A REVIEW OF INFORMATION SYSTEM E-HEALTH RESEARCH

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Abstract

The new information technology-based health care service known as "e-Health" has previously drawn a lot of scholarly interest. What can we infer about the past research? Using the e-Health-related scientific literature from the Web of Science core database, this article examines how earlier work has evolved. Our thorough examination leads us to believe that 1) IT adoption is the most crucial area for research in this area, 2) Research methodologies are becoming more varied, and 3) Research themes are relatively distinct.

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1. Introduction

e-Health is a new type of health care service that uses internet technology to support medical activities including remote treatment, recuperation, and healthcare (Lachowsky et al., 2016). E-Health, which dates back to the 1990s, has recently emerged as a crucial ICT application as Internet usage has increased. Many researchers from several academic fields—including medicine, information technology, psychology, and behavioural science—conducted extensive study on e-Health.

Early research in the field of information systems concentrated on the enhancement of artefacts, including subjects like "technology acceptance," "IT adoption," and "user engagement." The sophistication of healthcare services has led to the emergence of many e-Health service platforms covering a range of topics. Hence, in recent years, specialised and diverse research has prevailed.

This review's objective is to offer e-Health research in the realm of information systems a bibliographic lens. In this essay, significant research is examined, the evolution of earlier studies is analysed, the present situation is presented, and a useful direction for future study is offered.

2. Data study and methodology

For data collecting, we created a successful information retrieval approach. There are several synonyms for the phrase "e-Health," including "online medical," "mobile health," and "remote healthcare." Studies pertaining to these keywords are quite similar to those pertaining to "e-Health." Hence, "e-Health" was the sole term utilised in this study's literature search to prevent duplication. Also, the article's topic has been constrained. As e-Health is an interdisciplinary study issue, numerous disciplines are participating in related studies. Just three information systems domains that are very closely connected were chosen for this study to restrict the search results.

We included any study technique assessment of information technology impacting e-Health in our survey of studies for review. Because of the significant changes in technological application and the existence of other evaluations, we did not include research conducted before 2004 (Kim et al., 2019).

We searched "e-Health" on the "Web of Science" platform's core collection for the years 2004 to 2021 while restricting the article subject to "computer science," "information science," and "library science," as well as "communication." In March 2022, 1344 items were found through searches.

The author, title, abstract, and bibliographic citations for every publication are kept on file. To map the visualisation and evaluate the citation networks of these publications, we utilised CiteSpace. Through the citation networks, a few typical studies were discovered. To provide a timeline of the research hotspots, we statistically examined the pertinent literature and highlighted the frequently referenced publications.

3. Result Analysis

3.1. Time Distribution

Figure 1 displays the chronological distribution of pertinent articles. In the area of e-Health, the volume of research articles reflects a growing pace. The research began in the middle of the 1990s as information technology advanced. Prior to 2010, there were few healthcare-related applications and a dispersed body of research, which resulted in a lacklustre research phenomena. Nevertheless, since 2010, as Internet technology has continued to progress, particularly with the growing use of mobile devices, the number of e-Health publications has gradually grown.

3.2. High Centrality Analysis

We investigated CiteSpace's citation network. Table 1 lists 11 works of high centrality literature. The most often used phrase in this subject, according to the citation analysis, is the technology acceptance model (TAM) (Ekeland et al., 2010). Academics paid a lot of attention to e-Health as a novel sort of information system, and a lot of research has been done to support its implementation. While Holden and Karsh (Ekeland et al., 2010) showed that some Technology Acceptance Mode (TAM) associations were regularly shown to be important, while others were inconsistent, previous research has frequently indicated that consumers' attitudes to health information technology are difficult to categorise. The redistribution of jobs and obligations to patients in their everyday lives, according to certain research based on TAM, needs additional consideration (Aboujaoude et al., 2015).

Reports are also the most popular category of articles (Heerink et al., 2010; Karsh & Holden, 2010). These papers' high citation counts suggest that the researcher is more interested in the condition of e-Health today and wants to integrate research and business. For instance, Kummervold and Chronaki (Dedding et al., 2011) examined trends and patterns of Europeans' usage of the Internet for health-related purposes over a period of 18 months and discovered that the Internet was becoming more important as a source of health information than other conventional sources. Also, their study found that more consumers are utilising e-Health for interactive services rather than merely reading about health issues. The authors Kontos and Blake (Kummervold et al., 2008) concentrate on resolving ongoing health inequities and inequalities in communication. In their study,

eHealth use was statistically evaluated by sociodemographic characteristics including age, sex, race/ethnicity, and socioeconomic status (SES).

According to several studies, Meta-Analysis can be very beneficial for answering research questions in e-Health (Arjadi et al., 2018). As e-health is frequently information-intensive, meta-analysis gives researchers the opportunity to quickly respond to study questions. The meta-analysis led (Kobrinskii, 2014) to the conclusion that computerised and Internet therapies show promise as prospective evidence-based treatments for depression. The evidence that computerised CBT for anxiety and depressive disorders is acceptable to patients and beneficial in the short and long term was examined by (Andrews et al., 2010) using a meta-analysis.

Table 1: High centrality research

| Centrality	Year	Authors	Article Title
0.32	2010	Holden, R. J., & Karsh, B. T.	The past and future of the technology acceptance model in healthcare
0.22	2010	Webb, T., Joseph, J., Yardley, L., & Michie, S.	A comprehensive study and meta-analysis of the effects of the theoretical underpinnings, usage of behaviour change approaches, and manner of delivery on the effectiveness of using the internet to promote health behaviour change
0.03	2009	Andersson, G., & Cuijpers, P.	A Meta-Analysis of Internet-Based and Other Computerized Psychological Therapies for Adult Depression
0.19	2008	Kummervold, P., Chronaki, C., Lausen, B., Prokosch, H. U., Rasmussen, J., Santana, S., … & Wangberg, S.	Trends in eHealth in Europe from 2005 to 2007: a population-based study
0.13	2014	Kontos, E., Blake, K. D., Chou, W. Y. S., & Prestin, A.	Predictors of eHealth use: Findings from the 2012 Health Information National Trends Survey on the digital divide
0.04	2013	Ricciardi, L., Mostashari, F., Murphy, J., Daniel, J. G., & Siminerio, E. P.	a nationwide action plan to encourage e-health consumer involvement
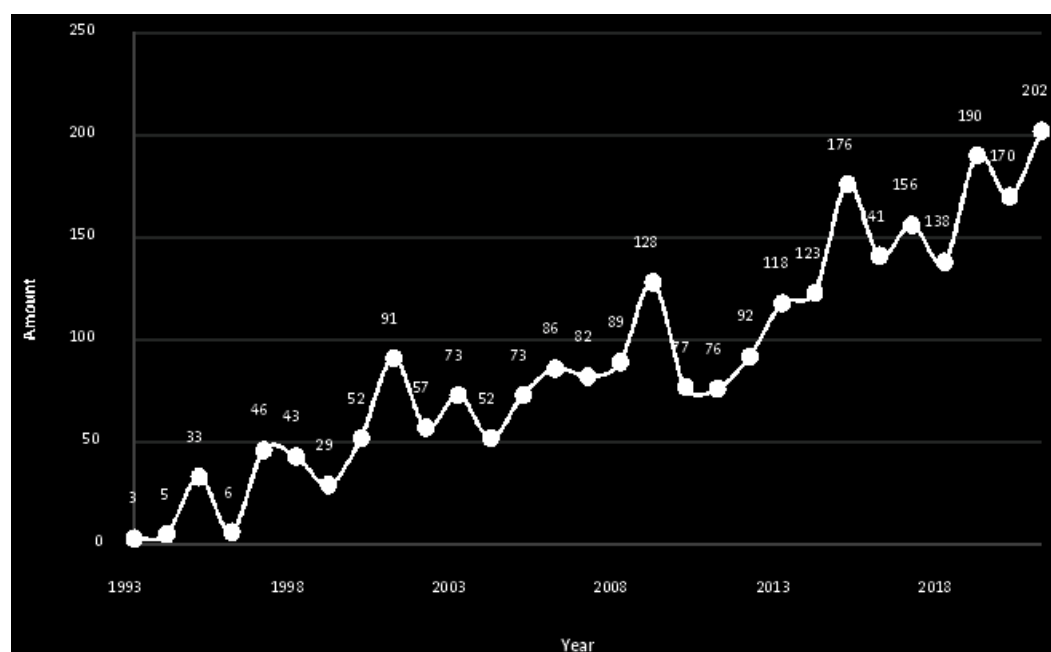
Figure 1: a timeline of the quantity of pertinent publications. Web of Science Core Database as a source

3.3. Prior to 2017, the most-cited research

Articles with any data errors were disqualified. After carefully examining the article content, we identified the top 10 referenced articles that seemed to be pertinent. They are listed by cited times in Table 2 and are summarized the research themes.

Up to 2017 (Tung et al., 2008), "IT adoption" and "Technology acceptance" were the most popular subjects investigated. The goal of the research is still to enhance the user experience on e-Health platforms. This means that both of these studies and another group that examined "Patients' experiences" might be described as "e-Health promoting" studies. For instance, investigated the variables that affect older persons' level of technology use and used a qualitative field research to characterise these variables. Similar research aims are presented in (Peek et al., n.d.), where they state that the goal of the "e-Health" project is to promote patient involvement, personal health, and the whole health care system.

Many advances have been made in research during this time. For instance, randomised controlled experiments have gained popularity in addition to qualitative and quantitative methodologies. Emerging technologies like wearable sensors, cloud computing, and minority issues have also received some attention. Overall, the research conducted during this time set the stage for e-Health and suggested the direction the field will go in the future.

3.4. The five most recent years' most-cited studies

The research on e-Health has advanced and improved during the last five years. We list the top 8 pieces of literature in Table 3.

The most popular study areas continue to be well-liked. TAM continues to serve as a conduit for e-Health adoption research that can improve the explanation of patients' decision-making processes in the interchange of medical data.

Table 2: The most popular studies before 2017

Authors	Year	Article Title	Times Cited	Theme
Andreassen, HK; BujnowskaFedak, MM; Chronaki, CE; Dumitru, RC; Pudule, I; Santana, S; Voss, H; Wynn, R	2007	European citizens' use of E-health services: A study of seven countries	383	Internet use; Survey;
Ziebland, S; Wyke, S	2012	Health and Illness in a Connected World: How Might Sharing Experiences on the Internet Affect People's Health?	279	Patients' experiences; Review;
Tung, FC; Chang, SC; Chou, CM	2008	An extension of trust and TAM model with IDT in the adoption of the electronic logistics information system in HIS non the medical industry	234	IT adoption; TAM; Trust; Perceived financial cost;

Table 3: The five years' worth of most-cited research

Authors	Year	Article Title	Times Cited	Theme
Wind, TR; Rijkeboer, M; Andersson, G; Riper, H	2020	The COVID-19 pandemic: The "black swan" for mental health care and a turning point for e-health	246	Mental health; Internet interventions;
Yildirim, O; San Tan, R; Acharya, UR	2018	An efficient compression of ECG signals using deep convolutional autoencoders	81	Neural networks; Data transfer;
Bol, N; Helberger, N; Weert, JCM	2018	Differences in mobile health app use: A source of new digital inequalities?	77	Digital inequalities; User characteristics analysis;
Hoque, MR; Bao, YK; Sorwarb, G	2017	Investigating factors influencing the adoption of e-Health in developing countries: A patient's perspective	68	IT adoption; TAM; Patient
Walker, DM; Hefner, JL; Fareed, N; Huerta, TR; McAlearney, AS	2020	Exploring the Digital Divide: Age and Race Disparities in Use of an Inpatient Portal	54	Digital inequalities; Race and Age

Yet, although IT adoption and technology acceptability continue to rule, once obscure study areas, including digital inequality, are becoming more and more popular. For instance, Bol, Helberger discovered consistent disparities between users and non-users of mobile health apps.

Particularly, compared to non-users, mobile health app users tended to be younger, more educated, and more literate in e-health. shown concern for racial inequities. In order to bridge the digital gap, they discovered that African American patients accessed the e-Health site less frequently than White patients.

The vast COVID-19 in recent years has also been a prominent topic, with scientists deeply worried about its effects on social structures and psychology. They focus on mental health as well, which is a subject that is receiving more and more attention in the field of e-Health.

4. Conclusion

This methodical review of the pertinent e-Health literature yields three useful conclusions.

1) The most significant area for research in this area is IT adoption. The most often used research model is TAM, and several studies have been carried out using it. As long as technology develops and changes, this issue should stay relevant.

2) The variety of research methodologies is expanding. The area is dominated entirely by quantitative research, but exploratory qualitative research is growing in popularity as more academics adopt interpretivism. The two are the primary research methodologies in e-Health, however technologies like randomised controlled trials and machine learning approaches provide researchers additional flexibility depending on the study subject.

3) The subjects of the research are sufficiently distinct. There are several diverse online health communities with various interests. There exist knowledge gaps across the many fields involved in e-Health research, which makes it difficult to establish an e-Health research scientific community.

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