

Observational Study

Correlation between psychological traits and the use of smart medical services in young and middle-aged adults: An observational study

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Abstract

BACKGROUND

Psychological problems affect economic development. However, there is a huge gap between mental health service resources and mental health service needs. Existing mental health service technology and platforms cannot meet all the diverse mental health needs of people. Smart medicine is a new medical system based online that can effectively improve the quality and efficiency of medical services and make mental health services accessible.

AIM

To explore the level of intelligent medical use among young and middle-aged people and its correlation with psychological factors.

METHODS

Convenience sampling was used to select 200 young and middle-aged patients with medical experience at the Third People's Hospital of Chengdu between January 2022 and January 2023 as the research subjects. The general condition Questionnaire, Eysenck Personality Questionnaire, Symptom Checklist-90, General Health Questionnaire, and Smart Medical Service Use Intention Questionnaire were used to collect data. Pearson's correlation was used to analyze the correlation between the participants' willingness to use smart medical services and their personality characteristics, psychological symptoms, and mental health.

RESULTS

The results revealed that the mental health of young and middle-aged people was poor, and some had psychological problems such as anxiety, depression, and physical discomfort. Familiarity, acceptance, and usage of smart healthcare in this population are at a medium level, and these levels correlate with psychological characteristics. Acceptance was positively correlated with E, and negatively correlated with P, anxiety, fear, anxiety/insomnia, and social dysfunction. The degree of use was negatively correlated with P, obsessive-compulsive symptoms, depression, anxiety, hostility, paranoia, and somatic symptoms.

CONCLUSION

The familiarity, acceptance, and usage of smart medical services among the middle-aged and young groups are related to various psychological characteristics.

Key Words: Young and middle-aged people; Smart healthcare; Willingness to serve; Psychological characteristics; Questionnaire survey; Relevance

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Core Tip: Smart healthcare refers to making full use of limited medical manpower and equipment resources based on advanced Internet + and Internet of Things technologies and giving full play to the medical technology advantages of large hospitals to create a regional medical information platform for health records and realize the interaction between patients and medical personnel, medical institutions, and medical equipment. A new medical system that provides information and mobile and remote medical services for disease diagnosis, monitoring, and treatment.

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INTRODUCTION

The development of "Internet +" promotes the integration of cloud computing and other network technologies with the medical industry, and the term "smart medical" frequently appears in people's vision[1]. Smart healthcare is a medical service model centered on patient data that advocates patient-centered care and provides convenient and quick communication channels for medical staff and patients. Through intelligent medical treatment, medical staff can obtain patient case reports and medical records at any time to quickly diagnose diseases and make treatment plans; at the same time, patients can know their own health status any time[2]. Related studies show that smart healthcare can optimize the medical environment and provide convenient medical services for the older adult population[3]. However, studies also indicate that the current awareness and usage rate of smart healthcare is relatively low, and therefore, targeted measures are needed to increase the usage rate of smart healthcare[4]. Therefore, targeted measures should be taken to improve the utilization rate of smart medical care[4]. In addition, smart medical care focuses not only on patient treatment but also on patient mental health. Relevant studies have indicated that smart medical products can provide special services according to the physiological characteristics and psychological needs of patients with chronic diseases, reduce their psychological pressure, and enhance their confidence in life[5]. However, research on smart healthcare has mainly focused on the utilization rate and psychological needs of vulnerable groups; there has been no exploration of the utilization and mental health status of young and middle-aged groups[6,7]. As the backbone of society, young and middle-aged people are under pressure from work, family, society and other aspects, and are more prone to negative emotions, which should be paid more attention to. Research has found that middle-aged and young adults have a higher incidence of depression, anxiety, and acute or transient mental disorders[8]. Based on this knowledge, this study considers young and middle-aged groups as research objects to explore the status quo of their willingness to use smart medical services and their correlation with psychological characteristics, aiming at improving the popularity and utilization rate of smart medical services.

MATERIALS AND METHODS

General information

Convenience sampling was used to select 200 young and middle-aged patients with medical experience at the Third People's Hospital of Chengdu between January 2022 and January 2023 as the research subjects.

Inclusion criteria: No major physiological diseases; The clinical data were complete.

Exclusion criteria: Dropouts.

Specific methods

General condition questionnaire: The self-designed questionnaire included questions on sex, age, marital status, education level, monthly family income per capita, household registration type, and medical insurance type.

Eysenck Personality Questionnaire for adults: The scale is an effective personality measurement tool compiled by the British psychologist Eysenck[9]. It involves the affirmation and negation of social life, self-consciousness, and emotion and is commonly used to analyze the traits or structure of personality. The scale includes four subscales: extroversion (E), psychoticism (P), neuroticism (N), and lying (L), with 21, 23, 24, and 20 items in each subscale, respectively, for a total of 88 items. The scale uses "yes" or "no" to evaluate the relevant questions, with one point for correct answers and no points for incorrect answers. The reliability and validity of the scale ranged from 0.74 to 0.78[10].

Symptom Checklist-90: This scale was adapted from the Hopkins symptoms checklist compiled by Derogatis[11]. The psychological symptoms and their severity were evaluated from the perspectives of feeling, emotion, thinking, consciousness, behavior, living habits, interpersonal relationships, diet, and sleep. The scale has nine factors and a total of 90 items. The scale uses a 5-point scoring method, ranging from "none" to "severe." The factor score is the total score of each item in a factor/number of items in a factor. The scores range from 1 to 5, with higher scores indicating more severe symptoms. The scale's reliability and validity were 0.871[12].

General Health Questionnaire: The scale was developed by Goldberg[13], including 28 items and four factors including somatic symptoms, anxiety/insomnia, social dysfunction, and severe depression. A four-stage scale is used, ranging from 0 for "never" to 3 for "often," with 7 questions for each scale. The score range for each scale was 0-21, and the total score range was 0-84. A high score indicates a lower level of mental health, and a total score of more than 21 indicates poor mental health. Scale for the reliability and validity of 0.872[14].

Smart medical services use intention questionnaire: A questionnaire on the willingness to use smart medical services was created with reference to relevant questions in the literature on the status quo of smart medical service use[15] to understand the willingness of middle-aged and young people to use smart medical services. It mainly includes the three dimensions of smart healthcare awareness, acceptance, and usage, with a total of 12 items. A 5-point scale was used, with a score of 5 for strongly agreeing and 1 for strongly disagreeing, with higher scores indicating a stronger intention to use.

Quality control: After the questionnaire was designed, a two-dimensional code was generated and posted on the platform, and the research subjects completed the questionnaire in an anonymous form. Two staff members were responsible for the release of the questionnaires and statistics of the results.

Statistical analysis

Statistical software (SPSS 27.0) was used to process the data from 200 young and middle-aged people. The measurement data were expressed as mean \pm SD, and the count data were expressed as rate (%). Pearson's correlation was used to analyze the correlation between young and middle-aged people's willingness to use smart medical services and their personality characteristics, psychological symptoms, and mental health status. $P < 0.05$ was considered statistically significant.

RESULTS

Basic information of the 200 young and middle-aged subjects

There were 123 males (61.50%) and 77 females (38.50%) with an average age of (34.35 ± 2.42) years (range, 30-39 years). There were 165 married cases (82.50%) and 35 unmarried cases (17.50%) patients. 69 cases (34.50%) had a junior high school education or below, and 131 patients (65.50%) had a junior high school education or above. Of these, 57 cases (28.50%) had a per capita monthly household income of < 3000 yuan, 143 cases (71.50%) had a per capita monthly household income of ≥ 3000 yuan. There were 97 cases (48.50%) with agricultural household registration and 103 cases (51.50%) without agricultural household registration. There were 21 cases (10.50%) without medical insurance, 131 cases (65.50%) with new rural cooperative medical insurance/medical insurance for urban and rural residents, 43 cases (21.50%) with urban medical insurance, and 5 cases (2.50%) with free medical insurance and commercial medical insurance.

Eysenck Personality Questionnaire scores of young and middle-aged groups

The scores of Eysenck Personality Questionnaire (EPQ) scale were: 6.15 ± 2.21 , 12.64 ± 3.77 , 7.57 ± 2.85 and 8.84 ± 2.31 , respectively (Figure 1).

Scores of Symptom Checklist-90 Symptom self-rating scale in young and middle-aged groups

The score of somatization dimension was 1.64 ± 0.50 , obsessive-compulsive symptom dimension was 1.74 ± 0.55 ,

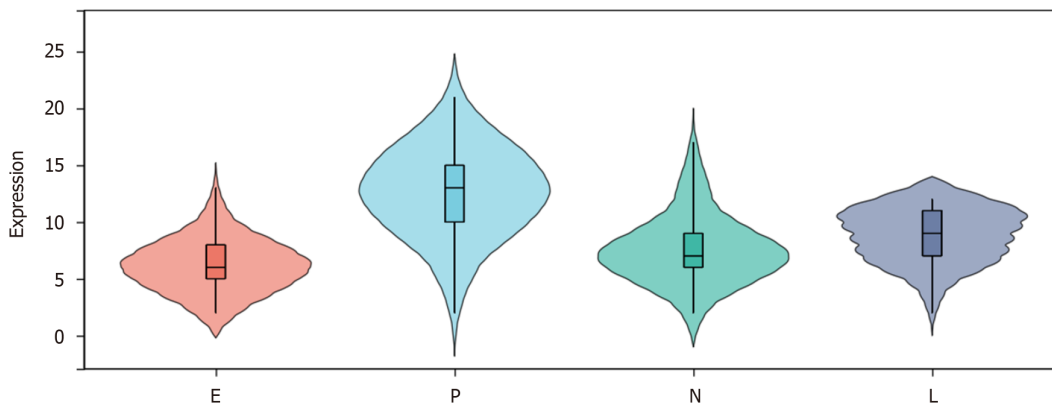


Figure 1 Scores of Eysenck Personality Questionnaire dimensions of young and middle-aged groups. E: Extroversion; P: Psychoticism; N: Neuroticism; L: Lying.

interpersonal relationship dimension was: 1.53 ± 0.53 , depression dimension was 1.90 ± 0.65 , anxiety dimension was 1.59 ± 0.59 . The scores of hostility, fear, paranoia, and psychosis were: 1.08 ± 0.27 , 1.07 ± 0.31 , 1.08 ± 0.31 and 1.57 ± 0.59 , respectively. Except for the hostile dimension, which was scored from 1 to 2, the scores of the other dimensions ranged from 1 to 3; the specific distribution is shown in [Figure 2](#).

General Health Questionnaire scores of young and middle-aged groups

The somatic symptom scores ranged from 1 to 13, with an average of 6.72 ± 2.30 . Anxiety/insomnia scores ranged from 1 to 16, with an average of 7.53 ± 3.18 . The social dysfunction scores ranged from 2 to 10, with an average of 5.85 ± 1.31 . The scores for major depression ranged from 2 to 8, with an average score of 5.08 ± 1.14 .

Willingness of young and middle-aged people to use smart medical services

The average scores of cognition, acceptance, and usage were: 13.70 ± 3.54 , 13.64 ± 3.42 and 13.16 ± 3.59 respectively. To fully understand the willingness of young and middle-aged people to use smart healthcare, the scores for each dimension were divided into P_{50} and P_{75} . In the cognitive dimension, scores of < 14 points indicated low familiarity, 14-17 points indicated medium familiarity and > 17 points indicated medium and high familiarity. Acceptance dimension: < 14 points indicated a low level of acceptance, 14-16 points indicated a medium level of acceptance, and > 16 points indicated a high level of acceptance. Dimensions of use: < 13 indicates a low level of use, 13-16 indicates a medium level of use, and > 16 indicates a high level of use. See [Figure 3](#) for the specific distribution of familiarity, acceptance and usage among 200 young and middle-aged people.

Correlation between the willingness to use smart medical services and psychological characteristics

Awareness of intelligent medical services among young and middle-aged people was positively correlated with E ($P < 0.05$), and negatively correlated with somatization, obsessive-compulsive symptoms, interpersonal relationships, depression, fear, paranoia, psychotic dimensions, somatic symptoms, anxiety/insomnia, and severe depression ($P < 0.05$). Acceptance was positively correlated with E ($P < 0.05$), and negatively correlated with P, anxiety, fear, anxiety/insomnia, and social dysfunction ($P < 0.05$). The degree of use was negatively correlated with P, obsessive-compulsive symptoms, depression, anxiety, hostility, paranoid dimensions, and somatic symptoms ($P < 0.05$) ([Figure 4](#), [Tables 1](#) and [2](#)).

DISCUSSION

Willingness level of young and middle-aged groups to use smart medical services

Smart healthcare is a medical service model centered on patient data and has a wide range of application scenarios, including telemedicine applications such as remote consultation, remote surgery, and emergency rescue, as well as smart guidance, mobile medical care, smart campus management, and AI-assisted diagnosis and treatment. It has important research significance and development potential in many fields[16,17]. However, smart healthcare started late in China, and owing to an imbalance in regional development, the smart healthcare system has not been fully popularized in some regions and groups.

Intelligent medical treatment has been developed based on modern scientific and technological means, and its audience consists mostly of young and middle-aged groups. This study shows that familiarity, acceptance, and use of smart medical care among young and middle-aged people are at a medium level, and only 20% of the participants have high cognition, high acceptance, and high willingness to use it. The reasons are as follows. First, young and middle-aged people generally have high technological literacy and Internet use experience, and their acceptance of new technologies and services is high. Intelligent medical services provide a more convenient, efficient, and personalized medical service experience through digital, automated, and intelligent technical means, which is in line with the pursuit of a high-quality

Table 1 Correlation between smart healthcare and Symptom Checklist-90 symptom checklist dimensions

	Degree of awareness	Degree of acceptance	Degree of use
Somatization	-0.367 ^b	-0.038	-0.056
Obsessive-compulsive symptoms	-0.266 ^b	-0.032	-0.161 ^a
Interpersonal relation	-0.222 ^b	-0.126	-0.080
Depression	-0.208 ^b	-0.062	-0.153 ^a
Anxiety	-0.138	-0.154 ^a	-0.141 ^a
Hostility	-0.137	-0.105	-0.162 ^a
Fear	-0.174 ^a	-0.200 ^b	-0.016
Paranoia	-0.206 ^b	-0.042	-0.161 ^a
Psychosis	-0.202 ^b	0.064	-0.054

^a*P* < 0.05.
^b*P* < 0.01.

Table 2 Correlation of smart medicine and General Health Questionnaire dimensions

	Somatization	Anxiety insomnia	Social dysfunction	Major depression
Degree of awareness	-0.244 ^b	-0.191 ^b	-0.097	-0.149 ^a
Degree of acceptance	-0.123	-0.232 ^b	-0.150 ^a	-0.051
Degree of use	-0.140 ^a	-0.054	-0.118	0.047

^a*P* < 0.05.
^b*P* < 0.01.

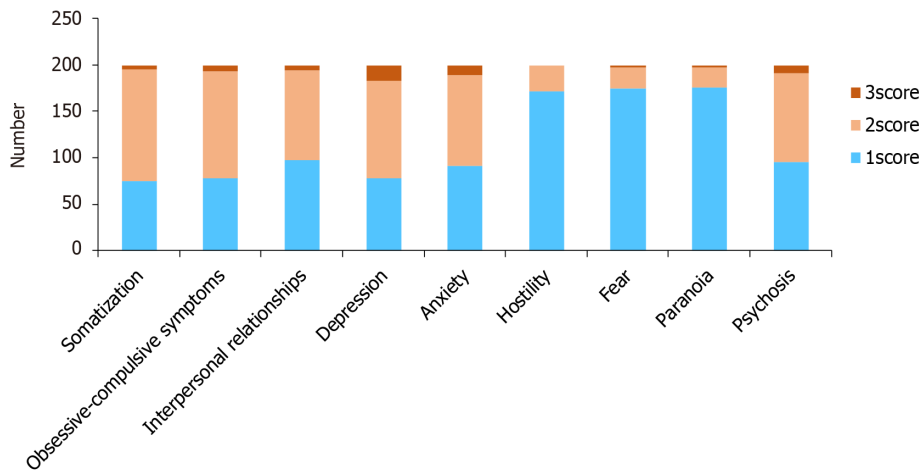


Figure 2 Score of the Symptom Checklist-90 symptom self-rating scale in the young and middle-aged group.

and efficient life for middle-aged and young people[18]. Second, young and middle-aged people face greater work and life pressures and pay more attention to health management and disease prevention.

Smart medical services can provide comprehensive health monitoring, disease prevention, remote diagnosis and treatment, and other functions to help patients manage their health status better and relieve the strain and inconvenience of medical resources[19]. However, the willingness of young and middle-aged people to use smart medical services is also affected by certain factors. On one hand, they are concerned about privacy leakage and data insecurity. However, the poor service quality of some smart medical systems may reduce their willingness to use the same[20,21]. Therefore, to promote continuous development, it is necessary to strengthen information protection and improve the service quality of smart healthcare.

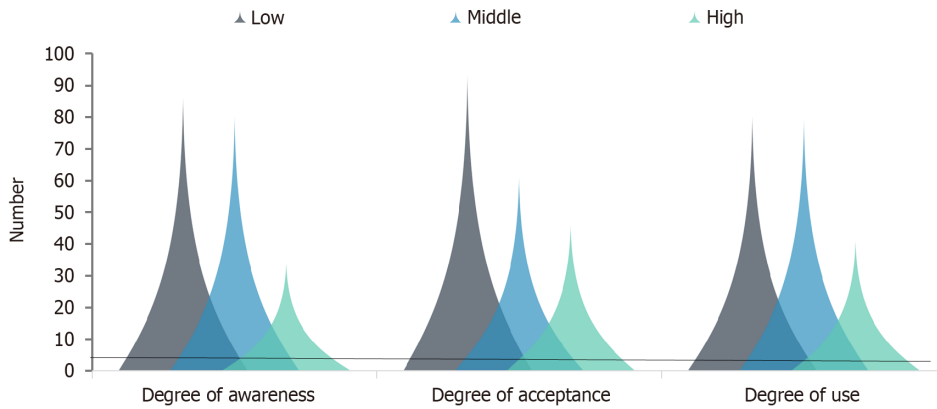


Figure 3 Willingness to use smart medical services among young and middle-aged people.

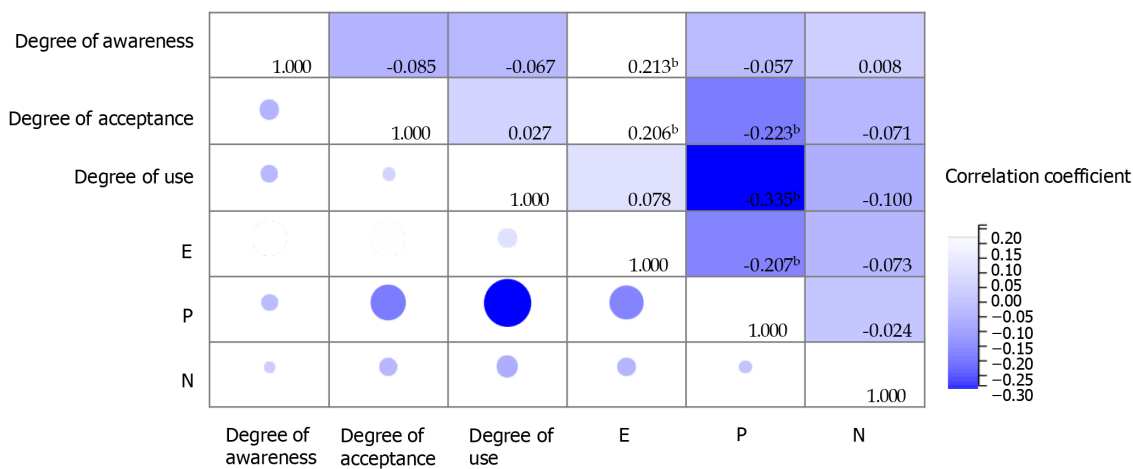


Figure 4 Correlation between all dimensions of smart medicine and Eysenck Personality Questionnaire. ^b*P* < 0.01. E: Extroversion; P: Psychoticism; N: Neuroticism.

Psychological characteristics of young and middle-aged people

The mental health status of young and middle-aged people is a complex and multi-dimensional issue of widespread concern around the world. Lanz *et al*[22] found that middle-aged and young people have the highest levels of stress and future anxiety and the poorest mental health status. This current study explores the psychological characteristics of 200 middle-aged and young people using EPQ, Symptom Checklist-90 (SCL-90), and General Health Questionnaire (GHQ-28). The results indicate that the mental health status of the participants was poor, specifically manifested as high scores on the EPQ dimensions of psychoticism and neuroticism, high scores on the SCL-90 dimensions of somatization, obsessive-compulsive symptoms, and depression, and high scores on the GHQ-28 dimensions of anxiety/insomnia and somatic symptoms. The results suggested that the participants were under a lot of pressure and were prone to anxiety, emotional instability, and physical discomfort, which is consistent with the above research results. This could be attributed to a number of reasons: first, middle-aged and young people are usually at a critical stage of career development and face considerable work pressures. Long working hours, high work pressure, and uncertainty about career development may all lead to anxiety and depression. Massamba *et al*[23] explored the work and psychosocial factors of 1736 white-collar workers and found that nearly 40% of them faced high levels of work pressure, and high levels of effort were accompanied by low returns, resulting in an imbalanced state and the potential for health problems. Second, this group also has to shoulder the responsibility of taking care of the family, raising children, and supporting older adults, which may bring economic and psychological pressure to bear and lead to psychological problems. Kim *et al* [24] pointed out in their study that during the epidemic period, schools were closed and parents had to devote themselves to taking care of their children and the elderly at home, which intensified parents' psychological pressure and affected their mental health. Furthermore, middle-aged and young people may face interpersonal tensions in relationship and social anxiety problems. They may feel they need to constantly adapt to different social environments and establish and maintain relationships with different groups of people, and this pressure may lead to the occurrence of psychological problems. Mistretta *et al*[25] pointed out that depressive symptoms in the middle-aged group are related to social processes and interpersonal tension. Additionally, due to long-term fatigue and irregular sleep patterns, some middle-aged people have physical diseases or health problems, which may also have a negative impact on their mental health [26]. Therefore, it is necessary to understand the mental health status of the middle-aged and young group and take

measures to reduce their stress.

Correlation between the willingness to use smart medical services and psychological characteristics among young and middle-aged people

This study indicates that the willingness to use smart medical services in young and middle-aged populations is correlated with psychological characteristics. Specifically, the degree of awareness was positively correlated with extraversion and negatively correlated with somatization, obsessive-compulsive symptoms, interpersonal relationships, depression, fear, paranoia, psychotic dimensions, somatic symptoms, anxiety/insomnia, and severe depression. Acceptance was positively correlated with extraversion and negatively correlated with psychoticism, anxiety, fear, anxiety/insomnia, and social dysfunction. The degree of use was negatively correlated with psychoticism, obsessive-compulsive symptoms, depression, anxiety, hostility, paranoia, and somatic symptoms.

First, some psychological characteristics, such as openness, curiosity, and innovation ability, may encourage people's acceptance and use of smart medical services. These psychological characteristics make people more willing to try new technologies, thereby increasing their likelihood of using smart medical services[27]. Second, when people experience negative emotions such as anxiety, depression, and psychoticism, their thinking mode may become narrow, and it is difficult to comprehensively and objectively evaluate new products or services, which leads to their biased cognition of smart medical services and a reduced utilization rate[28]. In addition, individuals with sensitive interpersonal relationships may feel an inferiority complex and uneasiness in communication, constantly indulging in ineffective self-suggestions, and accepting negative external factors. Therefore, they may feel that intelligent medical treatment is unreliable or unsafe and may be unwilling to use it or reduce their utilization rate[29].

In addition, somatization, obsessive-compulsive disorder, and paranoia all reflect an individual's mental state, which will also impact the acceptance of things in young and middle-aged groups[30]. However, smart healthcare can promote mental health among young and middle-aged people by providing convenient mental health services, personalized mental health management, integrating mental health and physical health services, and promoting social interaction and emotional support.

This study has some limitations: First, the sample size is relatively small, and the results may be biased; second, the survey scales used in this study are dependent on the respondents' self-report and assessment. This means the results could be affected by individual subjective perceptions, ability to understand the questions, and ability to express themselves clearly, which could impact the objectivity and accuracy of the data. Therefore, future studies can increase the sample size and consider the limitations of the scales in the survey, and combine other research methods for comprehensive analysis to improve the reliability of the data.

CONCLUSION

This study explored young and middle-aged people's willingness to use smart medical services and its correlation with psychological characteristics. The results revealed that the mental health of young and middle-aged people was poor, and some had psychological problems such as anxiety, depression, and physical discomfort. Familiarity, acceptance, and usage of smart healthcare in this population are at a medium level, and these levels correlate with psychological characteristics. Therefore, we should pay more attention to the mental health of young and middle-aged groups and improve mental health services through intelligent medical service systems to reduce their psychological stress and promote the development of intelligent medical services.

FOOTNOTES

Author contributions: Zhang H designed the study and wrote the manuscript; Liu Y collected and analyzed the data; and Gu R supervised the study.

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