19 pandemic has further accelerated the uptake of digital health solutions globally, creating an urgent need to understand the underlying factors that drive or obstruct their acceptance. Digital contact tracing apps, symptom-checking tools, and teleconsultation platforms saw unprecedented usage during the pandemic. However, user adoption often lagged behind technological advancements due to worries over privacy, usability, misinformation, or a lack of trust in the systems [5].

To better understand these complexities, it is essential to apply a robust theoretical framework that captures both general and context-specific determinants of technology adoption. The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by [2] has emerged as a comprehensive model for predicting user intentions and behaviour across various technological domains. It integrates constructs from several prominent theories of technology acceptance and has been validated across diverse settings.

However, in the context of digital health, UTAUT alone may not sufficiently capture the specific behavioural, psychological, and contextual dimensions associated with health-related decision-making. For instance, health literacy is a person's capacity to access, understand, and utilise health information, and it is a crucial factor that influences how individuals interact with digital health applications [6]. Likewise, perceived health risk, as the subjective assessment of susceptibility to health threats, can significantly shape one's motivation to engage in preventive behaviours, including the use of health apps [7].

Given these considerations, this paper aims to propose a comprehensive conceptual framework that integrates the core constructs of UTAUT with healthcare-specific variables such as health literacy and perceived health risk. By doing so, the model aspires to provide a deeper understanding of the behavioural intentions and actual usage of digital health applications. The paper is conceptual in nature and contributes to both theoretical advancements in technology adoption research and practical strategies for enhancing user engagement with digital health innovations.

This study holds relevance not only for researchers but also for app developers, healthcare professionals, and public health policymakers. Understanding user motivations and barriers can inform the design of user-centred applications, effective communication strategies, and supportive policies that facilitate digital health adoption among diverse populations, including the elderly, marginalised communities, and individuals with chronic health conditions. The structure of this paper is as follows:

1: elaborates on the theoretical foundation grounded in UTAUT.
2: presents the proposed conceptual model, integrating additional variables relevant to the digital health context.
3: discusses the development of propositions associated with each construct.
4 through 7: highlight the theoretical contributions, practical implications, future research directions, and conclusion of the study.

2. THEORETICAL FOUNDATION: UTAUT

The Unified Theory of Acceptance and Use of Technology (UTAUT) was developed by [2] to address the disjointed nature of technology acceptance research. By synthesising elements from eight previous models—including the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB), and the Diffusion of Innovation Theory (DOI)—UTAUT offers a unified approach for understanding user acceptance.

UTAUT proposes four core constructs that predict behavioural intention and usage behaviour:

1. **Performance Expectancy (PE)**: The degree to which an individual believes that using the technology will result in performance gains. In the context of digital health, PE can be linked to how effectively an app assists users in managing their health conditions or improving health outcomes [8] [9].
2. **Effort Expectancy (EE)**: The perceived ease of use of the system. This is particularly important in healthcare, where users may span across a wide demographic with varying degrees of technological proficiency [8].
3. **Social Influence (SI)**: The degree to which users perceive that important others—such as family members, peers, or healthcare providers—expect them to use the system. Endorsements and shared experiences can significantly impact adoption decisions in the digital health context [8].
4. **Facilitating Conditions (FC)**: The extent to which individuals believe there are organisational or technical infrastructures to support system use. This includes access to reliable internet, digital devices, and technical assistance. Creating favourable conditions, such as a supportive environment, adequate infrastructure, and easy access to healthcare, can encourage individuals to embrace digital health services [8].

PE, EE, and SI directly influence behavioural intention (BI), while BI and FC predict actual usage behaviour (UB). Furthermore, UTAUT introduces moderators such as age, gender, experience, and voluntariness that affect the strength of these relationships.

The robustness and adaptability of UTAUT have been demonstrated in various domains, including education, e-commerce, and healthcare [10]. Nonetheless, digital health introduces unique behavioural and emotional dynamics that UTAUT's core constructs may not fully address. This necessitates the inclusion of domain-specific variables to tailor the framework to health-related applications. By incorporating specific health-related constructs such as health literacy and perceived health risk, researchers can enhance the explanatory power of UTAUT in healthcare settings. These extensions help capture how individuals' knowledge and psychological states influence their decision-making processes regarding the adoption of digital health tools.

3. PROPOSED CONCEPTUAL MODEL AND DEVELOPMENT OF PROPOSITIONS

3.1 Performance Expectancy (PE)

In this conceptual study, performance expectancy refers to the extent to which users believe that using a digital health application will enhance their health management, improve well-being, or facilitate medical decision-making. This construct relates directly to how users perceive the application's contribution to their health goals, such as medication adherence, chronic disease monitoring, or preventive care.

Previous research has consistently shown that performance expectancy is one of the strongest predictors of behavioural intention in technology adoption [2], [8]. In digital health contexts, individuals are more likely to engage with an application when they believe it will positively impact their health outcomes [9].

Proposition 1:
Performance expectancy positively influences the behavioural intention to use digital health applications.

3.2 Effort Expectancy (EE)

Effort expectancy refers to the degree of ease associated with using a particular system or application. This construct captures users' perceptions of the complexity, learnability, and usability of digital health technologies.

Ease of use is critical to adoption, especially for populations such as the elderly or those with limited digital experience. If users perceive the application to be intuitive and not overly demanding cognitively or technically, they are more likely to adopt it [8]. Conversely, if the application requires complex navigation or language not easily understood by laypersons, adoption may suffer.

Proposition 2:
Effort expectancy positively influences the behavioural intention to use digital health applications.

3.3 Social Influence (SI)

Social influence is defined as the degree to which an individual perceives that important others, such as peers, family members, or healthcare professionals, believe they should use the technology [2].

The role of social influence is particularly prominent in health behaviour contexts, where individuals often rely on social networks or medical authorities for guidance and reassurance. Research by [8] found that endorsement by healthcare providers significantly enhances the perceived legitimacy and trustworthiness of health apps. Social pressure and observational learning (e.g., seeing peers use health apps) further reinforce adoption behaviour.

Proposition 3:
Social influence positively influences the behavioural intention to use digital health applications.

3.4 Facilitating Conditions (FC)

Facilitating conditions refer to the degree to which individuals perceive that organisational and technical infrastructures are available to support their use of the application [2]. This includes reliable internet connectivity, access to smartphones, technical support, and literacy assistance.

Even if users are willing to adopt digital health applications, the lack of enabling conditions may prevent actual usage. The availability of support mechanisms such as tutorials, help desks, or automated chat functions can bridge the gap between intention and behaviour [11]. This construct directly influences the transition from behavioural intention to actual use.

Proposition 4:
Facilitating conditions positively influence the actual use of digital health applications.

To enrich the UTAUT framework within the context of digital health, this paper proposes a conceptual model that integrates two healthcare-specific constructs: Health Literacy (HL) and Perceived Health Risk (PHR). These constructs, in conjunction with UTAUT's core variables, offer a multidimensional view of user behaviour.

3.5 Health Literacy (HL)

Health literacy is defined as the individual's capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions [4]. In the digital health context, HL plays a critical role in determining whether users can effectively interact with health applications. According to [3], individuals with higher HL are more likely to trust the information provided, follow digital instructions correctly, and sustain app usage over time. Users with higher health literacy are more capable of interpreting app functionalities, understanding medical terms, and making informed judgments about their personal health data.

Health literacy significantly moderates the ability to benefit from digital tools. Research by [3] demonstrate that users with higher HL levels are more likely to engage with mobile health apps effectively and sustain their usage. This construct is crucial for populations at risk of digital exclusion.

Proposition 5:
Health literacy positively influences the behavioural intention to use digital health applications.

3.6 Perceived Health Risk (PHR)

PHR refers to the subjective assessment of one's vulnerability to health problems [7]. It is a central belief in many health behaviour theories, including the Health Belief Model (HBM), and directly influences preventive health actions [12]. According to [7], individuals who perceive a higher level of health risk are more inclined to adopt digital tools that offer preventive or monitoring functionalities.

In the context of digital health applications, perceived health risk acts as a motivational factor. [7] found that users who perceived themselves at risk of chronic diseases or infections were more inclined to adopt digital monitoring tools. This construct is especially relevant during pandemics or in populations with preexisting conditions.

Proposition 6:
Perceived health risk positively influences the behavioural intention to use digital health applications.

3.7 Integrated Model

This paper focuses solely on the direct effects of the core UTAUT constructs—performance expectancy, effort expectancy, social influence, and facilitating conditions—because these factors have consistently demonstrated strong predictive validity across diverse technological adoption contexts, including digital health applications. By narrowing the scope to direct effects, the study maintains conceptual clarity and avoids the complexity of moderating variables that may vary contextually.

Additionally, the inclusion of two health-related constructs—perceived health risk (PHR) and health literacy (HL)—addresses the unique motivational factors influencing health app adoption, which are not adequately captured by the original UTAUT model. This integration is believed to further enrich the model by providing deeper insight into behavioural intention.

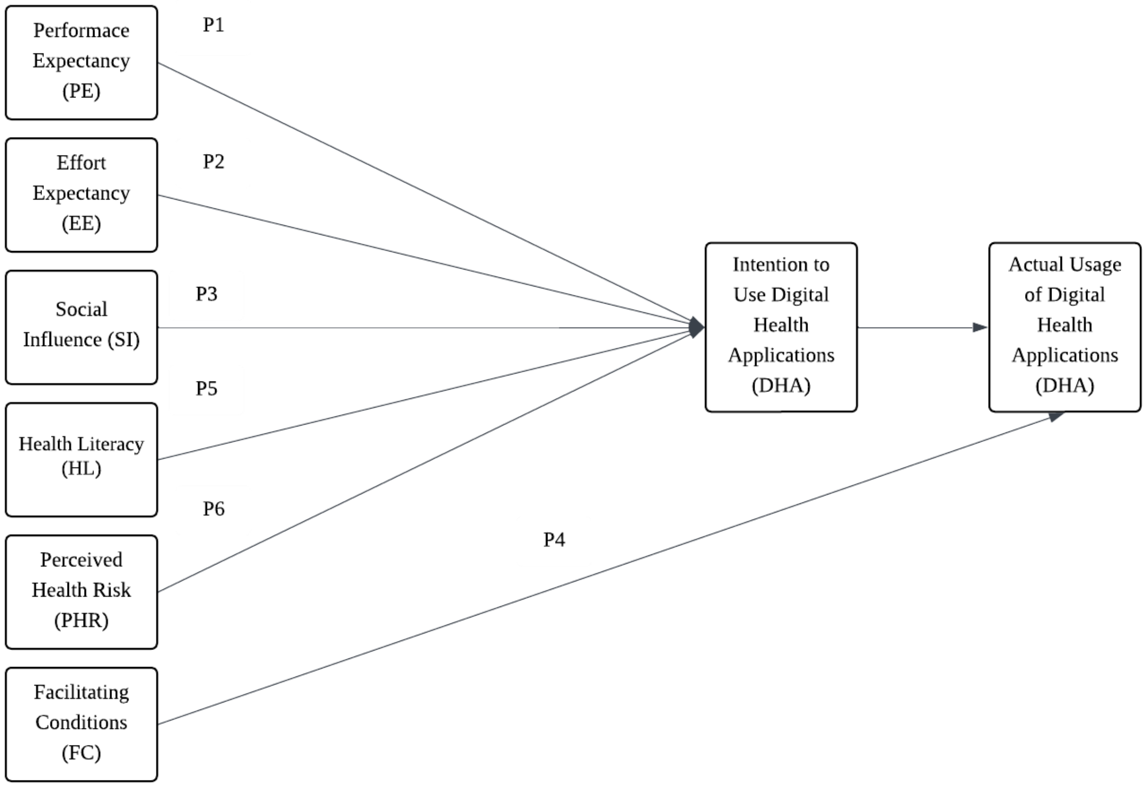

Fig. 1. Proposed conceptual framework

This integrated model reflects the realities of digital health adoption more accurately than traditional technology models. For example, an elderly individual with chronic disease may perceive high health risk (PHR) and find the app useful (PE), but low health literacy may impede usage. Similarly, a highly literate user with low perceived risk may not see the relevance of adopting the app despite its ease of use.

4. METHODOLOGY

Conceptual studies typically do not rely on data in the traditional sense. Instead, they are formed through a combination of adapting, reviewing, and analysing existing research, theories, or ideas from previous empirical studies [13]. According to [13], the primary aim of conceptual studies is not statistical analysis but rather a deeper understanding of the ideas, concepts, or theories that explain the phenomena or subjects under investigation. The evidence presented in this type of study is primarily drawn from prior research findings and literature reviews rather than from original data collection.

This study analysed various empirical research studies, and several notable references emerged that informed the development of the conceptual model. This methodological approach is well-suited for the conceptual study, as it provides fresh insights into the interplay between performance expectancy, effort expectancy, and behavioural intention.

5. CONCLUSION

This conceptual paper presents an integrated framework for understanding the adoption of digital health applications through the lens of the Unified Theory of Acceptance and Use of Technology (UTAUT), augmented with two critical health-related constructs, which are health literacy and perceived health risk. While UTAUT has been widely validated in numerous technology acceptance domains, its direct application to healthcare technology must account for contextual nuances that influence user behaviour uniquely in this domain. By embedding health literacy and perceived health risk into the original model, this study offers a more contextually robust framework to explore behavioural intention and actual use of digital health applications.

From a theoretical perspective, this paper contributes to the existing literature in three key ways. First, it extends UTAUT by incorporating constructs derived from health behaviour theories such as the Health Belief Model and public health literacy frameworks. This extension enhances the model's explanatory power in the healthcare context, where behavioural motivation is not solely technology-driven but is often influenced by perceived vulnerability and cognitive capacity related to health information processing. Second, it underscores the importance of interdisciplinary integration in model development—highlighting how constructs from public health and psychology can complement information systems theories. Third, this model encourages future researchers to consider health-specific variables as central, rather than peripheral, in studies of digital health adoption.

In terms of practical implications, the proposed model provides actionable insights for developers, policymakers, and healthcare practitioners aiming to increase the uptake and sustained use of digital health applications. Application developers, for example, should prioritise optimising user interfaces to reduce cognitive load and improve perceived ease of use (effort expectancy), especially for older users or those with low digital proficiency. Additionally, app features should clearly communicate health benefits and personalized outcomes to enhance performance expectancy. Including real-time tracking, user feedback loops, or evidence-based alerts can reinforce user belief in the app's utility.

Healthcare professionals and institutions also play a pivotal role in influencing behavioural intention through social influence. Their endorsements can increase trust and reduce perceived uncertainty. Public health campaigns, partnerships with healthcare providers, and targeted community interventions should aim to normalise the use of digital health apps, especially for chronic disease management and preventive health behaviours.

Furthermore, policy-level actions are required to improve facilitating conditions, particularly among underserved and digitally marginalised populations. This includes increasing access to affordable smartphones and mobile data, expanding internet infrastructure in rural areas, and implementing nationwide digital literacy programs. Importantly, educational initiatives designed to elevate health literacy must be interwoven with digital competency training. Apps themselves can integrate health education modules or interactive learning to reinforce understanding and build user confidence.

The construct of perceived health risk is particularly relevant for behavioural targeting. Applications that incorporate risk communication strategies—such as personalised risk scores, visual dashboards of health trends, or alerts triggered by deviations in user-reported symptoms—can heighten risk awareness and prompt preventive action. This is especially crucial in pandemic preparedness, chronic disease management, and behavioural health interventions.

Despite its contributions, this study is conceptual in nature and must be empirically validated. Future research should apply the proposed framework using quantitative techniques such as Structural Equation Modelling (SEM) or Partial Least Squares (PLS) with data collected from diverse user populations. This would test the strength and significance of relationships between constructs, assess the model's predictive power, and validate the propositions. Longitudinal studies could further reveal how usage behaviour evolves over time and is influenced by changing health status or app features.

Moreover, future studies should explore the moderating effects of demographic variables (e.g., age, gender, digital experience), as well as emergent constructs such as trust in technology, perceived data privacy, perceived credibility of health information, and personalisation features. It is also advisable to test the model across different cultural and socio-economic contexts, especially in developing countries where disparities in access and literacy may yield different user behaviours. Comparative studies across health app categories—such as mental health, chronic disease, and fitness—could reveal domain-specific adoption patterns.

In conclusion, as the global healthcare landscape continues to evolve toward digitalisation, understanding the psychological, social, and infrastructural determinants of digital health adoption becomes increasingly critical. The conceptual model proposed in this paper serves as a timely and theoretically grounded framework for guiding future empirical investigations, informing digital health policy, and enhancing technology design. It emphasises that the successful diffusion of digital health innovations depends not only on technological sophistication but also on the alignment of these tools with users' health needs, cognitive abilities, and socio-environmental contexts. By addressing both the technical and human dimensions of digital health, stakeholders can promote more inclusive, equitable, and sustainable adoption of health technologies that ultimately contribute to better population health outcomes.

REFERENCES

[1] N. Aldosari, S. Ahmed, J. McDermott, and E. Stanmore, "The Use of Digital Health by South Asian Communities: Scoping Review," *J Med Internet Res*, vol. 25, 2023, doi: 10.2196/40425.

[2] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, vol. 27, no. 3, pp. 425–478, 2003, doi: 10.1017/CBO9781107415324.004.

[3] M. Hwang, G. Kim, S. Lee, and Y. H. Park, "Digital Health Literacy and Associated Factors Among Older Adults Living Alone in South Korea: A Cross-Sectional Study," *Research in Community and Public Health Nursing*, vol. 35, no. 4, pp. 389–400, Dec. 2024, doi: 10.12799/rcphn.2024.00766.

[4] S. Ban, Y. Kim, and G. A. Seomun, "Digital health literacy: A concept analysis," *Digit Health*, vol. 10, Jan. 2024, doi: 10.1177/20552076241287894.

[5] F. Schuster and A. Habibipour, "Users' Privacy and Security Concerns that Affect IoT Adoption in the Home Domain," *Int J Hum Comput Interact*, vol. 40, no. 7, pp. 1632–1643, 2024, doi: 10.1080/10447318.2022.2147302.

[6] K. Sørensen *et al.*, "Health literacy and public health: A systematic review and integration of definitions and models," *BMC Public Health*, vol. 12, no. 1, 2012, doi: 10.1186/1471-2458-12-80.

[7] X. Zhang, V. Raghavan, and X. Yang, "Health perceptions and attitudes on mobile health apps in China," *Health Informatics J*, vol. 29, no. 4, Oct. 2023, doi: 10.1177/14604582231207745.

[8] C. A. N. Malarvizhi, A. Al Mamun, M. N. H. Reza, and M. M. Masud, "Ageing well with tech: Exploring the determinants of e-healthcare services adoption in an emerging economy," *Digit Health*, vol. 10, Jan. 2024, doi: 10.1177/20552076241272577.

[9] L. Wang, Y. Zhang, Z. Li, X. Pang, Y. Zhang, and M. Zou, "Analysis of willingness to use health management APP for female college students: application of UTAUT model based on Fogg theory," *Front Psychol*, vol. 15, 2024, doi: 10.3389/fpsyg.2024.1466566.

[10] V. Venkatesh, J. Y. L. Thong, and X. Xu, "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," *MIS Quarterly*, vol. 36, no. 1, pp. 157–178, 2012.

[11] N. Farhah, M. Ishak, N. A. Gani, and C. Author, "Facilitating Conditions Among the Elderly Towards the Intention to Use E-Health Article Info," *Jurnal Evolusi*, vol. 4, no. 3, 2023, [Online]. Available: http://creativecommons.org/licenses/by/4.0/legalcode

[12] H. Anuar, S. A. Shah[1], H. Gafor[1], I. Mahmood[1], and H. F. Ghazi, "Usage of Health Belief Model (HBM) in Health Behavior: A Systematic Review," *Malaysian Journal of Medicine and Health Sciences*, vol. 16, no. SUPP11, pp. 2636–9346, 2020.

[13] E. Jaakkola, "Designing conceptual articles: four approaches," *AMS Review*, vol. 10, no. 1–2, pp. 18–26, 2020, doi: 10.1007/s13162-020-00161-0.