Chapter 10
Intention vs. Perception: Understanding the Differences in Physicians' Attitudes Toward Mobile Health Applications

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10.1 Introduction

Mobile health (mHealth) has becoming a significant element for healthcare delivery. As such, the investments and researches on mHealth have been rapidly increasing. A number of international associations pointed out the growing market of healthcare services with the digital era, and most of them anticipated the growth in telemedicine and remote healthcare services in high numbers for the following decades. McKinsey's report in 2015 underlined that mobile device (tablet and smartphone) market may expand 1.1–1.3 times by 2018. The value created by the expansion may reach to hundreds of billions of dollars, and this growth will affect health and medical services the most (Atluri et al. 2015). On the other side, the 2015 OECD Digital Economy Outlook report presented that "the global mHealth market may reach $23 billion in 2017, with Europe accounting for $6.9 billion and Asia-Pacific for $6.8 billion, ahead of the North American market of $ 6.5 billion" (OECD 2015). The growth was not only triggered the investments but also the reduction of the costs of healthcare delivery. By 2017, mHealth use in the European Union was reported to have potential to save €99 billion in healthcare spending (OECD 2015). Furthermore, global reports presented that in 2025, the use of the mobile Internet, as well as applications, was estimated to have an economic impact around 3.7–10.8 trillion dollars

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E. Sezgin et al. (eds.), *Current and Emerging mHealth Technologies*,
https://doi.org/10.1007/978-3-319-73135-3_10

per year (Manyika et al. 2013). For instance, potential value gain was estimated to be 10–20% cost reduction only in chronic disease treatment via telemedicine. Considering the current developments and estimations, the worldwide dissemination and use of mobile health technologies have constantly been increasing. Similarly, use of mobile technologies and applications by healthcare providers has also increased (PwC Health Research Institute 2014; Ventola 2014). In that regard, the mobile application markets (App Stores) presented over thousands of applications related to healthcare services that are used for checking tests, keeping records, and taking assistance in diagnoses. These applications aimed to assist physicians or patients to manage and maintain healthcare-related data by enabling storing, recording, and accessing information (Hao et al. 2013; Martínez-Pérez et al. 2013).

On the other side, these reports demonstrated that the mHealth technologies have penetrated to many different segments, and they have been offered to different user groups in the market (e.g., patients, physicians, nurses). These groups were expected to use mHealth applications in checking, controlling, and maintaining personal healthcare or to deliver the services. However, it should be noted that the success of these technologies does not solely depend on the technological innovations itself. The perceptions about mHealth and the intention to use these new technologies are important elements in order to utilize them in practice effectively. In that regard, not only the mHealth users' intentions but also the perception of potential users should be considered, and the assessment of user behavior is an important input for the success of mHealth use.

10.1.1 Background Information on Assessment

Individuals' behaviors and attitudes toward information technologies have been investigated for a long time (King and He 2006; Rondan-Cataluña et al. 2015). The concept was employed for assessment of technology acceptance in the early 1990s, and the studies in technology acceptance gained interests (Davis 1989; Wood and Bandura 1989; Ajzen 1991; Venkatesh and Davis 2000; Venkatesh et al. 2003). One of the leading theories was proposed by Davis (1989) as the technology acceptance model (TAM). TAM is used to determine factors influencing behaviors of users toward technolo gies. The model argues that the actual use of technologies is influenced by perceived ease of use (PEOU) and perceived usefulness (PU). Thus, PEOU and PU were main contributors to individuals' attitude and behavioral intention (BI). In the latter studies, TAM has been modified involving other constructs to assess effects of different factors about different technologies (Bagozzi and Warshaw 1992; Venkatesh and Davis 2000). In the literature, there have been a number of studies about the healthcare technologies successfully using TAM theory (Holden and Karsh 2010). Furthermore, the studies employed an integrated or modified TAM to keep up with changing user needs and healthcare technologies. However, a major drawback of TAM was pointed out as the difficulty in the generalization of results and inconsistency in relationships between constructs (Venkatesh et al. 2003; Legris et al. 2003; Sun and Zhang 2006). Following TAM,

the unified theory of acceptance and use of technology (UTAUT) was proposed as a new integrated theory, which aims to assess the likelihood of success of new technologies and determine drivers of acceptance (Venkatesh et al. 2003). In 2012, Venkatesh, Thong, and Xu (2012) proposed UTAUT 2, which was an updated UTAUT including hedonic motivation, price value, and habit as additional exogenous variables influencing behavioral intention. Similar to TAM, UTAUT has been successfully implemented in a number of studies (Schaper and Pervan 2007b; Chang et al. 2007; Aggelidis and Chatzoglou 2009; Kijsanayotin et al. 2009; Pynoo et al. 2012; Dünnebeil et al. 2012). In addition to that, the theory of planned behavior (TPB) and innovation diffusion theory (IDT) have also been used in behavioral researches in healthcare delivery (Sezgin and Özkan-Yildirim 2014).

10.1.2 Aim of the Study

This chapter investigated the intentions and perceptions of physicians toward mHealth applications considering two different perspectives of physicians. In that regard, following a secondary research methodology, findings of previous researches about mHealth application use and adoption were employed to provide a comparison between two physician groups. Authors believe this comparison would be a valuable asset providing a distinct overview, which would be used in planning new health application development, management, and promotion.

10.2 Methodology

The chapter employed a secondary research method, which focuses on the synthesis of previous researches (Sezgin et al. 2017; Sezgin et al. 2016). In order to provide a comparative overview, the findings of these researches were discussed revealing the similarities and differences in mHealth application adoption by two user groups. The detailed methodology and research procedure of these researches were given in this section.

The researches that were held in this study were reported findings for intentions and perceptions toward mHealth application by the user and nonuser physicians. In these researches, similar research and testing procedures were employed which helped to present a common ground for the comparison. In both researches, to understand the influencing factors to use mHealth apps, a systematic method was followed. At the first phase, a literature research was conducted to identify researches about mHealth. It also helped to understand the behavioral theories in the domain as well as to gather constructs for assessing adoption and acceptance of mobile health information systems by the physicians. Following that, the conceptual model was developed, and hypotheses were formulated. In both researches, the same model was used, and the data collection was completed by employing a structured survey (questionnaire). Convenience sampling was used as the data collection method, and

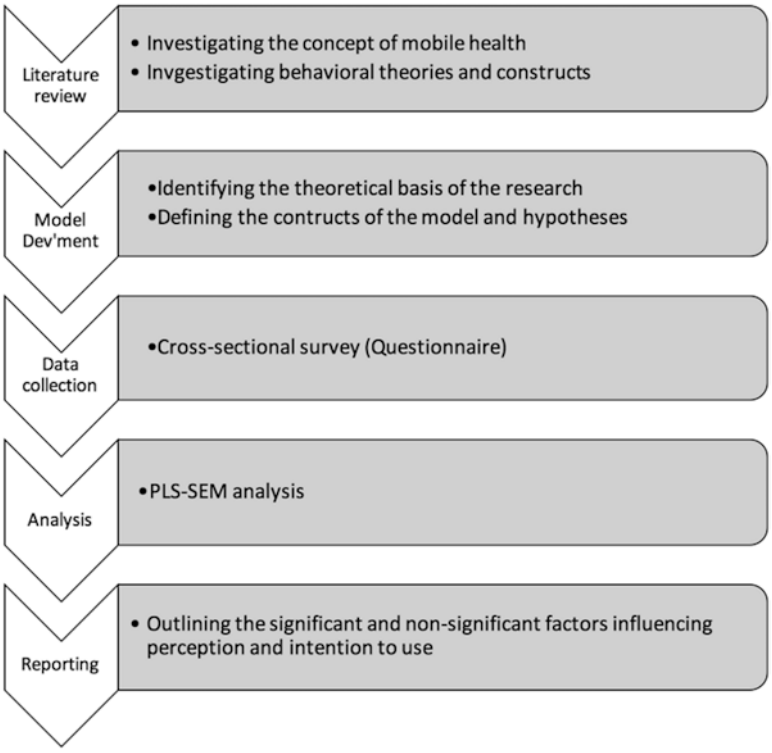

Fig. 10.1 Flow of the research processes

an online survey tool was employed. Non-mHealth application user physicians (n = 122) and mHealth application user physicians (n = 137) participated in the survey. Confirmatory factor analysis and structural equation modeling (SEM) were used in the analysis of quantitative data. Figure 10.1 provided an outline of the research processes.

The following constructs were used in the model, and they were tested in both researches in order to understand perception (of nonusers) and intention (of users) toward mHealth applications.

- Behavioral intention (BI): The act of deciding to use a particular technology (Venkatesh et al. 2003).
- Performance expectancy (PE): Personal beliefs using technology would increase the job performance (Venkatesh et al. 2003).
- Effort expectancy (EE): Personal beliefs using technology would be free of effort (Venkatesh et al. 2003).
- Compatibility (CO): The perception about the use of technology is consistent with users' needs, experiences, and values (Rogers 1995).
- Mobile self-efficacy (MS): Perceptions about personal abilities to use the technology to fulfill healthcare task and duties on mobile devices (Schaper and Pervan 2007b).

- Technical support and training (TT): The perception and the need for support and training to gain knowledge about the technology (Venkatesh et al. 2003).
- Perceived service availability (PS): The perception about the technology which is able to support "pervasive and timely usage" (Venkatesh et al. 2003).
- Personal innovativeness in IT (PI): The state of a person's willingness to take a risk in trying a new technology or innovation (Agarwal and Prasad 1998).
- Social influence (SI): The degree of social perceptions about technology's desirability (Venkatesh et al. 2003).
- Mobile anxiety (MA): The apprehension when using or having the possibility to use mobile devices and applications (Schaper and Pervan 2007b).
- Result demonstrability (RD): Tangibility or the level of observability of the results in using technology (Venkatesh and Davis 2000).
- Habit (HB): Repetitiveness and routine act of behavior in using the technology (Gagnon et al. 2003).

10.3 Comparison of User and Nonuser Physicians

In this section, the significant and nonsignificant factors of mHealth application use were outlined. Figures 10.2 and 10.3 presented the research model used for each group outlining significant (continuous line) and nonsignificant (dashed line) relationships. Research model testing resulted differently for each group regarding significant relations as well as the implications. In this section, a comparison of factors influencing these different groups was given.

Significant and nonsignificant relationships for both groups were given in Table 10.1. The researches reported that PE and PI influenced BI for users and EE and TT influenced BI for nonusers. This finding revealed that mHealth application user physicians would perceive their job performance and their willingness to try new technologies influential their intention to use mHealth applications (Chau and Hu 2002). On the other side, the perception of nonusers depended on the ease of using mHealth, and the support they were receiving would affect their intention to use mHealth applications (Chang et al. 2007).

The behavioral intention was influenced by perceived service availability and mobile anxiety in both groups. Thus, there was a common perception regarding reachable and accessible mHealth applications in practice (Becker et al. 2014). Furthermore, compatibility influenced performance expectancy, and mobile self-efficacy influences effort expectancy for both groups. Here, job performance was perceived to be related to compatible systems by nonusers similar to users, such as mHealth with hospital systems. In addition to that, the ease of mHealth use was perceived to be related with personal competency for both groups. However, their indirect influence on behavioral intention can be observed differently in each group due to the significant impact of PE and EE. Thus, compatibility was rather influential on BI over PE for user physicians, and mobile self-efficacy was on BI over EE for

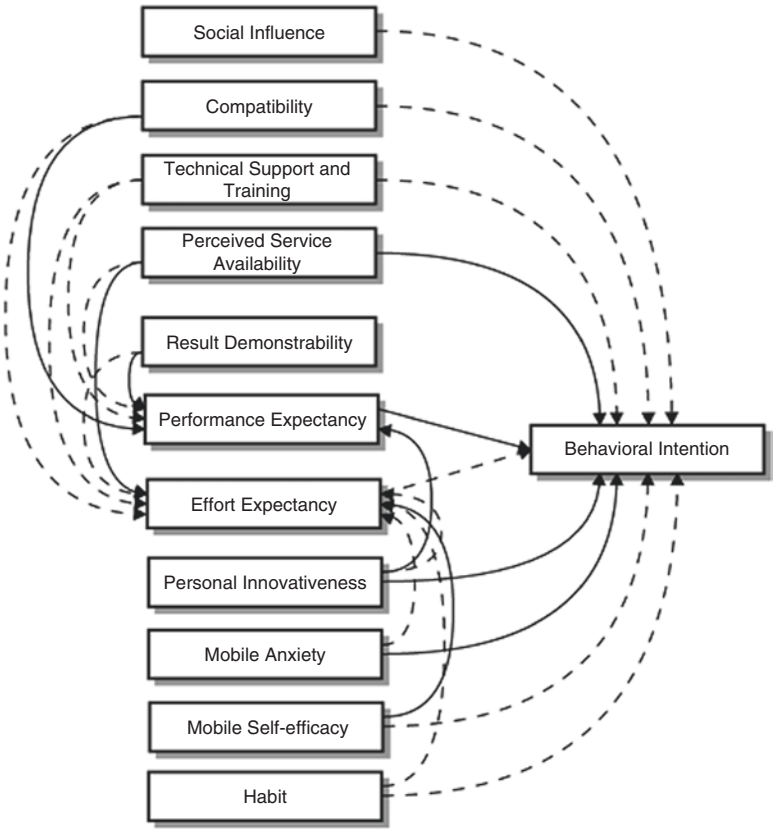

Fig. 10.2 Research model for mHealth user physicians

nonusers. That impact would be related to perceived job performance of user physicians since they observe the relation of compatibility and job performance. For nonusers, the expected ease of using mHealth applications could be perceived to be related to personal competency (Schaper and Pervan 2007a).

On the other side, the direct effect of CO, HB, MS, and SI was not influential on BI for both groups. Here, there was a consensus of physicians about direct impact on BI. Even though CO and MS had an indirect effect, they were not perceived to have a significant influence on BI as well as HB and SI. As explained in the previous section, these factors might have seen rather less relevant or non-applicable by the physicians considering the current state of mHealth application use in health institutions (Gagnon et al. 2015).

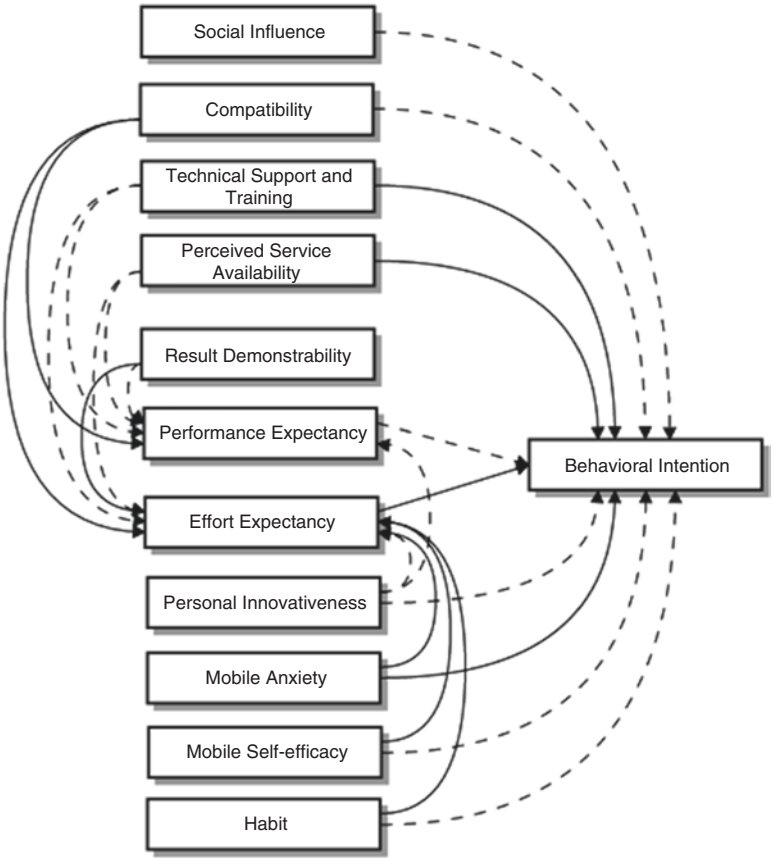

Fig. 10.3 Research model for nonuser physician

10.4 Suggestions

The previous section outlined the findings of intention and perception to use mHealth applications and implications. Considering both groups, in this section, a number of elements were outlined in order to be considered in application development and managerial processes in the common ground. Becker et al. (2014) provided psychological, clinical, technological, and regulatory viewpoints to outline the state of the mHealth. In this section, these viewpoints were used to categorize the elements in suggestions.

Table 10.1 Significant and nonsignificant relations for mHealth user physicians and nonuser physician

	User physicians		Nonuser Physicians	
	Sig.	Non-sig.	Sig.	Non-sig.
PS → BI	✓		✓	
MA → BI	✓		✓	
CO → PE	✓		✓	
MS → EE	✓		✓	
CO → BI		X		X
HB → BI		X		X
MS → BI		X		X
SI → BI		X		X
PI →EE		X		X
PS → EE		X		X
TT → EE		X		X
TT → PE		X		X
PE → BI	✓			X
PI →BI	✓			X
PI →PE	✓			X
RD → PE	✓			X
PS → EE	✓			X
EE → BI		X	✓	
TT → BI		X	✓	
HB → EE		X	✓	
RD → EE		X	✓	
CO → EE		X	✓	
MA → EE		X	✓	

10.4.1 Psychological Perspective

Today, more than 75% of world population are able to access mobile communication services (Becker et al. 2014). In the largest countries, such as the USA and China, more than 27 thousand medical applications were available on Android and iOS market (Xu and Liu 2015). However, literature provided that mHealth applications were underutilized in practice, and it has created no dramatic change in both organizational culture of health institutions and health behavior (Becker et al. 2014). In that regard, collaboration has been a need among application developers, physicians, and researchers who have expertise in behavior and attitudes. In this study, the significance of perception in job performance, ease of mHealth use, personal perspectives in new technologies, and potential of anxiety were revealed for both groups. Thus, the following elements should be considered for mHealth applications.

Focusing on the job performance and providing simple applications Since the workload is high and quick access to the information is a need, physicians rather prefer less exhausting assistive services in practice. Thus, they expect effort-free and useful, to-the-point applications in healthcare services. The simplicity of the application and providing quick and relevant information are valuable features in use (Gagnon et al. 2015).

Promotional activities for new mHealth applications There is a potential interest of physicians toward new technologies. Utilizing this feature, mHealth applications could be promoted among physicians for encouraging active use and creating a positive perception in healthcare services. Thus, instead of basic training or seminars at the initial stage, the promotional activities, such as meetings or activities including social interactions, would attract both users and potential users toward using mHealth applications in practice. Alternatively, key characters in the organizations, such as "opinion leaders," would be assistive to disseminate the use of mHealth applications, which would also impact the organizational culture and mHealth use "etiquette" in the long term (Hao et al. 2013).

The next level training. Following the promotional activities, training would help physicians to use mHealth in completing daily tasks. It could be provided as on-the-job training and in-action implementations. It is especially beneficial for new users in order to eliminate the risk of resistance and reduce potential anxiety in use by familiarizing the new users to the mHealth applications. In addition to that, it would reduce the possible risks as errors in multitasking (Wu et al. 2005; Varshney 2014).

10.4.2 Clinical Perspective

In the current state, literature and the study demonstrated that simple features of mobile technologies work effectively in clinical practice, especially in developing countries, such as communication applications and SMS (Free et al. 2013; Källander et al. 2013; Becker et al. 2014).

Collaboration is the core The study provided that there is a social bond among healthcare providers (i.e., physicians, nurses, technicians). Thus, collaboration among healthcare providers has been a must, and the applications should be developed regarding collaboration of the core of the operations. In that regard, easy sharing methods and collaborative working tools would be beneficial in mHealth applications.

Providing continuous services The service availability was perceived to be an important factor for the physicians. In that regard, one of the major benefits of communication applications was their service availability and providing access to

the service time and location independent. Here, the benefits of communication applications could be embraced in a broader extend to include healthcare-specific services providing significant functions available.

10.4.3 Technological Perspective

The study provided that the technological infrastructure of healthcare institutions include the Internet and local area computer network within the institutions. Each hospital uses a medical health record system to keep the track and to report the operations. In that regard, a couple of issues should be considered for mHealth application use.

Compatibility and interoperability of applications Compatibility of mHealth applications with the healthcare systems would influence physicians' working routines and the job performance as well. The current state of mHealth showed that the technology is still evolving and incompatible mHealth applications exist (Becker et al. 2014). Thus, the development of a mobile-compatible healthcare service platform for institutions is as important as developing mHealth application itself. In addition to that, the communication among the systems is also crucial for services. Interoperable systems would also boost the development and use of mHealth applications in healthcare services.

Providing demonstrable results The ability to demonstrate the medical results, calculations, problems, or processes was perceived important by the physicians. Hence, the mHealth technology being provided should grant the ability to display and share high-quality visual medical contents. In that regard, increasing visual quality as well processing speed in medical contents would be valuable in healthcare delivery.

Focusing on infrastructure Technological infrastructure, especially the communication network, is important for timely delivery of healthcare services (Sezgin and Özkan-Yildirim 2016). However, the reliability could be an issue, and uninterrupted service could not be provided for the developing countries (Varshney 2014). Thus, developing an interoperable and compatible platform does also rely on a reliable infrastructure. It is suggested to develop a contingency plan and ad hoc solution maps for unexpected infrastructural issues (such as electricity cuts, network loss, hardware and software malfunctions).

10.4.4 Regulatory Perspective

Laws and regulations regarding mHealth technologies and applications are at the initial stage (Barton 2012; Becker et al. 2014). In developing countries, it was estimated to adapt the regulations in the long term. In that regard, the following points would be considered in mHealth application development.

Acting with the laws and regulations about mHealth Even though the current state of regulations is in the development phase, the need for laws and regulations is increasing considering the number of available mHealth applications in the market. These applications were commercially available and enabled users to share confidential information with the third parties. Thus, for security and privacy of information, regulatory acts were required by the authorities. In the study, the physicians have also stated their expectations on regulations about mHealth applications.

Standards for applications This study reported that some mHealth applications were following international standards in medical practice while providing content in healthcare. However, the market was crowded with many other unregulated and unstandardized applications being available for the end users. Considering the current trajectory, mHealth applications following the standards were found more reliable by the physicians. Thus, considering international standards in the developmental phase would help to build the reliability and credibility of the mHealth applications. In addition to that, providing the procedures for implementing international standards at national level application development would also be recommended to the authorities.

Considering the four perspectives, the current stage of mHealth would be an opportunity for developers to anticipate the trajectory of the transformation in healthcare services and to release their applications in the market on time. In that regard, the potential of change in organizational culture and its evolution around mHealth applications and technologies should be considered in long-term strategic plans.

10.5 Conclusion

In this chapter, a comparative assessment of mHealth application adoption by the physicians was reported. Considering the intentions and perceptions of physicians, several suggestions were outlined. The suggestions in this chapter would be helpful for better understanding the characteristics of two different groups of physicians. The findings would guide developers and authorities to understand user needs. Thus, it would be a valuable input in the mHealth application and healthcare policy development.

It should be noted that this study has also extended the literature regarding researches investigating users and nonusers' behaviors in healthcare technologies (Cheung et al. 2013; Bidmon et al. 2014; Sims et al. 2014). However, further studies, employing qualitative designs, would be resourceful to achieve in-depth understanding in physician intentions and perceptions toward mHealth application use.

References

Agarwal R, Prasad J (1998) A conceptual and operational definition of personal innovativeness in the domain of information technology. Inf Syst Res 9:204–215

Aggelidis VP, Chatzoglou PD (2009) Using a modified technology acceptance model in hospitals. Int J Med Inform 78:115–126

Ajzen I (1991) The theory of planned behavior. Organ Behav Hum Decis Process 50:179–211

Atluri V, Rao S, Rajah T et al (2015) Unlocking digital health: opportunities for the mobile value chain 1:1–8. https://healthcare.mckinsey.com/sites/default/files/Healthcare_WhitePaper_screen_April17.pdf

Bagozzi RP, Warshaw PR (1992) Development and test of a theory of technological learning and usage. Hum Relations 45:659–686

Barton AJ (2012) The regulation of mobile health applications. BMC Med 10:46. https://doi.org/10.1186/1741-7015-10-46

Becker S, Miron-Shatz T, Schumacher N et al (2014) mHealth 2.0: experiences, possibilities, and perspectives. JMIR mHealth uHealth 2:e24. https://doi.org/10.2196/mhealth.3328

Bidmon S, Terlutter R, Rottl J (2014) What explains usage of mobile physician-rating apps results from a web-based questionnaire. J Med Internet Res 16:1–22. https://doi.org/10.2196/jmir.3122

Chang I-C, Hwang H-G, Hung W-F, Li Y-C (2007) Physicians' acceptance of pharmacokinetics-based clinical decision support systems. Expert Syst Appl 33:296–303. https://doi.org/10.1016/j.eswa.2006.05.001

Chau PYKP, PJ H (2002) Investigating healthcare professionals' decisions to accept telemedicine technology: an empirical test of competing theories. Inf Manag 39:297–311

Cheung CS, Tong EL, Cheung NT et al (2013) Factors associated with adoption of the electronic health record system among primary care physicians. JMIR Med informatics 1:e1. https://doi.org/10.2196/medinform.2766

Davis FD (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology. Manag Inf Syst 13:319–340

Dünnebeil S, Sunyaev A, Blohm I et al (2012) Determinants of physicians' technology acceptance for e-health in ambulatory care. Int J Med Inform 81:1–15. https://doi.org/10.1016/j.ijmedinf.2012.02.002

Free C, Phillips G, Watson L et al (2013) The effectiveness of mobile-health technologies to improve health care service delivery processes: a systematic review and meta-analysis. PLoS Med 10:e1001363. https://doi.org/10.1371/journal.pmed.1001363

Gagnon M-P, Godin G, Gagné C et al (2003) An adaptation of the theory of interpersonal behaviour to the study of telemedicine adoption by physicians. Int J Med Inform 71:103–115. https://doi.org/10.1016/S1386-5056(03)00094-7

Gagnon M-P, Ngangue P, Payne-Gagnon J, Desmartis M (2015) M-health adoption by healthcare professionals: a systematic review. J Am Med Informatics Assoc 23:1–10. https://doi.org/10.1093/jamia/ocv052

Hao H, Padman R, Telang R (2013) Physician's usage of mobile clinical applications in a community hospital: a longitudinal analysis of adoption behavior. UK Acad. Inf. Syst. Conf. Proc. 2013

Holden RJ, Karsh B-T (2010) The technology acceptance model: its past and its future in health care. J Biomed Inform 43:159–172. https://doi.org/10.1016/j.jbi.2009.07.002

Källander K, Tibenderana JK, Akpogheneta OJ et al (2013) Mobile health (mHealth) approaches and lessons for increased performance and retention of community health Workers in low- and Middle-Income Countries: a review. J Med Internet Res 15:e17. https://doi.org/10.2196/jmir.2130

Kijsanayotin B, Pannarunothai S, Speedie SM (2009) Factors influencing health information technology adoption in Thailand's community health centers: applying the UTAUT model. Int J Med Inform 78:404–416

King WR, He J (2006) A meta-analysis of the technology acceptance model. Inf Manag 43:740–755. https://doi.org/10.1016/j.im.2006.05.003

Legris P, Ingham J, Collerette P (2003) Why do people use information technology? A critical review of the technology acceptance model. Inf &amp. Manag 40:191–204. https://doi.org/10.1016/S0378-7206(01)00143-4

Manyika J, Chui M, Bughin J, Dobbs R (2013) Disruptive technologies: advances that will transform life, business, and the global economy-executive summary. McKinsey Global Institute, New York. https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/disruptive-technologies

Martínez-Pérez B, de la Torre-Díez I, López-Coronado M (2013) Mobile health applications for the most prevalent conditions by the World Health Organization: review and analysis. J Med Internet Res 15:e120. https://doi.org/10.2196/jmir.2600

OECD (2015) OECD digital economy outlook 2015

PwC Health Research Institute (2014) Top health industry issues of 2015

Pynoo B, Devolder P, Duyck W et al (2012) Do hospital physicians' attitudes change during PACS implementation? A cross-sectional acceptance study. Int J Med Inform 81:88–97. https://doi.org/10.1016/j.ijmedinf.2011.10.007

Rogers EM (1995) Diffusion of innovations. Free Press, NY

Rondan-Cataluña FJ, Arenas-Gaitán J, Ramírez-Correa PE (2015) A comparison of the different versions of popular technology acceptance models: a non-linear perspective. Kybernetes 44:788–805. https://doi.org/10.1108/JFM-03-2013-0017

Schaper L, Pervan G (2007a) An investigation of factors affecting technology acceptance and use decisions by Australian allied health therapists. In: Proceedings of the 40th Hawaii international conference on system sciences, IEEE, pp 141–141

Schaper LK, Pervan GP (2007b) ICT and OTs: a model of information and communication technology acceptance and utilisation by occupational therapists. Int J Med Inform 76:212–221. https://doi.org/10.1016/j.ijmedinf.2006.05.028

Sezgin E, Özkan-Yildirim S (2014) A literature review on attitudes of health professionals towards health information systems: from e-health to m-health. Procedia Technol 16:1317–1326

Sezgin E, Özkan-Yildirim S (2016) A cross-sectional investigation of acceptance of health information technology: a nationwide survey of community pharmacists in Turkey. Res Soc Adm Pharm 12:949–965

Sezgin E, Ozkan-Yildirim S, Yildirim S (2016) Understanding the perception towards using mHealth applications in practice: physicians' perspective. Inf Dev:1–19. https://doi.org/10.1177/0266666916684180

Sezgin E, Ozkan-Yildirim S, Yildirim S (2017) Investigation of Physicians' awareness and use of mHealth apps: a mixed method study. Health Policy and Technology 6(3):251–267

Sims MH, Fagnano M, Halterman JS, Marc W (2014) Provider impressions of the use of a mobile crowdsourcing app in medical practice. Heal informatics 22:221–231. https://doi.org/10.1177/1460458214545896

Sun H, Zhang P (2006) The role of moderating factors in user technology acceptance. Int J Hum Comput Stud 64:53–78. https://doi.org/10.1016/j.ijhcs.2005.04.013

Varshney U (2014) Mobile health: four emerging themes of research. Decis Support Syst 66:20–35. https://doi.org/10.1016/j.dss.2014.06.001

Venkatesh V, Davis FD (2000) A theoretical extension of the technology acceptance model: four longitudinal field studies. Manag Sci 46:186–204
Venkatesh V, Morris MG, Davis GB, Davis FD (2003) User acceptance of information technology: toward a unified view. MIS Q 27:425–478. https://doi.org/10.2307/30036540
Venkatesh V, Thong JYL, Xu X (2012) Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Q 36:157–178
Ventola CL (2014) Mobile devices and apps for health care professionals: uses and benefits. Pharm Ther 39:356–364
Wood R, Bandura A (1989) Social cognitive theory of organizational management. Acad Manag Rev 14:361–384. https://doi.org/10.2307/258173
Wu J, Wang S, Lin L (2005) What drives mobile health care? An empirical evaluation of technology acceptance. In: Proceedings of 38th Hawaii international conference on system sciences, pp 1–9
Xu W, Liu Y (2015) mHealthApps: a repository and database of mobile health apps. JMIR Mhealth Uhealth 3:e28. https://doi.org/10.2196/mhealth.4026