Comparison of the middle-aged and older users' adoption of mobile health services in China

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A R T I C L E   I N F O

A B S T R A C T

Objective: Given the increasing number of older people, China has become an aging society. A mobile health service is a type of health informatics that provides personalized healthcare advice to those who require it, especially the older people and the middle-aged. However, few studies consider the adoption of mobile health services with regard to older and middle-aged users. This paper explored a research model based on the value attitude behavior model, theory of planned behavior, and four aging characteristic constructs to investigate how older and middle-aged citizens adopted mobile health services.
Method: The hypothesized model was empirically tested using data collected from a survey of 424 residents older than 40 years in China. Structural equation modeling was used to estimate the significance of the path coefficients.
Results: The findings revealed that (1) perceived value, attitude, perceived behavior control, and resistance to change can be used to predict intention to use mobile health services for the middle-aged group; (2) perceived value, attitude, perceived behavior control, technology anxiety, and self-actualization need positively affected the behavior intention of older users; and (3) subjective norm and perceived physical condition showed no significant effects on the behavior intention to use mobile health services for the two groups. The theoretical and practical implications and contributions of this study are then discussed.

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1.   Introduction

With the rapid development of mobile communications and wireless technologies, the penetration of both mobile phones and various emerging mobile applications is very high [1]. Applications used in computers are now also designed for mobile phones. Mobile health services are a typical example of such applications, which aim to provide medical and healthcare service to both professionals, so that their work may be better supported, and for consumers, so that they may obtain useful information and guidance to manage their health better [2]. Compared to health services in the Internet delivered

from desktops and laptops, mobile health services have the capacity to interact with the individual with much greater frequency and flexibility without being limited by time and place [3,4]. In addition, the initial Internet digital divide has limited the reach of computerized health services for lower socioeconomic groups; thus, obtaining healthcare service via mobile phone appears more significant for populations most in need of healthcare, especially elderly people [5,6].

China, which has the largest population of older citizens in the world, has become an aging society. Statistics from the China National Committee on Aging (CNCA) show that the proportion of people older than 60 years has reached 14.8% [7]. An earlier report by CNCA [8] predicted that the

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proportion of elderly people in China would increase to 30% from 2025 to 2050. Older people have noticeably limited regenerative abilities and are more prone to chronic disease [9]. A study on healthcare for elderly Chinese shows that roughly 79.5% of people over 60 years old have at least one chronic disease, almost 50% have at least two, and more than 25% have three or more [10]. As the cost of medical care dramatically increases, the issue of increased medical expenses for an aging population is a difficult problem awaiting a solution [11]. Hence, finding an effective solution to relieve the heavy burden of providing healthcare for the elderly people is an urgent concern.

The number of mobile phone users is also rapidly increasing. According to the statistics issued by the Ministry of Industry and Information Technology of the People's Republic of China (MIIT), the number of Chinese mobile phone users has reached 1.15 billion, and mobile Internet users have accounted for 96.4% of all mobile phone users [12]. Mobile phones have become the most convenient and ubiquitous technological device due to the advancements in their capabilities and functionalities; moreover, they have proved to be an indispensable part of the daily lives of elderly people because mobile phones can help them communicate with their children and relatives [13]. Studies indicate that older people adopt mobile phones at a much higher rate than the Internet [14]. Given that elderly people rely heavily on mobile phones and the high penetration rate among them, a golden opportunity to develop mobile health services for the elderly has presented itself so that they could better manage their health. For example, through mobile health services, elderly people can seek medical advice, register for or check appointments, access medical test results, and seek post-diagnostic treatment for active prevention at their convenience.

Despite the potential benefits of mobile healthcare services, they have inevitably encountered numerous difficulties and challenges as a newly emerging phenomenon, especially with regard to elderly people who typically lag behind in technology-based innovation [15]. In China, this service is still in the infancy stage and requires a user adoption process, especially considering older users who have unique physical and psychophysical characteristics. Therefore, factors that influence the adoption of mobile health services by elderly people must be investigated.

Previous studies have focused mainly on the professionals' or organizations' view of mobile or electronic health [16–21]. Several studies have focused on the older people's or women's adoption of mobile health [22–24]. However, little attention has been paid to the view of middle-aged users. A gradually increasing number of middle-aged people are acquiring chronic diseases due to intensive social pressure and exacerbating environment pollution. In addition, middle age is the closest pre-age group to elderly people. Specifically, the middle-aged will soon experience health problems encountered by the elderly. Thus, investigating middle-aged acceptance is of importance. Therefore, focusing on middle-aged acceptance is necessary as well. However, previous studies on the behaviors of elderly people have generally examined only one specific population, that is, the elderly. We argue that developing a model to compare the adoption behavior of the elderly and middle-aged people is necessary, as well discussing their different influential factors.

The value attitude behavior model (VAB) is a useful framework for examining the behavior of users [25,26]. According to the VAB, the perceived values of individuals influence their attitude, and their attitude, in turn, influences their behavior. We assume that the value perceived by middle-aged and older users in adopting a mobile health service will predict their adoption behavior. The theory of planned behavior (TPB) and its extensions are widely used in adoption research [20,27,28]. TPB is mainly used for predicting technology adoption by considering the individual role (attitude, behavior control) and environmental role (subjective norm) of the user. We hypothesize that TPB can also predict the adoption of mobile health services by middle-aged and elderly Chinese users. Moreover, given that aging is an obvious characteristic of middle-aged and older users, the adoption behavior of aging people may differ from that of younger users. Research models that consider aging-specific constructs proved to be more powerful in explaining the adoption behavior of older users [29]. Therefore, to better understand the factors that influence the adoption behavior of middle-aged and elderly persons toward mobile health services, our paper developed an integrative model that applies VAB, TPB, and aging characteristic constructs.

2. Literature review and hypotheses development

In this research, we conduct empirical studies on the factors that affect the adoption of mobile health services by middle-aged and older users. Mobile health services are relatively new and are still tentative in most parts of China; hence, we use behavioral intention instead of actual usage as the dependent variable in this study.

2.1. Mobile health service

Mobile health is an important subset of e-health applications for a growing number of e-health functionalities have been made available on mobile platforms [30]. Mobile health is an umbrella term that covers areas of networking, mobile computing, medical sensors, and other communication technologies within healthcare. According to Istepanian and Pattichis [31], m-health refers to the health care-based mobile computing, medical sensors, and communications technologies. The three key components in mobile health are mobile devices, software platform (providing basic services such as networking and database), and m-health applications [32]. In this study, we define mobile health service as the services or applications regarding the provision of health care, prevention, diagnosis, treatment, and monitoring services via mobile devices. Mobile devices typically include personal digital assistants (PDAs), smart mobile phones, and tablet computers such as the iPad. Mobile phones are the prototype device within this space. Most healthcare services use mobile phone platforms. Additionally, standalone PDAs have become obsolete because of the incorporation of PDA features into smart phones [33]. Thus, we will discuss mobile health services that are mainly based on mobile phones.