A Study on Healthcare Workers' Intention to Use Digital Technology in Township Health Centers in Shandong Province: Based on the Technology Acceptance Model

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Abstract

Background Digital technologies are increasingly widely applied in the field of health care and have become an important means of promoting the modernization of primary health care services. As the main providers of primary health care services, medical staff in township health centers influence the effectiveness of digital tools in primary care through their willingness to use digital technologies. However, research on the willingness of this group to use digital technologies remains relatively limited. Objective To investigate the current status of willingness to use digital technologies among medical staff in township health centers and explore its influencing factors. Methods From July to December 2025, a questionnaire survey was conducted among 1 348 medical staff in township health centers in Shandong Province using multistage stratified random sampling. A self-designed questionnaire based on the Technology Acceptance Model was used, comprising 4 dimensions—perceived usefulness, perceived ease of use, willingness to use, and external support and policy environment—with a total of 17 items; its reliability and validity were confirmed to be good. Statistical description, reliability and validity testing, and structural equation model fitting were performed on the survey data to analyze the current status of willingness to use and its influencing factors. Results The median score for willingness to use digital technologies was 4.00 (4.00, 4.67). Differences in willingness to use were statistically significant among medical staff with different occupations (U=197 360.5, P<0.001), years of work experience (H=8.430, P=0.038), and frequency of digital technology use (H=49.708, P<0.001). Perceived ease of use (β=0.584, P<0.001), perceived usefulness (β=0.226, P<0.001), and external support and policy environment (β=0.136, P<0.001) all had significant positive effects on willingness to use. Perceived ease of use had the largest total effect on willingness to use (0.743), with an indirect effect of 0.159. The total effect of external support and policy environment on willingness to use was 0.679, with an indirect effect of 0.543; it indirectly affected willingness to use by influencing perceived ease of use (β=0.707, P<0.001) and perceived usefulness (β=0.077, P=0.040). Perceived ease of use had a significant positive effect on perceived usefulness (β=0.701, P<0.001). Conclusion Medical staff in township health centers have a relatively strong willingness to use digital technologies. Perceived ease of use is the main factor influencing willingness to use, exerting both a direct positive effect and an indirect effect through perceived usefulness. Perceived usefulness has a direct positive effect on willingness to use, while external support and policy environment mainly influence willingness to use indirectly through perceived ease of use and perceived usefulness.

Full Text

A Study on Healthcare Workers' Intention to Use Digital Technology in Township Health Centers in Shandong Province: Based on the Technology Acceptance Model

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【Abstract】**Background** Digital technology is increasingly widely applied in the field of healthcare and has become an important means of promoting the modernization of primary healthcare services. As the main providers of primary healthcare services, healthcare workers in township health centers influence the effectiveness of digital tools at the primary level through their willingness to use digital technology. However, research on intention to use digital technology in this population is relatively scarce. **Objective** To understand the current status of township health center healthcare workers' intention to use digital technology and to explore its influencing factors. **Methods** From July to December 2025, a multistage stratified random sampling method was used to conduct a questionnaire survey among 1 348 healthcare workers in township health centers in Shandong Province. A questionnaire was designed based on the Technology Acceptance Model, including 4 dimensions—perceived usefulness, perceived ease of use, intention to use, and external support and policy environment—with a total of 17 items. Reliability and validity were verified to be good. Statistical description, reliability and validity testing, and structural equation model fitting were performed on the survey data to analyze the current status and influencing factors of intention to use. **Results** The median score for respondents' intention to use digital technology was 4.00 (4.00, 4.67) points. There were statistically significant differences in intention to use among healthcare workers with different occupations (U=197 360.5, P<0.001) , years of service (H=8.430, P=0.038) , and frequency of digital technology use (H=49.708, P<0.001) . Perceived ease of use (β=0.584, P<0.001) , perceived usefulness (β=0.226, P<0.001) , and external support and policy environment (β=0.136, P<0.001) all had significant positive effects on intention to use. Perceived ease of use had the largest total effect on intention to use (0.743) , with an indirect effect of 0.159. The total

effect of external support and policy environment on intention to use was 0.679, with an indirect effect of 0.543; it indirectly influenced intention to use through perceived ease of use (β=0.707, P<0.001) and perceived usefulness (β=0.077, P=0.040) . Perceived ease of use had a significant positive effect on perceived usefulness (β=0.701, P<0.001) . **Conclusion** Healthcare workers in township health centers have a relatively strong intention to use digital technology. Perceived ease of use is the main factor influencing intention to use, exerting both a direct positive effect and an indirect effect through perceived usefulness. Perceived usefulness has a direct positive effect on intention to use, while external support and policy environment mainly influence intention to use indirectly through perceived ease of use and perceived usefulness.

【Keywords】healthcare workers; primary healthcare; digital technology; intention to use; Technology Acceptance Model; Shandong Province

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Healthcare Workers' Intention to Use Digital Technology in Township Health Centers in Shandong Province: Based on the Technology Acceptance Model

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【Abstract】**Background** Given the increasing prevalence of digital technology in healthcare and its potential to drive primary care modernization, understanding medical staff' s acceptance of these tools is of practical importance. As the main primary care providers, township hospital medical staff critically influence the success of digital technology implementation through their intention to use. However, research specifically addressing intention to use regarding digital technology in this

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population remains limited. **Objective** This study aimed to investigate the current status of intention to use digital technology among township hospital medical staff and to explore its influencing factors. **Methods** From July to December 2025, a multi-stage stratified random sampling method was used to survey 1 348 medical staff in township hospitals across Shandong Province. A self-designed questionnaire based on the Technology Acceptance Model (TAM) was developed, comprising four dimensions (perceived usefulness, perceived ease of use, intention to use, and external support and policy environment) with 17 items in total. The questionnaire demonstrated satisfactory reliability and validity. Descriptive statistical analysis, reliability and validity testing, and structural equation modeling were performed to analyze the current status and influencing factors of intention to use. **Results** The median intention-to-use score was 4.00 (4.00, 4.67). Statistically significant differences in intention to use were observed across occupations ($U = 197\,360.5$, $P < 0.001$), years of work ($H = 8.430$, $P = 0.038$), and frequency of digital technology use ($H = 49.708$, $P < 0.001$). Perceived ease of use ($\beta = 0.584$, $P < 0.001$), perceived usefulness ($\beta = 0.226$, $P < 0.001$), and external support and policy environment ($\beta = 0.136$, $P < 0.001$) all had significant positive effects on intention to use. Perceived ease of use had the largest total effect on intention to use (0.743), with an indirect effect of 0.159. The total effect of external support and policy environment on intention to use was 0.679, with an indirect effect of 0.543, and it indirectly influenced intention to use through perceived ease of use ($\beta = 0.707$, $P < 0.001$) and perceived usefulness ($\beta = 0.077$, $P = 0.040$). Perceived ease of use had a significant positive effect on perceived usefulness ($\beta = 0.701$, $P < 0.001$). **Conclusion** Medical staff in township hospitals demonstrate a relatively strong intention to use digital technology. Perceived ease of use is the primary influencing factor, exerting both direct positive effects and indirect effects through perceived usefulness. Perceived usefulness has a direct positive effect on intention to use, while external support and policy environment primarily influence intention to use indirectly through perceived ease of use and perceived usefulness.

【Key words】 Medical staff; Primary health care; Digital technology; Intention to use; Technology acceptance model; Shandong Province

With the rapid development of information technology, the application of digital technologies in the field of health care has become increasingly widespread, and has become an important means of improving the quality of medical services, optimizing resource allocation, and promoting the modernization of primary health-care services[1–2]. The *Overall Layout Plan for Digital China Construction* proposed the major task of building an inclusive and convenient digital society, emphasizing the development of digital health and the standardized development of Internet-based diagnosis and treatment and Internet hospitals[3]. As an important component of China' s primary health-care service system[4], township hospitals' medical staff' s intention to use digital technology directly affects the efficiency and accessibility of primary medical services. Although the digitalization of township hospitals in China continues to advance, challenges remain[5]. Some medical staff still have obvious deficiencies in information acquisition, technology application, and data security, making it difficult for them to fully adapt to the developmental needs of digital health care and restricting the realization of their intended functions[1,6]. Existing studies have conducted many exploratory investigations of digital-technology use intention among groups such as urban residents or medical staff in tertiary hospitals, but related research on the intention to use digital technology among medical staff in township hospitals is relatively scarce[7].

The technology acceptance model (TAM) is a theoretical framework proposed by Davis et al.[8] in 1989 on the basis of the theory of reasoned action and the theory of planned behavior. It aims to analyze and predict users' acceptance of information technology through factors such as individual beliefs, subjective attitudes, behavioral intentions, and external variables. The model indicates that perceived usefulness and perceived ease of use are the two core factors determining users' intention to use[9–10]. Therefore, based on the TAM model, this study aims to systematically analyze the current status of digital-technology use intention among medical staff in township hospitals and to explore the factors influencing their intention to use, thereby providing a theoretical basis and practical guidance for improving medical staff' s intention to use digital technology in township hospitals.

1 Participants and Methods

1.1 Survey Participants

From July to December 2025, a multistage stratified random sampling method was used. Within Shandong Province, six prefecture-level cities were randomly selected according to their levels of economic and social development (i.e., regional GDP total), classified as high, medium, and low. Following the same principle, three counties (cities or districts) were selected from each prefecture-level city; four township hospitals were selected from each county (city or dis-

trict); and 23 medical staff members were selected from each township hospital, including 20 as the base sample size and 3 as the additional sample calculated according to a 15% nonresponse rate. A face-to-face questionnaire survey was conducted using a questionnaire developed by the research team, and a total of 1 445 questionnaires were distributed. The survey was anonymous and was independently conducted by the research team; respondents completed it voluntarily. During the survey, investigators emphasized to respondents that the survey was unrelated to their individual performance assessment, in order to reduce response pressure. Completed questionnaires were collected on site by the investigators. Three graduate students jointly completed data cleaning. Questionnaires with missing information $ $20%, logical contradictions, or patterned responses were excluded, and 1 348 valid samples were ultimately included. This study was approved by the Medical Ethics Committee of Shandong Second Medical University (approval No.: 2025YX059).

1.2 Sample Size Calculation

This study took in-service clinical physicians and nurses in township hospitals as the research participants. The minimum sample size required for the study was determined according to the $n : q$ rule proposed by Jackson. Here, n is the sample size and q is the number of parameters to be estimated in the model; the ratio is 20:1, and may also be relaxed to 10:1[11–12].

In this study, the number of parameters estimated in the initially constructed structural equation model was 17. Therefore, the minimum sample size for this study should be 170–340.

1.3 Questionnaire

This study used a questionnaire on willingness to use digital technologies developed by the research team for medical staff in township health centers. In this study, digital technologies mainly refer to commonly used digital technologies in the basic medical services of township health-center medical staff, such as telemedicine, electronic medical records, digital imaging transmission, and public-health information reporting systems[1].

1.3.1 Questionnaire content The first part concerns basic demographic characteristics and the use of digital technologies, including sex, age, education level, occupation, years of work experience, level of economic development, and frequency of digital-technology use.

The second part is a questionnaire on the willingness of township health-center medical staff to use digital technologies, based on the technology acceptance model. It includes four dimensions: perceived usefulness, perceived ease of use, use intention, and external support and policy environment. Among these, the perceived-usefulness questionnaire includes 4 items; the perceived-ease-of-use questionnaire includes 5 items; the use-intention questionnaire includes 3 items;

and the external-support and policy-environment questionnaire includes 5 items. The specific content is shown in Table 1. All items were scored using a 5-point Likert scale, with "strongly disagree" scored as 1 point and "strongly agree" scored as 5 points. The score for each sub-questionnaire was the mean score of the items it contained.

Table 1. Questionnaire dimensions and corresponding items

Dimension	Item content
Perceived usefulness	1. I believe digital technologies can improve my work efficiency.2. I believe digital technologies can help me diagnose diseases more accurately.3. I believe digital technologies can help me reduce the risk of medical errors.4. I believe digital technologies are helpful to my career development.
Perceived ease of use	1. I believe digital technologies are not difficult to learn.2. The use of digital technologies has not disrupted my daily work habits.3. Digital technologies are relatively stable.4. The digital technologies I currently use at work are simple to operate and easy to use.5. The digital technologies I currently use at work can adapt well to my existing work processes.
Use intention	1. I believe it is necessary to use digital technologies in township health centers.2. I am willing to use digital technologies in my daily work.3. I will recommend digital technologies to other medical staff in township health centers.

Dimension	Item content
External support and policy environment	1. The use of digital technologies will be included in my performance appraisal.2. Higher-level departments have clear policy requirements for the use of digital technologies.3. Relevant digital-technology enterprises provide technical support or subsidy support for the promotion and use of digital technologies.4. Patients can trust me to use digital technologies.5. My colleagues often exchange with me their experiences in using digital technologies.

1.3.2 Questionnaire reliability Cronbach's α coefficient was used to test the internal consistency of the scale. The results showed that the overall Cronbach' s α coefficient of the total scale was 0.937, and the Cronbach' s α coefficients for the dimensions were 0.891 (perceived usefulness), 0.883 (perceived ease of use), 0.844 (use intention), and 0.867 (external support and policy environment), all exceeding the relatively high reliability criterion of 0.80, indicating that the overall scale and all dimensions had good internal-consistency reliability.

1.3.3 Questionnaire validity Exploratory factor analysis was used to test the structural validity of the scale. Principal component analysis and maximum-variance rotation were used to extract 4 common factors. The results showed that the KMO test value was 0.944, and Bartlett' s test of sphericity reached a significant level ($\chi^2 = 14\,963.857$, $df = 136$, $P < 0.001$), indicating that the data were suitable for factor analysis. The cumulative variance explained was 71.979%, exceeding the recommended standard of 60%. The rotated component matrix showed that factor 1 corresponded to perceived usefulness (4 items, factor loadings 0.719–0.811), factor 2 corresponded to perceived ease of use (5 items, factor loadings 0.565–0.773), factor 3 corresponded to use intention (3 items, factor loadings 0.636–0.773), and factor 4 corresponded to external support and policy environment (5 items, factor loadings 0.657–0.834). The loading values of all items on their respective factors were higher than the acceptance criterion of 0.50, and there were no significant cross-loadings, indicating that the scale had good structural validity. In summary, the reliability and validity indicators of the scale used in this study all met psychometric standards, and the measurement results were reliable and valid.

1.4 Statistical methods

SPSS 27.0 and AMOS 29.0 software were used for statistical analysis. Count data were expressed as composition ratios, and comparisons between groups

were performed using the χ^2 test. Quantitative data that did not conform to a normal distribution were expressed as M (P_{25}, P_{75}), and intergroup comparisons were performed using the Mann–Whitney U test and the Kruskal–Wallis H test. Spearman rank correlation analysis was used to explore correlations among the dimensions. A value of $P < 0.05$ was considered statistically significant.

Based on the technology acceptance model (TAM), this study constructed a model of factors influencing township health-center medical staff' s willingness to use digital technologies, and tested the research hypotheses and the path relationships among variables. Therefore, according to the modification indices output by AMOS 29.0, the model was revised to obtain better fit. Model modification followed the recommendations of Wen Zhonglin et al., taking theoretical judgment as the main basis rather than relying solely on modification indices[13]. For evaluation of model fit, the recommendations of Wen Zhonglin et al.[13] were used, adopting the following indicators and criteria: absolute fit indices included the root mean square error of approximation ($RMSEA < 0.08$), standardized root mean square residual ($SRMR < 0.05$), and adjusted goodness-of-fit index ($AGFI > 0.90$); incremental fit indices included the normed fit index (NFI), comparative fit index (CFI), non-normed fit index [$NNFI$, i.e., Tucker–Lewis index (TLI)], and incremental fit index (IFI), all of which should be > 0.90; parsimonious fit indices included the parsimonious normed fit index ($PNFI$) and parsimonious comparative fit index ($PCFI$), with > 0.50 as the acceptable criterion.

2 Results

2.1 Basic characteristics of the respondents

A total of 1,348 township health-center medical staff were included in this study. The respondents were mainly female (75.5%), aged 30–<50 years (59.0%), had a bachelor' s degree or above (74.0%), were physicians (56.9%), and had $ $10 years of work experience (41.5%). The results of univariate analysis showed that among medical staff of different sex, age, education level, and economic-development level, willingness to use

In score comparisons, the differences were not statistically significant ($P > 0.05$); in comparisons of intention-to-use scores among medical staff with different occupations, years of work, and frequency of digital technology use, the differences were statistically significant ($P < 0.05$), as shown in Table 2.

Table 2 Univariate analysis comparing intention-to-use scores for digital technology among township-hospital medical staff with different characteristics [$M(P_{25}, P_{75})$, points]

Variable	Number	Intention to use	H (U) value	P value
Sex			160 900.5[a]	0.236

Variable	Number	Intention to use	H (U) value	P value
Male	330	4.00 (4.00, 5.00)		
Female	1 018	4.00 (4.00, 4.67)		
Age			4.295	0.231
<30 years	367	4.00 (4.00, 4.67)		
30-<40 years	406	4.00 (4.00, 5.00)		
40-<50 years	389	4.00 (4.00, 4.67)		
$ $50 years	186	4.00 (4.00, 5.00)		
Educational level			1.848	0.397
Secondary technical school or below	73	4.00 (4.00, 4.67)		
Junior college	278	4.00 (4.00, 4.67)		
Bachelor's degree or above	997	4.00 (4.00, 4.67)		
Occupation			197 360.5[a]	<0.001
Physician	767	4.00 (4.00, 5.00)		
Nurse	581	4.00 (4.00, 4.67)		
Years of work			8.430	0.038
$ $10 years	559	4.00 (4.00, 5.00)		
11-20 years	415	4.00 (4.00, 4.67)		
21-30 years	289	4.00 (4.00, 4.67)		
$ $31 years	85	4.17 (4.00, 5.00)		
Level of economic develop-ment			2.466	0.291

Variable	Number	Intention to use	H (U) value	P value
Good	469	4.00 (4.00, 5.00)		
Medium	469	4.00 (4.00, 4.67)		
Poor	410	4.00 (3.67, 4.67)		
Frequency of digital technology use			49.708	<0.001
Very little	92	4.00 (3.67, 4.33)		
Relatively little	120	4.00 (3.67, 4.33)		
Average	415	4.00 (3.67, 4.67)		
Relatively much	439	4.00 (4.00, 4.83)		
Very much	282	4.33 (4.00, 5.00)		

Note: ^{a} denotes the U value.

2.2 Correlation analysis among dimensions

The scores for the four questionnaire dimensions were as follows: external support and policy environment, 3.80 (3.20, 4.20) points; perceived ease of use, 4.00 (3.40, 4.40) points; perceived usefulness, 4.25 (4.00, 5.00) points; and intention to use, 4.00 (4.00, 4.67) points. Among them, perceived ease of use had the strongest correlation with intention to use ($r_s = 0.711$), whereas external support and policy environment had the weakest correlation with perceived usefulness ($r_s = 0.501$), as shown in Table 3.

Table 3 Spearman correlations among four questionnaire dimensions (r_s values)

Variable	External support and policy environment	Perceived ease of use	Perceived usefulness	Intention to use
External support and policy environment	1.000			
Perceived ease of use	0.596[a]	1.000		
Perceived usefulness	0.501[a]	0.695[a]	1.000	
Intention to use	0.534[a]	0.711[a]	0.665[a]	1.000

Note: [a] denotes $P < 0.001$.

2.3 Testing and modification of model fit

After fitting the initial model, it was found that the model fit required improvement ($RMSEA = 0.077$, $CFI = 0.939$, $GFI = 0.913$). On the premise of ensuring theoretical rationality, covariances were added successively between three pairs of measurement error terms. Among them, "the difficulty of learning is not great (e13)" and "does not disrupt work habits (e14)," and "high operational stability (e15)" and "compatible with work processes (e16)," all belong to the perceived ease-of-use dimension, and the item contents have a certain degree of similarity; "requirements of higher-level policies (e9)" and "included in performance appraisal (e8)" both belong to the external support and policy environment dimension. Theoretically, these items have intrinsic associations, which is consistent with the common practice in measurement models of allowing correlated errors within the same factor [13]. The standardized effect coefficients for each path are shown in Figure 1.

After modification, the model fit improved, and all fit indices reached good standards. In terms of absolute fit indices, $RMSEA$ was 0.062, reaching the good standard of below 0.08; $AGFI$ was 0.920, higher than the critical value of 0.90; and $SRMR$ was 0.029, lower than the critical value of 0.05, indicating that the model fit the sample data well overall. In terms of incremental fit indices, NFI was 0.955, CFI was 0.962, TLI was 0.953, and IFI was 0.962, all greater than 0.90, indicating that the model showed significant improvement relative to the baseline model. In terms of parsimonious fit indices, $PNFI$ was 0.773 and $PCFI$ was 0.778, both higher than the recommended standard of 0.50. In this study, all model fit indices were clearly superior to the critical values, indicating that the overall fit between the model and the data was good, that the model

had sufficient explanatory power, and that it could be used for subsequent path coefficient estimation and hypothesis testing.

2.4 Path analysis and hypothesis testing

The data were imported into the structural equation model to obtain the path coefficients among latent variables. The path analysis results showed that external support and policy environment had a direct positive effect on perceived ease of use ($\beta = 0.707$, $P < 0.001$); external support and policy environment had significant direct effects on perceived usefulness ($\beta = 0.077$, $P = 0.040$) and intention to use ($\beta = 0.136$, $P < 0.001$); perceived ease of use not only directly and positively affected intention to use ($\beta = 0.584$, $P < 0.001$), but also exerted an indirect effect on intention to use by influencing perceived usefulness ($\beta = 0.701$, $P < 0.001$); and perceived usefulness had a significant positive effect on intention to use ($\beta = 0.226$, $P < 0.001$), as shown in Table 4.

Table 4 Results of path parameter estimation and hypothesis testing for the structural equation model ($n = 1\,348$)

Figure 1. Standardized path coefficients of the modified model

Path relationship	Standardized estimate (β)	Standard error (SE)	Critical ratio (CR)	P value	Test result
Perceived ease of use ← External support and policy environment	0.707	0.034	19.634	<0.001	Supported
Perceived usefulness ← External support and policy environment	0.077	0.037	2.056	0.040	Supported

Path relationship	Standardized estimate (β)	Standard error (SE)	Critical ratio (CR)	P value	Test result
Intention to use ← External support and policy environment	0.136	0.033	4.166	<0.001	Supported
Perceived usefulness ← Perceived ease of use	0.701	0.045	16.197	<0.001	Supported
Intention to use ← Perceived ease of use	0.584	0.050	12.398	<0.001	Supported
Intention to use ← Perceived usefulness	0.226	0.037	6.306	<0.001	Supported

2.5 Effect Analysis

To further clarify the influence of each antecedent variable on intention to use, this study decomposed the effects of the standardized path coefficients. The results showed that the degree of influence of each factor on intention to use differed markedly. Among them, perceived ease of use was the primary factor affecting willingness to use digital technology and had the greatest effect on intention to use, with a total effect of 0.743, a direct effect of 0.584, and an indirect effect of 0.159 through perceived usefulness. External support and the policy environment were important foundational factors: their total effect on intention to use was 0.679, with an indirect effect of 0.543, but their direct effect was only 0.136, indicating that their influence was mainly transmitted through perceived ease of use and perceived usefulness. The direct effect of perceived usefulness on intention to use was 0.226. In addition, perceived ease of use had

a significant direct promoting effect on perceived usefulness (0.701). The direct effect of external support and the policy environment on perceived ease of use was 0.707, and they produced an indirect effect on perceived usefulness through perceived ease of use (0.496), yielding a total effect of 0.573.

3 Discussion

3.1 Grass-roots medical personnel have a relatively high willingness to use digital technology

The median score for willingness to use digital technology among medical personnel in township health centers was 4.00 (4.00, 4.67) points out of 5, which is relatively close to findings from previous research on community medical and nursing personnel' s willingness to use "Internet +" chronic disease management

$$(4.03 \pm 0.88) points$$

[14]. This indicates that medical personnel hold a positive and receptive attitude toward the use of digital technology, although there remains room for improvement. It also reflects the continual increase in grass-roots medical personnel' s acceptance of digital technology under the impetus of Digital China construction. At different occupational levels, physicians in township health centers scored slightly higher than nurses in willingness to use digital technology. Physicians need to process more complex medical information during diagnosis and treatment, and the digital-skills training they receive is relatively systematic. To a certain extent, this alleviates their anxiety when facing new technologies[6] and enhances their willingness to use digital technology. By contrast, nurses place greater emphasis on executing medical orders and operating workflows[15], have relatively lower dependence on digital technology, and receive comparatively weaker digital-technology training; therefore, their willingness to use digital technology is slightly lower than that of physicians. In addition, medical personnel in township health centers with $ $31 years of work experience scored higher in willingness to use digital technology than other groups. Compared with younger medical personnel, senior medical personnel usually have greater professional authority and decision-making autonomy within the organization[16], and are more familiar with work processes; therefore, when facing digital technology, they can demonstrate a stronger willingness to accept it. The study also found that the more frequently medical personnel in township health centers used digital technology, the stronger their willingness to use it.

This may be because medical staff who use digital technologies more frequently often have stronger work competence and greater initiative in learning. They are able to master operational methods for digital technologies more quickly and integrate them effectively into daily workflows, thereby further perceiving improvements in work efficiency and diagnostic and treatment quality brought about by digital technology use, strengthening their value recognition, and enhancing their intention to use them[17]. Meanwhile, frequent use of digital

technologies helps improve operational proficiency, strengthen self-efficacy and a sense of achievement, generate a positive attitude toward use[18], and reduce behavioral resistance to use; thus, intention to use is stronger[19]. Therefore, targeted training systems can be established, with emphasis on strengthening digital-skills training for nurses and leveraging the leading role of senior medical staff. At the same time, institutional design should encourage medical staff to increase the frequency of digital technology use and provide immediate guidance for those with lower use frequency, gradually cultivating their usage habits and thereby enhancing their willingness and motivation to use digital technologies.

3.2 Perceived ease of use is the main factor influencing primary-level medical staff' s intention to use digital technologies

This study found that the total effect of perceived ease of use on intention to use reached 0.743, far higher than that of other variables. In addition, perceived ease of use not only directly and significantly influenced intention to use ($\beta = 0.584$), but also indirectly influenced intention to use through perceived usefulness, with a mediating effect of 0.159. This is consistent with the classical technology acceptance model proposed by Davis et al.[8], namely that ease of use is a foundational variable for predicting technology acceptance. In primary medical services, reducing cognitive burden and operational barriers is not only a direct facilitator of technology adoption, but also an important prerequisite for enhancing perceived technological value[20]. This may be because township health centers have relatively limited resources; medical staff in township health centers generally have relatively low educational attainment and commonly face heavy workloads and fragmented time. Any technology that increases operational complexity or learning costs can easily generate resistance. Therefore, to effectively promote the implementation and continuous use of digital technologies in primary medical institutions, at the technical level it is necessary to adhere to the principle of "user experience first," optimize design around medical staff in township health centers, improve interface design, simplify operational procedures, enhance system stability, ensure compatibility with existing workflows, and lower the threshold for use.

3.3 External support and the policy environment indirectly influence intention to use digital technologies through perceived ease of use

The total effect of external support and the policy environment on intention to use was 0.679, among which the indirect effect (0.543) was far greater than the direct effect (0.136), indicating that they mainly influence intention to use indirectly through perceived ease of use ($\beta = 0.707$). This is consistent with the TAM theory proposed by Venkatesh et al.[21], namely that external variables such as organizational support and technical infrastructure mainly act indirectly on intention to use by influencing perceived ease of use. In primary medical institutions, medical staff vary considerably in digital literacy, and technical infrastructure is relatively weak. External policy guidance and resource

investment are needed to lower operational barriers, provide learning support, and improve technological accessibility, thereby strengthening confidence in the ease of use of technologies and indirectly increasing willingness to adopt them. An empirical study by Chunlan et al. on Luoyang Central Hospital found that external support factors such as organizational management and organizational change indirectly promoted physicians' intention to use electronic medical record systems by improving perceived ease of use and perceived usefulness[22]. Tian Qingxiu et al.[23], in a study of factors influencing use behavior for nursing information systems, found that good training programs and technical support help enhance behavioral intention, and that the ease of use perceived by medical staff can predict their intention to use information systems. This indicates that, in primary medical institutions, perceived ease of use is the key mediator through which external support is transformed into intention to use. Therefore, it is recommended that relevant departments establish a support system covering training support, technical assurance, and incentive evaluation, transforming institutional requirements into sustainable resource input and regularized skills training, and promoting the transition of medical staff from passive compliance to active and continuous use.

3.4 Perceived usefulness further strengthens intention to use on the basis of ease of use

This model verified that perceived ease of use has a significant positive effect on perceived usefulness ($\beta = 0.701$), which is consistent with previous findings on medical staff' s use of informatization platforms: a system' s perceived ease of use significantly enhances users' judgments of its usefulness[24]. In primary medical practice, medical staff' s judgment of the value of digital technologies is not based on simple publicity about functions, but is established on the basis of actual operational experience. Only when they perceive a technology as easy to master and stable and reliable are medical staff more likely to recognize its role in improving diagnostic and treatment quality and optimizing workflows. If medical staff believe, at the initial stage of using digital technologies, that they are difficult to master or unstable, it will be very difficult for them to recognize the usefulness of those digital technologies. This suggests that, in the early stage of digital technology promotion, a smooth and stable user experience is crucial. Therefore, in promoting digital technologies in primary health institutions, sufficient technical support and training should be provided, and training content should be reasonably planned[25], helping medical staff form a positive first impression of digital technologies, promoting value recognition, and reducing concerns.

This study has certain limitations. First, the cross-sectional design cannot infer causal relationships among variables. Second, the sample came only from township health centers in Shandong Province, so the generalizability of the conclusions is relatively limited. In addition, self-reported data may be subject to social desirability effects. Although measures such as anonymity and

reverse-scored items were adopted to control for this, bias cannot be completely eliminated. Finally, this study measured "digital technologies"as a whole and did not distinguish among specific types of digital technologies, such as electronic medical records and remote consultations, which may affect validity. Different digital technologies vary in their degree of detachment from practice and in their application scenarios. Some digital technologies may trigger resistance among medical staff because they are disconnected from daily workflows, while others that can genuinely improve diagnostic and treatment efficiency may have higher acceptance. Future studies may measure different types of digital technologies separately and compare differences in medical staff' s intention to use them.

In summary, this study analyzed the current status of township health center medical staff' s intention to use digital technologies and its influencing factors. The results show that primary-level medical staff have a generally strong intention to use digital technologies, but there is still room for improvement. Perceived ease of use is the main factor influencing intention to use; it both directly promotes intention to use and acts indirectly through perceived usefulness. External support and the policy environment mainly influence intention to use indirectly through perceived ease of use and perceived usefulness, while perceived usefulness has a direct positive effect on intention to use. Together, these three factors reveal the influence pathway of "external support and policy environment → perceived ease of use → perceived usefulness → intention to use," providing policy reference for optimizing the digital development of the primary medical and health system and improving medical staff' s intention to use digital technologies.

Author contributions: Zhuge Xianglan proposed the main research objectives, and was responsible for the conception, design, and implementation of the study, as well as drafting the manuscript; Zhuge Xianglan, Sun Xiuming, Zhang Xianqi, Xu Mengyuan, Li Haoqi, Yue Jianing, and Wang Jinkun performed data collection and organization, statistical processing, and the preparation and presentation of figures and tables; Zhuge Xianglan, Guo Hongwei, Ma Dongping, Feng Zhiqiang, Yin Wenqiang, and Chen Zhongming revised the manuscript; Zhuge Xianglan and Chen Zhongming were responsible for quality control and review of the article, took overall responsibility for the article, and provided supervision and management.

The authors declare no conflicts of interest.

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