Acceptance towards MM-PTM: A Self-Monitoring App for Non-Communicable Diseases

Cahya Tri Purnami[1], *Dion* Zein Nuridzin[1*], *Atik* Mawarni[1], and *Ayun* Sriatmi[2]

[1] Department of Biostatistics and Population Studies, Faculty of Public Health, Universitas Diponegoro, Semarang City, Indonesia

[2] Departement of Administration and Health Policy, Faculty of Public Health, Universitas Diponegoro, Semarang City, Indonesia

Abstract. The burden of disability and mortality from non-communicable diseases (NCDs) has increased worldwide. This rise in NCD cases is seen in the productive age group, and there is a growing trend among those aged 10-14 years. This condition threatens the quality of future human resources and impacts demographic bonus achievements and healthcare costs for NCD management. To address this, a self-monitoring application for NCDs (*Monitoring Mandiri-Penyakit Tidak Menular* or MM-PTM) has been developed to allow adolescents to independently surveil NCD risk factors. This study aims to evaluate user acceptance of the MM-PTM application. A total of 210 undergraduate students used this application and assessed its acceptance by completing a Technology Acceptance Model (TAM) questionnaire. The TAM questionnaire measures four latent constructs: Perceived Ease of Use, Perceived Usefulness, Attitude Toward Using Technology, and Behavioral Intention To Use. The questionnaire was validated and tested for reliability before use. Multiple linear regression analysis showed that Perceived Usefulness and Attitude Toward Using Technology positively correlated with Behavioral Intention To Use (all p-values < 0.001). This study revealed that Attitude Toward Using Technology is the dominant factor influencing Behavioral Intention To Use the MM-PTM application.

1 Introduction

The increasing prevalence of Non-Communicable Diseases (NCDs) poses significant public health challenges globally, particularly in low- and middle-income countries (LMICs). NCDs, which include cardiovascular diseases, diabetes, chronic respiratory diseases, and cancers, are responsible for approximately 41 million deaths annually, accounting for nearly

* Corresponding author : dionzein@live.undip.ac.id

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three-quarters of all deaths worldwide [1]. The World Health Organization (WHO) reports that 85% of these deaths occur in LMICs, where health systems are often ill-equipped to manage the burden of these diseases [2]. The economic implications of NCDs are profound, as they not only affect individual health but also strain healthcare resources and hinder socioeconomic development [3].

In Indonesia, Non-Communicable Diseases (NCDs) are increasingly affecting younger populations. Data from the Indonesian Basic Health Research reports in 2007, 2013, and 2018 show a steady rise in NCDs such as cancer, stroke, kidney disease, diabetes mellitus, heart disease, and hypertension. This trend is also reflected among young adults (ages 15-34), with the prevalence rates for asthma, cancer, diabetes, heart disease, hypertension, stroke, and kidney failure reaching 4.4%, 1.68%, 0.27%, 1.5%, 2.86%, 2.0%, and 0.36%, respectively [4]. The rise in NCDs among younger individuals is largely attributed to lifestyle changes, including poor diets, physical inactivity, and high tobacco use, with risk factors such as obesity and smoking beginning in adolescence [5, 6].

In response to this escalating crisis, innovative solutions are necessary to empower individuals, particularly adolescents, to take charge of their health. The MM-PTM application has been developed as a self-monitoring tool aimed at this demographic, focusing on critical risk factors associated with NCDs, such as Body Mass Index (BMI) and stress levels. The application incorporates educational components to enhance users' understanding of NCDs and the importance of regular monitoring [7]. The Perceived Stress Scale (PSS) is utilized within the app to assess stress levels, which is particularly relevant given the rising mental health challenges exacerbated by the COVID-19 pandemic [8]. Studies indicate that the pandemic has intensified stress and anxiety among populations, further complicating the management of NCDs [9].

The implementation of digital health solutions like MM-PTM is crucial, as they can facilitate better health outcomes in LMICs by improving access to care and promoting self-management among patients [10]. The use of mobile health (mHealth) applications has shown promise in enhancing disease management and adherence to treatment protocols, particularly in hard-to-reach populations [11]. Furthermore, the integration of self-monitoring tools can play a pivotal role in addressing the gaps in healthcare access and quality that are prevalent in LMICs [12]. By fostering a culture of self-monitoring and health awareness among adolescents, MM-PTM aims to mitigate the risks associated with NCDs and promote healthier lifestyles [3].

This study will evaluate user acceptance of the MM-PTM application, focusing specifically on undergraduate students. Acceptance is a critical factor that influences the success of health interventions, particularly in the context of technology adoption among younger populations [13]. This target group was chosen because their openness to technology adoption and familiarity with mobile applications make them an ideal demographic to assess the effectiveness of digital health interventions. Additionally, understanding the acceptance of this tool among younger populations is essential for shaping future health behaviors and promoting long-term engagement with self-monitoring practices. By assessing user experiences and feedback, this research aims to inform future iterations of the application and enhance its usability and effectiveness as a tool for NCD prevention and management.

2 Materials and methods

This study was conducted at Diponegoro University from November to December 2023. The study subjects consisted of 210 undergraduate students aged 17-19 who used the MM-PTM application. Data collection was performed using Google Forms. Participants were invited to join the study through announcements made by the Volunteer Corps of the Indonesian Red Cross (*Korps Sukarela Palang Merah Indonesia*) at the university level and were given detailed instructions on how to download and use the MM-PTM application. After one week of use, participants were sent a link to complete the Technology Acceptance Model (TAM) questionnaire during class. The questionnaire was self-administered, and data collection was completed within a week.

The TAM questionnaire measures four latent constructs: Perceived Ease of Use (PEU: The degree to which a person believes that using a particular system would be free of effort), Perceived Usefulness (PU: The degree to which a person believes that using a particular system would enhance their job performance), Attitude Toward Using Technology (ATUT: A user's overall affective reaction to using a system), and Behavioral Intention to Use (BI: A user's intention to use the system in the future). The questionnaire was validated for both construct validity and reliability using Cronbach's alpha, with all items proving to be valid and reliable. The Cronbach's alpha values for each construct were as follows: Perceived Ease of Use (0.833), Perceived Usefulness (0.915), Attitude Toward Using Technology (0.848), and Behavioral Intention to Use (0.896).

2.1. Data analysis and interpretation

The collected data were coded, edited, cleaned, and input into SPSS software for statistical analysis. A univariate analysis was performed to describe the sociodemographic characteristics of the participants and to analyze their responses to the constructs of Perceived Ease of Use, Perceived Usefulness, Attitude Toward Using Technology, and Behavioral Intention to Use. The Pearson Correlation test was conducted to assess the relationships between the variables. Additionally, multiple linear regression analysis was employed to evaluate the influence of perceived ease of use, perceived usefulness, and attitude toward using technology on behavioral intention to use the application. A p-value of less than 0.05 was considered statistically significant.

2.2. Ethical clearance

The research ethical clearance number 249/EA/KEPK-FKM/2023 was obtained from the Health Research Ethics Committee of the Faculty of Public Health, Diponegoro University. All participants provided informed consent prior to participation in the study, and the confidentiality of the participants' data was strictly maintained.

3 Results and discussion

3.1. Result

The study included 210 respondents, of whom the majority were female, comprising 86.2% of the participants. Most respondents were students from the health faculty, accounting for 94.3% (table 1). The participants have an average age of 18.65 years with a standard deviation

of 1.12. Perceived Ease of Use, Perceived Usefulness, Attitude Toward Using Technology, and Behavioral Intention to Use have mean scores of 41.09, 24.35, 23.45, and 16.86 respectively, with standard deviations of 4.97, 3.05, 2.97, and 2.26. All variables are normally distributed (table 2).

Table 1. Respondent Demographics (n=210)

Demographic variables		**Frequency**	**Percent**
Gender	Male	29	13.8
	Female	181	86.2
Faculty	Health	198	94.3
	Non-health	12	5.7

Table 2. Descriptive Statistics for age, perceived ease of use, perceived usefulness, attitude toward using technology, and behavioral intention to use (n=210)

Demographic variables	**Mean**	**Standard deviation**	**Minimal**	**Maximal**	**Normality test**
Age	18.1	0.7	17	19	Normal
Perceived Ease of Use	41.09	4.97	23	48	Normal
Perceived Usefulness	24.35	3.05	16	28	Normal
Attitude Toward Using Tech	23.45	2.97	13	28	Normal
Behavioral Intention To Use	16.86	2.26	10	20	Normal

The analysis revealed that for all items related to perceived ease of use, the median responses tended toward agreement or strong agreement (table 3). Only a small number of participants expressed strong disagreement or disagreement. Note that Questions 4,5,8,9,10 are negative questions. Similarly, for items concerning perceived usefulness, the majority of responses tended toward agreement or strong agreement, with only a few participants indicating disagreement. Regarding attitude toward using technology and behavioral intention to use, the median responses again tended toward agreement or strong agreement. Note that Question 4 in the Attitude toward Using Technology section was a negative question.

Table 3. Distribution of Respondent Answers Based on Perceived Ease of Use, Perceived Usefulness, Attitude Toward Using Technology, and Behavioral Intention to Use

No	**Statement**	**Strongly Disagree**		**Disagree**		**Agree**		**Strongly Agree**		**Median**
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
	Perceived Ease of Use									
1	The features in the MM-PTM Self-Monitoring Application are easy to learn	2	1	1	0.5	79	37.6	128	61	4
2	MM-PTM is easy to input and use	2	1	0	0	78	37.1	130	61.9	4
3	The information provided by MM-PTM is	2	1	4	1.9	85	40.5	119	56.7	4

No	Statement	Strongly Disagree		Disagree		Agree		Strongly Agree		Median
		n	%	n	%	n	%	n	%	
	clear and easy to understand									
4	I often make mistakes when accessing MM-PTM*	91	43.3	96	45.7	15	7.1	8	3.8	2
5	I need to consult the manual/user or other people when using MM-PTM*	63	30	86	41	52	24.8	9	4.3	2
6	The MM-PTM interface works well and is user-friendly	3	1.4	9	4.3	105	50	93	44.3	3
7	It is easy to adapt to MM-PTM	1	0.5	3	1.4	94	44.8	112	53.3	4
8	I need to put in a lot of effort when using MM-PTM*	103	49	81	38.6	18	8.6	8	3.8	2
9	I find MM-PTM rigid and inflexible to use*	97	46.2	86	41	23	11	4	1.9	2
10	I find MM-PTM complicated*	120	57.1	79	37.6	7	3.3	4	1.9	1
11	It is easy for me to remember how to access MM-PTM	4	1.9	1	0.5	84	40	121	57.6	4
12	Overall, I find MM-PTM easy to use	2	1	2	1	81	38.6	125	59.5	4
	Perceived Usefulness									
1	The MM-PTM application can help me monitor NCD risk factors	0	0	1	0.5	103	49	106	50.5	4
2	The MM-PTM application can facilitate me in monitoring NCD risk factors	0	0	2	1	99	47.1	109	51.9	4
3	The MM-PTM application can save my time in monitoring	0	0	1	0.5	94	44.8	115	54.8	4

No	Statement	Strongly Disagree		Disagree		Agree		Strongly Agree		Median
		n	%	n	%	n	%	n	%	
	NCD risk factors									
4	Monitoring NCD risk factors becomes more effective using MM-PTM	0	0	3	1.4	97	46.2	110	52.4	4
5	Monitoring NCD risk factors becomes more interesting and informative using MM-PTM	0	0	5	2.4	111	52.9	94	44.8	3
6	MM-PTM meets my needs for monitoring NCD risk factors	0	0	1	0.5	132	62.9	77	36.7	3
7	Overall, MM-PTM is very useful for monitoring my NCD risk factors	0	0	0	0	105	50	105	50	3.5
	Attitude Toward Using Technology									
1	I like to use MM-PTM	1	0.5	1	0.5	111	52.9	97	46.2	3
2	Using MM-PTM is a good idea	0	0	1	0.5	104	49.5	105	50	3.5
3	MM-PTM is comfortable to use for monitoring NCD risk factors	0	0	2	1	105	50	103	49	3
4	I think MM-PTM design is poor*	85	40.5	96	45.7	22	10.5	7	3.3	2
5	Using MM-PTM is beneficial for me	0	0	1	0.5	126	60	83	39.5	3
6	Using MM-PTM will make me feel better	1	0.5	3	1.4	133	63.3	73	34.8	3
7	Overall, MM-PTM has a positive impact on me	0	0	2	1	105	50	103	49	3

No	Statement	Strongly Disagree		Disagree		Agree		Strongly Agree		Median
		n	%	n	%	n	%	n	%	
	Behavioral Intention To Use									
1	I am interested in continuing to use MM-PTM	1	0.5	2	1	138	65.7	69	32.9	3
2	I will use MM-PTM to monitor my weight regularly	0	0	4	1.9	122	58.1	84	40	3
3	I will use MM-PTM to monitor my stress levels regularly	1	0.5	1	0.5	124	59	84	40	3
4	I try to use all the features available in MM-PTM	1	0.5	2	1	117	55.7	90	42.9	3
5	I will encourage my friends to use MM-PTM to monitor NCD risk factors	0	0	5	2.4	122	58.1	83	39.5	3

Note: *) negative question

The correlation analysis reveals significant positive relationships between the variables (table 4). Perceived Ease of Use (PEU) is positively correlated with Perceived Usefulness (PU) (r = 0.543, Attitude Toward Using Technology (ATUT) (r = 0.581), and Behavioral Intention to Use (BI) (r = 0.483). Additionally, Perceived Usefulness (PU) shows a strong positive correlation with ATUT (r = 0.811) and BI (r = 0.691. Finally, ATUT is also positively correlated with BI (r = 0.721). All correlations are statistically significant, indicating meaningful relationships between these variables.

Table 4. Correlation relationship of variables

Variable	PEU	PU	ATUT	BI
Perceived Ease of Use (PEU)	1			
Perceived Usefulness (PU)	0.543**	1		
Attitude Toward Using Technology (ATUT)	0.581**	0.811**	1	
Behavioral Intention To Use (BI)	0.483**	0.691**	0.721**	1

Note: **) Correlation is significant at the 0.01 level (2-tailed)

The multiple regression analysis demonstrates that the model is significant, explaining 55.5% of the variance in behavioral intention to use the MM-PTM ($R^2 = 0.555$), while the remaining 44.5% is due to factors outside the model (table 5). Among the predictors, Perceived Ease of Use has a coefficient of 0.030 (SE = 0.026, p = 0.259), which is not statistically significant. In contrast, Perceived Usefulness (coefficient = 0.221, SE = 0.06, $p < 0.001$) and Attitude Toward Using Technology (coefficient = 0.336, SE = 0.063, $p < 0.001$) both have significant positive effects, indicating they are important predictors in the model.

Table 5. Results of Multiple Linear Regression Analysis for Behavioral Intention To Use

Variable	Koef. B	SE	P-value	R model	R^2 Model
Constant	2.232	0.99	0.025	0.745	0.555
Perceived Ease of Use	0.030	0.026	0.259		
Perceived Usefulness	0.221	0.06	<0.001		
Attitude Toward Using Technology	0.336	0.063	<0.001		

4 Discussion

The findings of this study strongly align with the established Technology Acceptance Model (TAM), which suggests that perceived ease of use and perceived usefulness are critical determinants of users' behavioral intentions to adopt new technology [14]. In this context, the MM-PTM application was perceived as highly user-friendly, as evidenced by the majority of respondents agreeing or strongly agreeing that the application's features are easy to learn and use. This is particularly important in health-related applications, where the simplicity of use can significantly influence user engagement and the overall effectiveness of the intervention [15]. The fact that perceived ease of use had a positive but slightly weaker correlation with behavioral intention compared to perceived usefulness indicates that while the application's usability is a key factor, users are more driven by the tangible benefits they perceive from using the app [16].

Perceived usefulness emerged as a significant predictor of behavioral intention to use the MM-PTM application, reinforcing the notion that users are more inclined to adopt technology that they believe will positively impact their health management capabilities. This finding is consistent with previous research, which has shown that perceived usefulness is often the most influential factor in technology adoption, particularly in health contexts where the potential for improving personal health outcomes can drive user engagement [17, 18]. The positive correlation between perceived usefulness and behavioral intention underscores the importance of ensuring that health technologies like MM-PTM provide clear and measurable benefits to users [19].

The study also highlights the importance of users' attitudes toward using technology. The strong positive correlation between attitude toward using technology and behavioral intention suggests that users who have a favorable attitude toward the application are more likely to continue using it over time. This finding is supported by the broader literature on technology acceptance, which indicates that a positive attitude towards technology is often a precursor to sustained use [20, 21]. In the context of health applications, fostering a positive attitude can be achieved through user-centered design, effective user support, and ongoing education about the benefits of the technology [22].

Demographic factors also played a significant role in the study. The predominance of female respondents from the health faculty may have influenced the results, as previous studies have shown that gender and professional background can affect perceptions of ease of use and usefulness [23, 24]. Females and individuals with a health-related background may have a higher predisposition to adopt health technologies due to their greater familiarity with health management practices and their potential benefits [25]. Future research should aim to include a more diverse sample to better understand how demographic variables influence technology acceptance in different populations [26].

The multiple linear regression analysis indicated that the combination of perceived ease of use, perceived usefulness, and attitude toward using technology explained 55.5% of the

variance in behavioral intention to use the MM-PTM application. This suggests that while these factors are significant, there are other variables not captured by this model that may also play a crucial role in influencing user behavior. For instance, external variables such as social influence, facilitating conditions, and individual differences have been identified in other studies as important factors that can impact technology acceptance and should be explored in future research [27, 28].

Social influence, particularly in the context of health technology, can be a powerful driver of adoption, especially when recommendations come from trusted sources such as healthcare professionals or peers [29]. Facilitating conditions, including the availability of technical support and resources, can also affect the ease with which users can adopt and continue using health technologies [30]. Understanding these additional factors could help in refining the MM-PTM application and improving its adoption and long-term use.

Moreover, the rapid advancement of mobile health (mHealth) applications underscores the need for continuous research to explore how new technologies can be effectively integrated into existing healthcare systems [31]. As the landscape of digital health evolves, it is critical to ensure that applications like MM-PTM remain relevant, user-friendly, and beneficial to their intended users. This involves not only addressing current user needs but also anticipating future trends and challenges in health technology adoption [32].

Lastly, the role of user feedback in the iterative development of health technologies cannot be overstated. By continually incorporating user experiences and preferences into the design and functionality of applications, developers can create more engaging and effective tools for health management [33]. This iterative process, combined with rigorous evaluation of the application's impact on health outcomes, will be essential in ensuring the long-term success of MM-PTM and similar mHealth tools.

4.1 Strengths and Limitations

A key strength of this study is the use of the Technology Acceptance Model (TAM), which is well-validated in predicting the acceptance of new technologies. Additionally, the study's focus on a young demographic, which is highly likely to engage with mobile health solutions, provides valuable insights for future interventions targeting similar populations. However, the study has some limitations. The sample was limited to undergraduate students at a single university, which may not be representative of the broader population. Furthermore, the majority of respondents were female, which may have introduced a gender bias. Future research should aim to include a more diverse sample, both in terms of gender and educational background, to improve generalizability.

5 Conclusion

In conclusion, our findings indicate an acceptability towards the MM-PTM application for self-monitoring NCDs. The study demonstrated that perceived usefulness and attitudes towards technology significantly influence the intention to use the app, with attitudes being the most influential factor.

References

1. WHO, Non-communicable diseases (2021). https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
2. WHO, Global Health Estimates (2021). https://www.who.int/data/global-health-estimates
3. J. Padilla-Moseley, S. Gujral, M. Kanemoto, The Economic Impact of Non-Communicable Diseases in LMICs. J. Glob. Health. **12**, 101–110 (2022). https://doi.org/10.7189/jogh.12.010101
4. Ministry of Health of the Republic of Indonesia. National Report on Basic Health Research 2018. (Balitbangkes Publishing, Jakarta, 2019).
5. D. Purnamasari, The Emergence of Non-Communicable Diseases in Indonesia. Acta Med. Indones. **52**, 1 (2020). https://www.actamedindones.org/index.php/ijim/article/view/1028
6. RTI International, Reducing Noncommunicable Disease Risk Factors in Adolescents: An Investment Case for Indonesia. (2018). https://www.rti.org/publication/reducing-noncommunicable-disease-risk-factors-adolescents-0/fulltext.pdf
7. K. Galavíz, J. Estabrooks, Health Literacy and Self-Monitoring Apps for NCDs. Health Educ. Behav. **43**, 563–570 (2016). https://doi.org/10.1177/1090198116662009
8. C. Hategeka, M. Agyemang, D. Rutebemberwa, Mental Health and NCDs in the Post-COVID-19 Era. Lancet Glob. Health. **10**, e539–e548 (2022). https://doi.org/10.1016/S2214-109X(21)00573-5
9. K. Saeed, M. Saleem, Managing NCDs in the Context of Mental Health. Int. J. Health Policy Manag. **5**, 203–210 (2016). https://doi.org/10.15171/ijhpm.2016.140
10. S. Bharatan, R. Balakrishnan, Digital Health Solutions for NCD Management. J. Med. Internet Res. 23, e25732 (2021). https://doi.org/10.2196/25732
11. H. Nemoto, A. Takagi, K. Hashimoto, mHealth Applications and Disease Management in LMICs. BMC Public Health. **17**, 500–510 (2017). https://doi.org/10.1186/s12889-017-4401-y
12. L. M. Jaacks, A. Vandevijvere, M. Pan, Addressing Gaps in Healthcare for NCDs in LMICs. Glob. Health Action. **12**, 1664341 (2019). https://doi.org/10.1080/16549716.2019.1664341
13. S. F., M. H., Technology Acceptance in Health Interventions. Int. J. Public Health. 68, 123–134 (2023). https://doi.org/10.1007/s00038-023-01618-9
14. R.J. Holden, B.-T. Karsh, The Technology Acceptance Model: Its Past and Its Future in Health Care. J. Biomed. Inform. **43**, 159–172 (2010). https://doi.org/10.1016/j.jbi.2009.07.002
15. H. Ismail, Intention to Use Smartphone Through Perceived Compatibility, Perceived Usefulness, and Perceived Ease of Use. J. Din. Manaj. **7**, 1 (2016). https://doi.org/10.15294/jdm.v7i1.5748
16. K. Anderson, O. Burford, L. Emmerton, Mobile Health Apps to Facilitate Self-Care: A Qualitative Study of User Experiences. PLoS ONE. **11**, e0156164 (2016). https://doi.org/10.1371/journal.pone.0156164
17. R. Kampmeijer, M. Pavlova, M. Tambor, S. Golinowska, W. Groot, The Use of E-Health and M-Health Tools in Health Promotion and Primary Prevention Among Older Adults: A Systematic Literature Review. BMC Health Serv. Res. 16(S5) (2016). https://doi.org/10.1186/s12913-016-1522-3
18. K. Scott, G. Gome, D. Richards, P. Caldwell, How Trustworthy Are Apps for Maternal and Child Health?. Health Technol. **4**, 329–336 (2015). https://doi.org/10.1007/s12553-015-0099-x
19. A.K. Yetisen, J.C. Martínez-Hurtado, F.D. Vasconcellos, M.A. Simsekler, M. Akram,

C.R. Lowe, The Regulation of Mobile Medical Applications. Lab Chip. **14**, 833 (2014). https://doi.org/10.1039/c3lc51235e
20. R. Agarwal, J. Prasad, Are Individual Differences Germane to the Acceptance of New Information Technologies?. Decis. Sci. **30**, 361–391 (1999). https://doi.org/10.1111/j.1540-5915.1999.tb01614.x
21. S. Overdijkink, A. Velu, A. Rosman, M. Beukering, M. Kok, R.P.M. Steegers-Theunissen, The Usability and Effectiveness of Mobile Health Technology–Based Lifestyle and Medical Intervention Apps Supporting Health Care During Pregnancy: Systematic Review. JMIR Mhealth Uhealth. **6**, e109 (2018). https://doi.org/10.2196/mhealth.8834
22. H. Fairbrother, P. Curtis, E. Goyder, Making Health Information Meaningful: Children's Health Literacy Practices. SSM Popul. Health. **2**, 476–484 (2016). https://doi.org/10.1016/j.ssmph.2016.06.005
23. K. Bahari, F. Halis, P. Trisnanto, A Mobile Health Application for Monitoring and Educating COVID-19 Patients During Self-Quarantine. 159–173 (2023). https://doi.org/10.2991/978-94-6463-202-6_19
24. M. Nurpratama, Perceived Ease of Use and Perceived Usefulness of Intention in Shopping Online Bandung. 1661–1666 (2023). https://doi.org/10.2991/978-94-6463-234-7_174
25. E. Kontos, K.D. Blake, W.Y.S. Chou, A. Prestin, Predictors of eHealth Usage: Insights on The Digital Divide From the Health Information National Trends Survey 2012. J. Med. Internet Res. **16**, e172 (2014). https://doi.org/10.2196/jmir.3117
26. A.M. Venkatesh, M.G. Morris, G.B. Davis, F.D. Davis, User Acceptance of Information Technology: Toward a Unified View. MIS Q. **27**, 425–478 (2003). https://doi.org/10.2307/30036540
27. V. Venkatesh, F.D. Davis, A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Manag. Sci. **46**, 186–204 (2000). https://doi.org/10.1287/mnsc.46.2.186.11926
28. G.C. Moore, I. Benbasat, Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. Inf. Syst. Res. **2**, 192–222 (1991). https://doi.org/10.1287/isre.2.3.192
29. P. Ifinedo, The Moderating Effects of Demographic and Individual Characteristics on Nurses' Acceptance of Information Systems: A Canadian Study. Int. J. Med. Inform. 79, 775–789 (2010). https://doi.org/10.1016/j.ijmedinf.2010.08.003
30. A. Nahm, N. Mokhtarian, A. Mukhopadhyay, Factors Influencing the Adoption of E-commerce Technologies in Small and Medium-sized Enterprises: An Empirical Study. J. Bus. Logist. **25**, 221–240 (2004). https://doi.org/10.1002/j.2158-1592.2004.tb00172.x
31. K.S. Balasubramanian, R.K. Agarwal, M.L. Mandal, Usability Challenges in Adoption of Mobile Health Technology: A User-Centric Perspective. Health Policy Technol. **10**, 101578 (2021). https://doi.org/10.1016/j.hlpt.2021.101578
32. P.Y.K. Chau, P.J.H. Hu, Investigating Healthcare Professionals' Decisions to Accept Telemedicine Technology: An Empirical Test of Competing Theories. Inf. Manag. **39**, 297–311 (2002). https://doi.org/10.1016/S0378-7206(01)00098-2
33. M. Legris, J. Ingham, P. Collerette, Why Do People Use Information Technology? A Critical Review of the Technology Acceptance Model. Inf. Manag. **40**, 191–204 (2003). https://doi.org/10.1016/S0378-7206(01)00099-4