Review Article

Utilization of smart devices and the evolution of customized healthcare services focusing on big data: a systematic review

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Contributions: (I) Conception and design: Both authors; (II) Administrative support: None; (III) Provision of study materials or patients: YS Son; (IV) Collection and assembly of data: YS Son; (V) Data analysis and interpretation: YS Son; (VI) Manuscript writing: Both authors; (VII) Final approval of manuscript: Both authors.

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Background: Currently, smart devices can prevent diseases by continuously collecting user information and providing health-related feedback. Smart devices big data provide personalized, faster, and more accurate health care. By examining existing studies, we suggest a new healthcare evolution and health promotion through information technology (IT) convergence. A big data systematic review examined the evolution of new health care and their potential for health promotion by monitoring physical activities, preventing diseases, and analyzing health data smart devices.

Methods: Therefore, this evaluates whether a new healthcare industry combining smart devices and big-data-based customized health care services can promote health. This study searched PubMed, Google Scholar, Scopus, and Research Information Sharing Service (RISS) for keywords related to big data, smart devices, healthcare, customized health services, health apps, and mobile health. This study comprised 43 of 453 publications from 2007 to 2023. Among them, a total of 43 articles were successfully completed in this study using the PRISMA flowchart in the final stage.

Results: Smart devices centered on big data enable personalized health care, and app technologies that promote well-being to prepare for aging society have many applications in clinical, prevention, public health, and rehabilitation settings. Smart devices and tailored healthcare services using big data to inform individuals about exercise, health status, diagnosis, and health information will expand into major sectors. By reviewing previous studies, the convergence of the IT technology field, which allows you to easily identify individual health and receive faster and more accurate medical services through customized health care services, has future-oriented values as, new health care services evolve. The systematic review of big data herein can monitor physical activity and prevent diseases using smart devices, thus promoting a healthy lifestyle.

Conclusions: Smart devices that analyze data to provide personal exercise and health conditions, checkups, and information, are making our lives easier. The information service using big data will continue to evolve into a personalized management service and provide basic healthcare data as it grows into an expected industry in the future.

Keywords: Big data; smart devices; customized health services; health apps; m-Health

Received: 22 April 2023; Accepted: 24 October 2023; Published online: 12 December 2023.
doi: 10.21037/mhealth-23-24
View this article at: https://dx.doi.org/10.21037/mhealth-23-24

Introduction

Everyone strives for health, which is mainly due to the development of people's economic and living standards (1). Big data analysis is based on data collection, data preprocessing, and data analysis. Data collection includes information collected from 5G-based Internet of Things (IoT) networks, among other important components and processes, from a variety of external and internal sources. External data is collected from service areas, organizations, and markets, while internal sources include operating systems, support systems, and business systems. There are two types of collected data, a data source and an auxiliary tool. IoT devices can collect multimedia data using sensor nodes as a data collection tool. Cameras, and GPS systems are equipped with Wi-Fi and Bluetooth technologies, and network data is collected using packet capture applications such as SmartSniff and ComView. The process of storing data after data collection is called data preprocessing, and data storage is one of the complex tasks with properties, after storing data, it generates useful information for analyzing and optimizing it using various machine learning methods. This process is used to provide data efficiency and conform to the requirements (2). In comparison to Organization for Economic Cooperation and Development (OECD) countries, the rate of population aging in Korea is accelerating significantly. As human life expectancy increases due to rapid demographic changes and the development of modern medicine, people are becoming increasingly interested in healthcare related to physical activity, as a concern for quality of life is correlated with health-related behaviors. Individual health care for people over 100 years old has a significant impact on consumption, investment, and the economy. As more people start using smartphones, they are being used as tools to improve their health and physical strength, which is expected to have a positive impact on the field of mobile health and personal health care services. Big data can be used to manage individual health conditions and prevent diseases through smart devices based on health and medical data, suggesting the possibility of health promotion in the new healthcare sector (3). As a data quality management plan, it should consider the importance, accuracy, validity, reliability, completeness, readability, timeliness, accessibility, and confidentiality of the data (4). Big data refers to a technology that extracts value from data and analyzes results beyond the ability of existing database management tools to collect, store, manage, and analyze data (5). Various types of big data development refer to technologies that more accurately predict a diverse modern society and efficiently provide, manage, and analyze personalized information (6). Utilizing big data, which can be an important tool for dramatically enhancing human life in areas such as health care, aging, and life extension, can reveal true value (7). Recently, in collaboration with IT companies and hospitals, it has been leading the data economy by providing customized services using life logs (calorie consumption, heart rate, blood sugar level, etc.) and artificial intelligence (AI) collected through wearable devices. The global statistics portal Statista forecasts the economic value of data in 2022. It is expected to grow to $260 billion, and the Korean data market will exceed 32 trillion won. The value and impact of data are expected to be even greater (8). Sharing and integrating data from health information is essential to spreading healthcare, and as data needs to be accessed from multiple locations in a distributed system, the security and privacy of data are critical (9). In the future, big data information services will continue to develop into personalized management services and expand into the healthcare industry. Big data and AI technologies play an important role in epidemic prevention and control (10). The mobile health (mHealth) app changes personal health and lifestyle based on new information and communication technologies and the IoT and enables user behavior change and disease management through data collection and analysis for clinical trials. Based on patient health promotion and medical cost reduction, we aim to review the acceptability of customized healthcare service apps and develop them through continuous research by actively utilizing big data. We present this article in

Highlight box

Key findings

- We present the results of developing and implementing big data that measures health promotion and status through customized health care services.

What is known and what is new?

- The new health care service provides accurate medical services through customized health care services and has future-oriented value.
- The digital divide between different population groups may persist. We will need to develop policies and programs that serve all members of society.

What is the implication, and what should change now?

- For personalized health management centered on big data, additional research is needed to protect personal information and strengthen big data.

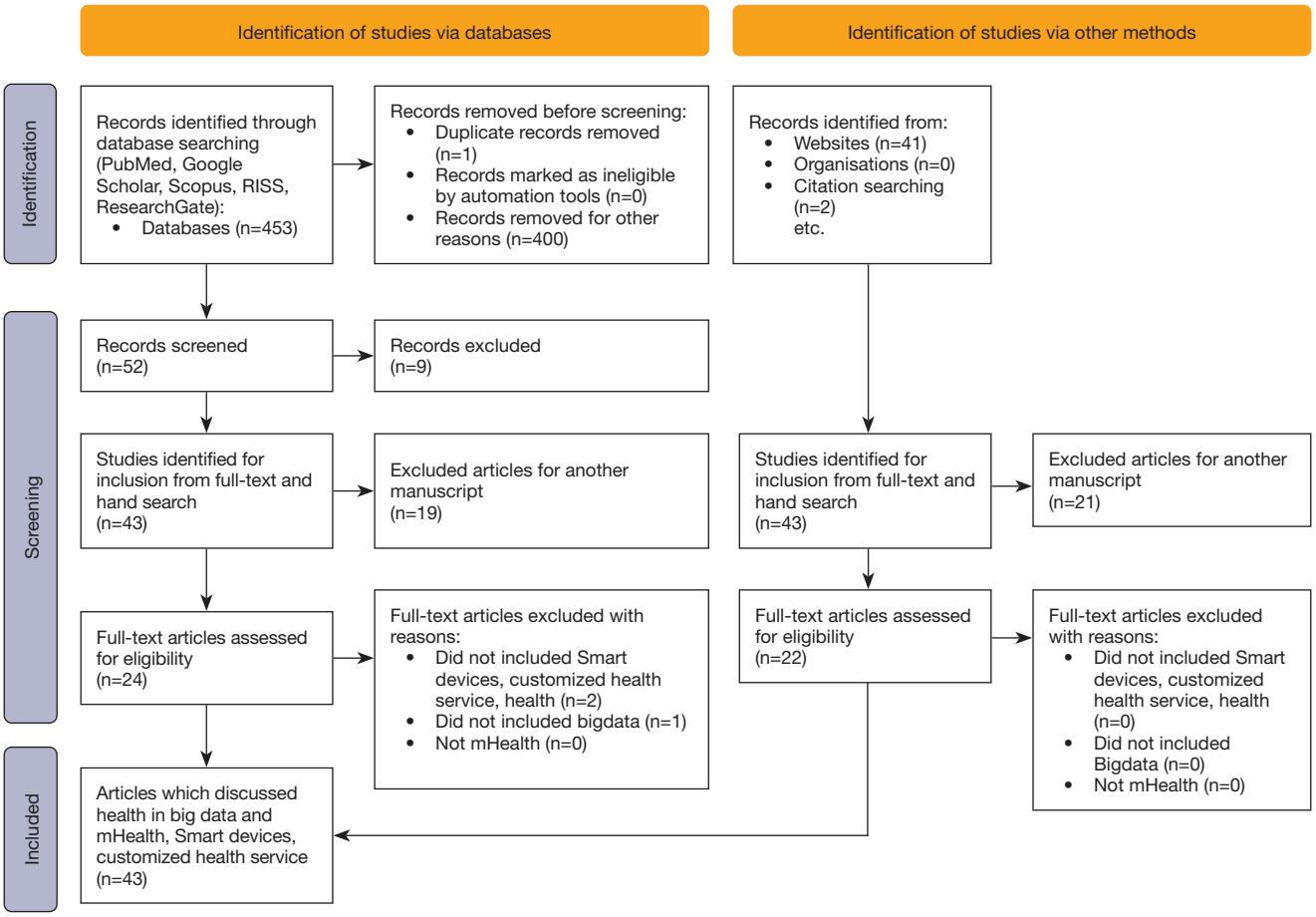

Figure 1 PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers, and other sources. Literature retrieval strategy and review process in accordance with the PRISMA guidelines. RISS, Research Information Sharing Service.

accordance with the PRISMA reporting checklist (available at https://mhealth.amegroups.com/article/view/10.21037/mhealth-23-24/rc).

Methods

Search strategy

This review of the commentary, which aims to integrate and critically evaluate the literature, presents the possibility of health promotion as a new field of healthcare that can manage individual health conditions and prevent diseases using big data-related health care data. This literature review was but we searched PubMed, Medline, Scopus, Research Information Sharing Service (RISS), Research Gate, and Google Scholar according to PRISMA guidelines. Focusing on the use of big data, customized health services, health apps, and m-Health smart devices, we aimed to predict the trend of health promotion possibilities using prior research on the historical background of existing theories and correlations between variables. *Figure 1* shows the literature search strategy and review process according to PRISMA guidelines.

Eligibility criteria

The papers included in this review had to meet the following eligibility criteria. The following studies considered the use of big data, smart devices, customized health services, health apps, and m-Health. *Figure 1* summarizes the process used to identify suitable articles. We reviewed titles and abstracts, assessed (I) targeting smart devices and big data, (II) using personalized healthcare, and (III) at least some outcomes of interest. If it did not meet the pre-determined eligibility criteria, the article was deleted. Then we read and reviewed the entire article. We further assessed article eligibility

using participant, intervention, comparison, outcome, and study design (PICOS) approaches. In reviewing the articles, we collected data using a standardized data collection form, including author, year, country, big data group, type of study, healthcare, personalized health, health promotion, health-related standards, usage methods, follow-up, results, and results. The manuscripts included in this article were not evaluated for quality due to the limited number of papers that met the eligibility criteria.

Screening and data extraction

We considered different article types, such as articles, review articles, internet articles, brief reports, and series, as criteria for inclusion. No restrictions were applied. on the date of publication or language. The exclusion criteria included accessible full text without raw data, irrelevant topics, university papers, and dissertations not related to the focus of the review.

Risk of bias assessment

All authors independently assessed the methodological caliber of the included studies.

Study selection

This review is a critical literature review. It employs a descriptive review approach. A total of 453 references were selected using representative journal search sites such as PubMed, Google Scholar, Scopus, RISS, and ResearchGate through PRISMA flows. Accordingly, 43 papers were selected in the final stage from 2007 to 2023. The PRISMA flow chart is shown in *Figure 1*.

Results

Leverage smart devices focused on big data

With the development of digital technology and the internet, we can use and add information. With the addition of devices capable of producing big data, such as smartphones, data is growing rapidly, leading to a shift to cloud computing instead of storing individual. It is premised on the collection of a large amount of data, and big data collects data resources secured online and offline and utilizes useful information through data analysis. When a data pattern is formed when human experience and interaction are made, rather than being developed by technology alone, you can try various possibilities using big data, and prepare for real-time risks by analyzing information patterns to identify risks in advance. Resources are recreated by forming and pursuing a network step by step. The issues confronting information services, including big data, are an abundance of data and the need for specialized expertise to derive meaningful data. Smart devices that inform individuals about exercise, health status, health checkups, and health information are evolving in direction for that is convenient in our daily lives (11). Based on big data, medical cloud service governance, medical cloud service resources, platform public services, platform runtime services, infrastructure, security and monitoring, and access across the platform are composed of an eight-tier architecture. The medical cloud service platform of the smart medical system is a public information service system that supports users to receiving medical services through smart devices without geographical restrictions. The smart medical cloud shares and implements data for all medical services. Based on cloud computing technology, it extracts information from big data to find effective information to improve patients' medical experience and efficiency, and supplement medical resources (12). It is important to demonstrate and highlight the benefits of personalized health care services for health care to promote mHealth use among older adults who are vulnerable to performance expectations, social impacts, and environmental risk factors. Awareness of the target person's surroundings also plays an important role, and there is a need to promote these services, especially at the family and community level. In addition, support from trusted service providers should be strengthened to ensure that older adults continue to receive technical assistance, and a variety of strategies should be used depending on the presence or absence of chronic conditions. The reliability of bio-signal measurement using wearable devices should be further emphasized to increase the use rate among the elderly with chronic diseases (13). It is possible to collect patient health information and utilize various sensors through the IoT network. Specifically, the heart sensor is used for analyzing a patient's heart rate, and the body temperature sensor is used to record the patient's body temperature. The pressure sensor determines the pressure value, so the glucose level or the respiratory, pulse, and gas sensors can collect body information to monitor the patient's health. IoT technology recognizes the current situation in real time with accuracy. Medical sensors and devices help monitor physical problems. After collecting

the monitored data, it is sent to the cloud to improve the performance of the medical device by integrating with the smartphone or some medical devices and smartphone applications (14). It is also having a potential impact in other areas, such as cardiovascular disease and prevention management (15). Medical IoT, which encompasses wearable devices, smartphone apps, Internet-based drug delivery systems, and telemedicine technologies, can continuously monitor the health of mild patients, receive medicines at home without hospital care, and receive emergency feedback for rapid treatment (16). Devices such as smartwatches, fitness bracelets, and smart clothing collect diverse data, including heart rate, oxygen consumption, posture, and sleep quality, to analyze information, improve personalized feedback and fitness, and encourage healthier and more active lifestyles through accurate monitoring (17). Smart shoes can be applied in any field that promotes independence, comfort, and healthy living. Furthermore, it has the potential to create new scientific functions in gait biomechanics with rehabilitation applications, sensor technology, and computing. Assistive footwear designed for individuals with visual or physical impairments, combined with wearable sensors, microfabrication, data collection and processing advances, and portable, wireless systems, to alert pedestrians of hazard detection and enable safe movement (18). The use of big data plays an important role in all fields of society in implementing mobile technology, and continuous quality control of big data quality management is needed because it deals with life and health, especially in health care. As a quality management plan, it should be developed in consideration of the importance, accuracy, validity, reliability, completeness, readability, timeliness, accessibility, and confidentiality of the data (4). This will need to play a role in increasing the accuracy of data information by reducing the error range and reflecting the individual's purpose and characteristics (5). Along with a positive view of big data, negative views such as data infringement and personal information protection exist. Although research related to big data is actively conducted to address this problem, those on analyzing big data are still insufficient. Besides, information infringement on individuals, and individual participation rates are low, and additional data measures are needed for quality (6).

Evolution of smart devices and applications for self-health management

An aging society and the prospect of a future society suffering under climate change are increasing interest in healthcare while countermeasures are still insufficient. An increase in the elderly population can lead to an increase in the number of chronically ill people, and individual healthcare for the 100-year-old era will have great ripple effects across consumption, investment, and economy (19). With the ubiquity of smartphones, they are being used increasingly as tools to help improve health and fitness. In particular, the market for fitness applications or apps on smartphones involves not only the utilization of programs that measure health and fitness using data gathered from smartphone built-in tools (global positioning systems, accelerometers, microphones, speakers, and cameras), but also the utilization of these data. It is analyzed as a basis to devise an individualized plan based on the user's goals, and feedback provides personalized coaching and additional motivation to share on social media. Health-related apps play a role as a convenient tool to evaluate and motivate smartphone owners with limited access to medical services. These help change patient behavior and improve health, and it shows all the possibilities of use, including settings such as clinical, prevention, public health, and rehabilitation (20). Smart devices and applications that manage personal health information data in real time are receiving a lot of attention from users. Currently, users of health apps rely only on watching and imitating video content or fitness videos, which use Pose Net, an AI convolutional neural network (CNN) model, to analyze human coordinates, implement applause as part of their movements, or learn by posing. A smart health management system that converts and shows the corresponding value [mentabolic equivalent of task (MET)] to an application program can determine the user's exercise calorie consumption. In particular, if you have a device that supports the camera function, Pose Net analyzes posture or motion in real time through a browser anytime, anywhere, and calculates calories when the user uses MET. As a model suitable for the development of smart healthcare services among healthcare platforms, is highly useful (21). Wearables provide opportunities for home-based healthcare in hospitals and in-hospital healthcare, as well as for healthcare in diverse and poor environments. Accordingly, the wearable device market is expected to reach $19.5 billion by 2021 (22). The technology in wearables is now a driving force that is dramatically changing the healthcare economy. Replacing one in five outpatient counseling or home outpatient visits with a digital visit could save $40 billion annually (23). Handling some of the expensive standard tests and medical services with wearables can effectively reduce

medical costs (24). Located in Hyderabad, India, Zoylo is a start-up company that launches mobile application services. The service provided by Zoylo gathers the Indian medical system, where diagnosis, hospital treatment, and drug prescription work are divided, and provides optimal information to customers. It consists of one medical service in India and has established partnerships with 600 cities, doctors, and general hospitals to store customers' electronic medical records, online consultation contents, and health information cloud so that their medical records can be accessed in any city. You can easily check online and receive medical treatment and prescriptions for medicines. and it connects you to the optimal medical facility by searching for conditions such as medical expenses, pharmacy expenses, hospital distance, and visits. Telemedicine has so far been used intermittently in Indian healthcare, but COVID-19 has provided an opportunity to increase access, and by integrating telemedicine systems, visits by doctors and patients can be reduced and viral infections can be prevented (25). The pilot project, which statistically verified the effectiveness of the newly attempted "AI-IoT Healthcare Service for the Elderly" in Seoul, consisted of providing wearable devices to local seniors, checking healthcare missions, and providing non-face-to-face professional counseling with exercise experts, nutritionists, and home nurses. Users can connect their health data (step count, blood pressure, blood sugar, and healthcare missions) to their smartphone app in real time via a wearable device, and this information is monitored remotely by visiting nurses, exercise experts, nutritionists, and other experts at the health center. Based on this information, more than one non-face-to-face consultation has been conducted and health education materials are provided non-face-to-face, so photos or video links related to healthcare are sent to mobile phones at least once a month as push notifications from apps, or text messages encouraging them to perform medical tasks once a week. The home nurse monitors blood pressure, blood sugar levels, and number of steps at least once a week and provides counseling regarding any abnormality (26). The Noom-Coah health application, which helps healthcare only with non-face-to-face interaction, provides services for conditions such as diabetes and chronic diseases to 43 million users around the world. Users record data daily on the app on eating habits and exercise, and health trainers and nutritionists participate in real-time direct chat and coachcoaching. This plays a role in helping to reach the target weight and is a solution designed mainly for the purpose of changing eating habits. Noom-Coach is a lifestyle intervention program for mHealth behavior change and is based on health education content, progress analysis, chat, and community as well as diet and exercise record weight management functions. It was certified as the world's first mobile diabetes prevention program (DPP) by the Centers for Disease and Prevention in April 2017. This became the first case in which the existing offline-oriented DPP was expanded to mobile services, and measures for telemedicine are gradually expanding to individual services (27). In terms of self-health management, young people actively and effectively utilize smart devices and health applications, while the elderly are passive in the use and activities of mobile and applications. As such, in order to support and promote physical activities for mobile health services for the elderly, digital gaps that may arise from age, social, economic, geographical, location, and cultural factors should be considered by providing activities suitable for lifestyle (13). Interventions in behavioral change technologies, as well as social and professional support, ca n be effective in order to clearly recognize the older population's access to technology, but the ongoing crisis caused by COVID-19 may create challenges in structuring services. The use of mobile health services should be safely tailored to individual needs (28). We demonstrate the broad applicability of big data in studying human behavior during the COVID-19 pandemic. Methods, measurements, and modeling of utilizing human behavior in epidemiology are powerful yet show room for improvement, and investigated methods and applications can provide insight to cope with current epidemics and future disasters (29). The evolution of health promotion services needs to be developed for the elderly in line with an aging society, and the potential for digitalization is obviously great, however, to achieve this, additional research and analysis that is suitable for the elderly and explores the age gap is needed.

Expanding the customized management service industry with big data as the focus

Big data on healthcare is directly related to the healthy life of humanity, so it is more important and more useful than any other data and has facilitated developments of innovative new drugs through data, as well as allowing an integrated and efficient medical system for disease management and health management. As a result, global private companies and tech companies are constantly attempting to establish a data platform for healthcare by collecting large-scale medical and genetic information (30).

At the national level, big data on healthcare is collected for public and medical purposes, and institutional aspects related to the use of data are being actively addressed. From research to understand the current status and structure of data we are continuously researching data linkage, utilization technology, data standardization, interoperability, data security technology, and data itself (31). The customized management service industry, which focuses on big data, will continue to be able to manage chronic disease patients and the elderly, manage patients' prognosis, analyze changes in health indicators, detect risks, provide advice for health promotion, and detect outbreaks at an early stage. It will perform various functions to quickly respond to emergencies through system linkage during emergency response, by providing hospital reservations and accumulated health information based on this to users and medical experts in the management system, it provides an opportunity to diagnose diseases and develop medical care through health analysis (32). Disease prevention and early detection will reduce national medical costs and medical resources, which will independently contribute to improving the national health level for patient treatment (33). Mobile healthcare services to increase health lifespan and prevent chronic diseases is expected to be of great help in developing various contents. Combining services that consider individual genetic differences, the development of information and communication technologies such as IoT, big data, and AI, and the use of IT technologies in the healthcare industry will not only increase accessibility but also improve sustainability and efficiency in terms of health care (34). Industries centered on AI, loT, mobile, and big data are diversified and subdivided, creating innovative products that no one thought of, influenced by changes in values, social habits, and trends reflecting this era (35). Personalized health care services and devices combined with science and technology and medical services are evolving at a rapid pace with the growth of the healthcare industry. As a representative example, Health Kit is an application that provides health healthcare using a device and implements various types of services such as blood sugar management, electrocardiogram, eating habits, and even checking exercise habits. This means that if the scope of the service expands, the personalized management service will grow into an industry in the future (36). The non-face-to-face service platform for home care considers essential factors such as physical care, psychological care, social function maintenance, mental stability, and home care, and monitoring functions enable systematic patient management in smartphone apps and provides guidance for specific patients. A web-based management platform accesses and manages information entered into an app by affiliated hospital medical staff, which can help identify health problems before your next outpatient visit by identifying data such as health journals, graphs, or photos. The advantages of mobile apps can benefit healthcare staff by collecting rich health data directly and evaluating health conditions more thoroughly (37). The Bio Heart Glove (BH Glove) is an open filtering glove synchronized with an app that allows monitoring of several physiological parameters including heart rate, oxygen level and blood pressure. The app, integrated with the glove, uses the data to track blood pressure and uses a unique tracker built into each finger to remind the patient when to take medication or when the patient needs to adjust. Blood pressure levels are differentiated by shapes and, depending on the variability of blood pressure, the patient receives a notification from the app to their phone. A sensor on the back of the hand can remind the patient to sleep, drink water, exercise, or take medication, intelligently track specific eating behaviors, and provide visual or audible indicators to remind the patient to stop. A chime sounds to remind the patient not to give in to cravings. Patients can get healthier recipes in the app and other alternatives in the web application. The app can use the glove's data and personal preferences to create meal plans, medication schedules, exercise routines, and more. In addition, the patient is reminded that eating certain foods can increase or decrease the pressure. Companion apps can track medications, recognize foods, search content, and discuss potential drug-food interactions (38). Social welfare budgets are increasing in Korea, and these resources were not enough to provide universally needed services, and there were additional barriers to face-to-face and home-visit service patients. To get the most out of what you have, you need to database and automatically connect community resources to meet eligibility criteria (39). The empirical analysis results of customized healthcare have a positive impact on providers and governments. First, healthcare providers, medical personnel, and clinicians should be added to provide more professional and personalized services. Second, we need to pay attention to users' feedback to increase satisfaction and motivate them to voluntarily promote health information. Third, it is necessary to improve users' E-health literacy by means such as online and offline service tutorials and consultations, to increase the continuity of app use. Since the advent of COVID-19, as many people consider mobile health services

very important as part of public services, governments and people should continue to introduce digital health policies and regulations to optimize the social digital atmosphere and improve subjective norms (40).

Discussion

SEMs on survey data collected from the elderly aged 60 to 75 years were conducted to confirm the acceptance prediction factors of personalized healthcare service apps. Expected performance (β=0.453; P=0.003) and social influence (β=0.693; P<0.001) were identified as a significant predictor. It also had an indirect effect on behavioral intentions. In addition, device reliability has been found to have a significant indirect effect on behavioral intentions in patients with chronic diseases. Improving performance expectations in the early stages of service adoption, especially for older adults with chronic conditions vulnerable to environmental risk factors, will help highlight the accuracy and reliability of wearable devices. A smart device utilization plan with a focus on big data is expected to have a significant impact on health management, but it is judged that optimized smart systems that are easy to access and highly usable for the elderly or the socially underprivileged, who may be socially and physically protected, but may be neglected, are needed. Since the elderly are more passive users of mobile devices and applications than younger people, the evolution of health promotion services will require additional research and analysis targeting the elderly in line with an aging society. As remote devices and applications evolve rapidly, health, well-being, and digital gaps between different populations can continue. To solve this problem, we will need to develop policies and programs that provide for all members of society, including both organizations and governments. Collaborative approaches among medical, technical, and research professionals are needed, and we will need to study ways to easily adapt individually (13). Users will need to conduct more research on ongoing investment and interest in the AI, IT, and IoT convergence industry. This will grow into an industry where individual, customized management services are expected in the future (17). Medical information corresponds to sensitive information among personal information. Since the patient's medical records are included, in principle, individual patient consent is required under the Personal Information Protection Act to collect or utilize medical information. Due to a lack of awareness of the protection of medical information and its management, the problem of infringement of medical information may arise for the purpose of indiscriminate collection and utilization of medical information. While the evaluation that the use of big data in the future has a future-oriented value is dominant, medical information and sensitive information from patient's medical records have a greater risk than other information (3). While the evaluation that the use of big data in the future has future-oriented value is dominant, the sensitive information of medical information and patients' medical records is more dangerous than other information (5). Along with a positive view of big data, negative views such as data infringement and personal information protection exist. Although research related to big data is actively conducted with this problem, research to analyze opinions on how people think about big data, information infringement on individuals, and individual participation rate is low, and additional data measures are needed for data quality (4). Applications use big data analysis and computation devices. This work identifies several key features and optimal management designs proposed in the area of medical big data analysis to achieve efficacy in disease diagnosis, suggesting that the results of this systematic work should adjust advanced hybrid machine learning-based models and cloud computing applications to improve treatment quality. Therefore, this study will help policymakers, researchers, and practitioners to encourage the development of advanced disease diagnosis models, as well as to present the quality of improved treatment mechanisms for patients (41). While the issue of property rights over the value of personal information is being discussed, the reality is that data cannot provide clear valuation criteria for intangible assets and legal grounds for them. Medical data should not only apply policy directions and proven ICT technologies in terms of the protection and utilization of the most sensitive personal information, but also provide an environment where individual health information can be provided and controlled on its own. Only when an environment is created for receiving reasonable compensation should there be a social security system that can improve medical services. For helping individuals choose their own health data sharing targets and scope and agreeing to and changing data movement to third parties, it is necessary to check whether the functions that can be easily processed in the Lee online environment are properly implemented. In addition, a review of the scope of excessive information disclosure and a personal information dispute mediation system can relieve damages from illegal transactions, etc. It is necessary

to establish the same institutional safeguards and simplify the procedures, and a process of actively promoting them so that consumers can recognize them as safe will also be needed (42). Big data is often unstructured, fragmented, disparate, and incompatible, making it difficult to aggregate and analyze. There are important issues related to data security, privacy, and confidentiality. There are problems with data standardization, language barriers, and a lack of terminology. There is a problem with the accuracy and correctness of the data. Data storage and transmission are associated with significant costs. There is an intensive and persistent underfunding problem. Healthcare professionals' awareness of big data analytics is rather limited. Due to the lack of researchers with big data skills and the constant development of science and technology, experts who collect, process, extract, or analyze data must receive regular and up-to-date training. Issues of data governance and ownership often arise. Healthcare organizations that implement big data analytics as part of their information systems must comply with regulations and laws for standards (43). Big data is one of the most essential and promising future technologies today. Thus, big data can improve patient outcomes, prevent health problems, and reduce hospital costs. Collecting health information, sharing data, and integrating health are essential to spreading healthcare. The medical community is highly impacted by big data. Effective healthcare analysis requires database aggregation and cleaning of data to reduce data heterogeneity, lack of structure, and other quality issues. Data can suffer from heterogeneity, noise, and a lack of structure and pre-set models. Beyond understanding psychological disorders, social media analytics suffers from data quality challenges compared to other fields as it cannot standardize posts, reviews, comments, etc. Since several linguistic issues hinder analysis, it is recommended to use hashtags to increase the efficiency of analysis. Furthermore, understanding medical social media requires computer, media, and medical knowledge. The literature suggests that several quality parameters can be used to improve and evaluate important data qualities such as accuracy, completeness, consistency, timeliness, objectivity, interpretability, and accessibility. Besides, you need to confirm that privacy and security have been presented in the big data analysis phase, along with the deficiencies and benefits of these techniques in big healthcare data. In order to bridge the gap between structured and unstructured data in big data, a transition to an integrated data environment is required (9).

Conclusions

mHealth app modifies personal health and lifestyle based on new information and communication technology and the IoT, enables user behavior change and disease management through data collection and analysis, and improves patient health, and reviews the acceptability of customized healthcare. As remote devices and applications evolve rapidly digital and health disparities can persist between populations. To solve these problems, it will be necessary to develop policies and programs that benefit all members of society, including organizations and governments. It is expected to be used as important data for new changes in the healthcare market. Thus, numerous programs for self-health management and personalized management will be implemented through the use of smart devices centered on big data. Additional studies are required to enhance the personal information protection and linkage systems of big data. The use of big data has future-oriented values and will become an increasingly important aspect of society and the economy.

Acknowledgments

Funding: None.

Footnote

Reporting Checklist: The authors have completed the PRISMA reporting checklist. Available at https://mhealth.amegroups.com/article/view/10.21037/mhealth-23-24/rc

Peer Review File: Available at https://mhealth.amegroups.com/article/view/10.21037/mhealth-23-24/prf

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at https://mhealth.amegroups.com/article/view/10.21037/mhealth-23-24/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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doi: 10.21037/mhealth-23-24
Cite this article as: Son YS, Kwon KH. Utilization of smart devices and the evolution of customized healthcare services focusing on big data: a systematic review. mHealth 2024;10:7.