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Factors that determine a Patient’s willingness to physician selection in online healthcare communities: A trust theory perspective

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ABSTRACT

Health care users and patients are increasingly using online health communities to seek medical service, especially during the COVID-19 epidemic. The factors that determine the online trust between physicians and patients perplex the stakeholders for a long time. Based on the trust theory, this study explored the influence of physicians’ personal quality and online reputation on patients’ selection. A longitudinal panel data collection exercise, covering 11905 physicians on haodf.com, was conducted on May 20, 2018, May 22, 2019 and May 25, 2020. The random effect models are used to test our hypothesis. Results show that physicians’ quality (competence, benevolence, and integrity) and online reputation (online reviews and online rating) can significantly affect patients’ selection. Moreover, the physician’s gender can enhance the influence of online reputation on patients’ selection. As online healthcare community becomes an increasingly appealing channel for health, the frequency of the physician’s quality information updating and the quality of online service are equally important to online physician-patient trust.

1. Introduction

Online healthcare community is a telemedicine system which creates a new and important way for patients to find physicians, especially during the COVID-19 epidemic. For example, the amount of online consultation during the epidemic period is about 8 times that of the normal period on haodf.com, a popular online medical community in China. Compared with offline medical treatment, a variety of physician online information causes a certain degree of information load and affects the choice of patients [1,2]. What kind of physician’s information is the key factor that affects patients’ selection in healthcare community, which not only puzzles patients, but also arouses the interest of scholars.

Physician-patient trust has always been an important topic in the study of the physician-patient relationship because trust is the basis of communication between strangers [3]. In the traditional asymmetric physician-patient relationship, physicians are always in a dominant position because of their professional medical knowledge [4]. The emergence of the online medical community began to change the traditional physician-patient communication relationship, and the selection of patients became particularly important. Mcknight’s trust theory [5] points out that two main dimensions, physician’s personal quality and online reputation, affect patients’ selection. And online characteristics includes online reviews and online ratings.

Moreover, owing to the effect of gender congruity, which is primarily mediated by affective trust, female consumers are more likely to book an Airbnb property hosted by a female [6]. However, Blanch-Hartigan found that the physician’s gender did not directly influence patients’ trust when the influence of differences in communication other than the physician’s gender was eliminated [7]. We think that physicians’ gender could moderate the relationship between physicians’ personal quality/online reputation and patients’ selection.

Previous researches on online trust between physicians and patients mostly used cross-sectional data such as questionnaires or experiments, and studied from the perspective of patients. As a provider of physician-patient online trust, physicians are the leading players in online medical services. Physicians’ personal quality is the direct signal of their credibility [8], their online reputation generated by patients is an indirect signal of physicians’ credibility. Therefore, it can better explain the mechanism behind the physician-patient online trust by exploring the impact of physicians’ various information on patients’ trust from the perspective of physicians. The application of longitudinal panel data can shed light on the impact of the dynamic change of the physician’s
personal quality and online reputation on patient selection.

2. Related research

2.1. Trust theory

Since the 1950s, trust has been extensively studied in sociology, psychology, economics, and management, and the importance of trust is also widely recognized. Trust is not only an important social resource, but also the basis of strangers’ communication [3]. Trust is crucial in transactions with high uncertainty because trust creates positive expectations and reduces perceived risk for customers [9]. In e-commerce, it is trust that enables customers to share their information, shop and act on vendors’ advice [5]. In online communities, users can build online trust through richer discussions and exchanges in the interaction, and create more economic or social values, such as increasing sales volume [10], reducing costs, gaining emotional support [11]. With the development of Internet Technology, online interaction in various industries has become more common, so it is crucial to clarify the mechanism underlying trust.

Mcknight pointed out three major mechanisms of trust, including institution-based trust, knowledge-based trust and trust transfer process [5]. Knowledge-based trust indicates that trust is a belief and is often defined as the belief of an individual in the trustworthiness of others, which is determined by their perceived competence, benevolence and integrity [12]. Trust transfer process refers to a trust mechanism in which one’s trust in a stranger depends on a person/object who has some connection with the stranger [13]. Institution-based trust refers to the vendor gains the vendee’s trust mainly through feedback mechanism, third-party custody service and credit card guarantee mechanism [14].

In our research background, the three mechanisms of trust theory can better explain the influence mechanism of physicians’ characteristics on patient selection. Knowledge-based trust corresponds to physicians’ personal quality, and the trust transfer process and the institution base trust theory correspond to physicians’ online characteristics.

2.2. Trust and online healthcare community

As a product of the combination of Internet and medical, online healthcare community has thoroughly changed the ways for patients to seek medical services, and has eliminated the obstacles of time and space, and has eliminated the obstacles of time and space. However, the existing researches mainly focus on the information generated by patients, but little on the information generated by physicians. In addition, they mostly use questionnaire data or cross-sectional data, and ignore the influence of time dimension on user trust.

3. Research hypotheses and model

3.1. Trust in physician’s personal quality

Knowledge-based trust points out that the physicians’ personal quality can be divided into three elements: competence, benevolence, and integrity [27]. Competence refers to the skills or characteristics possessed by physician that can make it influential in a particular field. Benevolence means that physician is willing to do something beneficial to physicians to some extent, rather than self-centered profit motive. Integrity means that physician is willing to show its true information to patient and alleviate the information asymmetry between them, so as to enhance the trust degree. Competence, benevolence and integrity are important dimensions to measure the physician’s quality.

In the trust research of peer to peer platform, the physician’s (service provider) personal quality can affect patients (service recipients) satisfaction [22,28,29]. Users consider the personal attributes of provider as the source of trust, which combine the three dimensions of trust: competence, integrity and benevolence [30]. In the online short-rent market research, Wu Jiang et al. found that the landlord’s personal attributes can significantly affect the sales of housing resources [31].

As an expert service, the physicians’ personal quality is crucial in medical treatment [23,32,33]. Medical service is a kind of service based on professional competence, and the physicians’ professional competence is the core of service. The level of physicians’ competence is an important signal of physicians’ credibility, which can improve patients recognition of physicians and promote their behavior of choosing physicians. Therefore, we propose:

H1a. The physician’s competence is positively related to patients’ selection.

The online health community follows the physician’s free will. The more services a physician is willing to offer voluntarily and gratis, the more efforts the physician makes. The degree of the physician’s effort can represent the physician’s benevolence [34,35]. The more benevolent the physician is, the more likely they are to gain the trust of patients, thus promoting the selection of patients. Therefore, we propose:

H1b. The physician’s benevolence is positively related to patients’ selection.

In the online virtual community, information asymmetry and information risk are greater due to the lack of face-to-face communication. The degree of disclosure of real information shows an honest online attitude. The degree of personal information disclosed by physicians is a signal of physicians’ integrity. The higher the degree of information disclosure, the more integrity the physicians are, the more likely they are to win the trust of patients. Therefore, we propose:

H1c. The physician’s integrity is positively related to patients’ selection.

3.2. Trust in physician’s online reputation

The online reputation includes online review and online rating. The online reputation system automatically records all online reviews, provides a reputation score for each service provider (physician) and service recipient (patients) and publishes the number of online reviews and online rating, so as to serve patients’ selection. On the P2P sharing platform, online ratings, and online reviews provided by the platform can shorten the social distance between service providers and recipients, thereby strengthening the level of trust between them [36]. Online reviews are generated directly by patients. In trust transfer theory, online reviews generated by similar patients will become an important basis for
other patients to choose physicians [37]. Online rating is generated by the platform and calculated according to the number of patients served by physicians and patient satisfaction. Institution-based trust thinks that this online feedback mechanism can enhance the trust of online transactions [38].

Medical services are invisible and intangible, different from general product services. In the online healthcare community, the most important role of online review is to reduce the risk perception and uncertainty of patients, so that patients can evaluate the quality of services [39,40]. The number of online reviews has a positive impact on consumers’ selection. Wu Jiang found that the cumulative online reviews and orders of homeowners in Airbnb had a significant positive impact on the increment of housing orders [4]. In e-commerce, many scholars have found that the reputation of businesses can affect consumers’ initial trust and purchase behavior [41,42]. The specialization of medical services makes the information asymmetry between physicians and patients more serious, which makes patients more dependent on the evaluation of patients with similar diseases [43]. The number of online reviews can eliminate the information asymmetry between physicians and patients, and then positively affect the patients’ selection. Therefore, we propose:

H2a. The physician’s online review is positively related to patients’ selection.

Online rating mechanism has been widely used in e-commerce platform. The trust evaluation mechanism largely relies on online rating [44]. The online rating mechanism is an important part of the online medical community reputation feedback mechanism, which is mainly used to accumulate the evaluation information of patients on the physician’s past service behavior. Previous studies have confirmed that online rating mechanism has a significant positive impact on consumer trust and behavior intention. Online feedback mechanism can enhance consumers’ trust in online trading market [45]. Online rating reduces the negative impact of seasonality on hotel prices [46,47]. However, due to the professionalism of physicians’ service, patient trust is different from consumer trust in e-commerce and depends to a large extent on the quality of physicians [48]. Gao et al. found that online ratings are directly proportional to physicians’ quality [49]. Online rating has a significant impact on patients’ awareness, attitude, and behavioral intention [49,50].

Accordingly, in the online medical community environment, if patients can perceive the effectiveness of online rating, their trust level will be higher, and their willingness to participate will be stronger. Utz et al. used experimental methods to find that online ratings are the best predictor of trust [51]. Trust relationships can help users find the most helpful people in the community [52]. Therefore, we propose:

H2b. The physician’s online rating is positively related to patients’ selection.

3.3. The moderating effect of physicians’ gender

On the Airbnb platform, tenants prefer to choose female landlords [31]. Similar phenomena, female physicians get patients’ trust more easily than male, are more likely to occur in online healthcare community, which is a peer-to-peer platform similar to Airbnb platform. In the personality characteristics, there are great differences between male and female. Female physicians are higher in the character trait of cooperativeness compared with men [53,54]. In practice style, the social ability of female physicians is more likely to be affirmed, while the technical skills of male physicians are more likely to be affirmed [55]. In the process of diagnosis, female physicians can spend more time with patients, be more willing to let patients participate in the discussion of their own conditions, and more often deal with the feelings and emotions of patients. Then, the quality of the interaction between the female physicians and patients will be better, it will be easier to gain the trust of the patient, and thus to achieve higher patient satisfaction. Many scholars have clearly pointed out that the satisfaction of female physicians is higher than that of male physicians [56]. Therefore, we infer that physicians’ gender plays a moderating role in physicians’ personal attributes, online reputation and patients’ selection. Based on the above discussion and analysis, we hypothesize:

H3. The physician’s gender can moderate the relationship among physician’s personal quality/ online reputation and patients’ selection.

Based on the above assumptions, we establish a research model, as shown in Fig. 1.

4. Methodology

4.1. The research context

Our research context is www.haodf.com, among the largest online healthcare community in China, which was founded in 2006. After 13 years of honest management, its business development is becoming more and more perfect. At present, haodf.com can provide services such as online consultation, telephone consultation, outpatient information inquiry, disease popular science knowledge, family physicians and so on. As of December 2019 (specific time is 21:00 on December 16, 2019), www.haodf.com has attracted a total of 612957 physicians from 9938 regular hospitals in 31 provinces and municipalities in China.

This website (www.haodf.com) provides a natural research platform, which not only provides a platform for physicians and patients to communicate, but also integrates online and offline medical resources. Meanwhile, we can view many types of physicians’ information through the website, including physicians’ personal quality information, which is mainly provided by the physician himself at the time of registration, and physicians’ online reputation information, which is generated by the patients diagnosed and the website. Patients can effectively participate in the management of the course of disease. Fig. 2 shows the details of physician’s personal homepage on www.haodf.com.

4.2. Data collection

The physicians’ online information on www.haodf.com is closely related to the quality of online service of physicians in recent two year. Therefore, we set the period for data collection to be two years, and collect data in three times, with an interval of about one year. We collected physicians’ information on May 20, 2018, May 22, 2019 and May 25, 2020, respectively [7]. Therefore, we can get a longitudinal panel dataset (there is a one-year interval between these dates). First, we used the python crawler program to capture 33,992 active consultation questions’ data from May 10, 2018 to May 31, 2018. A physician could answer a few of patients’ questions, which leads to the duplication of physicians’ information. After removing the duplicate data, we finally had 13206 samples left. Then we matched the URL of physicians to get their information at the other two time points. In the process, we excluded 1121 physicians because of the disappearance of their home pages or the absence of certain variables. Finally, we have 11905 physicians in our sample. Table 1 shows the demographic characteristics of physicians. 68.28% of physicians are men, 31.72% of physicians are women. The great majority of physicians (88%) come from Third-Class hospitals. But the level of the city where the hospital locates is relatively balanced.

4.3. Variables

4.3.1. Dependent variable

The Number of patients Online. The number of patients online is the number of patients who have consulted the physician online. Our aim to verify the impact of physicians’ personal characteristics and online characteristics in patients’ selection. Our dependent variable is the patients’ selection. And Farley pointed out that the true demand for
Fig. 1. Research model.

Fig. 2. The Physician’s personal homepage.
The physician’s benevolence is measured by the articles which physician published on his or her home page. Physicians usually volunteer to publish articles about diseases on their homepages to broaden patients’ basic knowledge. The number of articles is directly proportional to the time physicians spend on the platform, and this work is non-profit and completely out of physicians’ personal wishes. Therefore, the number of articles can partly represent medical ethics. The more articles, the more benevolent the physician is, and the physician is more likely to get the favor of patients.

**Integrity.** The physician’s integrity refers to the extent to which physician discloses information. The physician can disclose his or her areas of expertise and a brief introduction on their homepage, including their medical and academic experiences. Different physicians describe their areas of expertise and introduce in different texts. The longer the text is, the more information it conveys, the easier it is for the patient to perceive the physicians’ integrity. In order to alleviate the information asymmetry between physicians and patients, physicians actively disclose their own information, which is consistent with the concept of integrity in knowledge-based trust.

**Online reviews.** The physician’s online reviews include online votes, thanks letters, and virtual gifts generated by patients. Online votes, thanks letters, and virtual gifts can reflect patients’ satisfaction with physicians’ diagnosis results and attitudes. If patients satisfy with the physician’s service, they can vote, write a thank-you letter, or send a virtual gift to the physician. These behaviors are free, except for virtual gifts. The price of virtual gifts varies from a few yuan to a few hundred yuan.

**Online rating.** The physician’s online rating is related to the physician’s service quality, which is calculated by the website according to the number of patients served and online satisfaction.

### 4.3.3. Moderator

**Gender.** The gender of physicians is not marked on haodf.com. We manually mark them according to the photos provided by physicians. If the physician’s gender is male, gender = 1, otherwise gender = 0.

### 4.3.4. Control variables

#### City level and hospital level.

The level of city and hospital also play roles in patients’ decision-making behavior. Li Hongjie et al. investigated on the relationship between medical resources and population scale in cities of different scales, and found that medical institutions tend to move to larger cities with the increase of population size [58]. According to the characteristics of [www.haodf.com](http://www.haodf.com), in order to get more objective experimental results, we choose city level and hospital level as control variables. The city level: First-tier cities are marked 5, second-tier cities are 4, third-tier cities are 3, and the rest is 1. The hospital level: Third-Class A Hospital is marked 5, Level 3 Hospital is 4, Second class hospital is 3, Level II Hospital is 2, and the rest is 1.

### 4.4. Model estimation

In order to explore the influence of physicians’ personal quality and online reputation on patients’ selection in online healthcare community, we established the panel models. As our panel data contains variables that do not change with time, we can choose pooled regression model and random effect model. After LM test for individual-specific effects, we used random effect model to test our hypotheses. We show the pooled expression model results in the robust results section. The formula of the random effect model is shown in model 1.

**Model 1. Formula of the random effect model**

\[
Y_{it} = \beta_{0} + \beta_{1}X_{it}^{1} + \gamma_{1}C_{it}^{1} + \mu_{it}
\]

\[
Y_{it} = \beta_{0} + \beta_{1}X_{it}^{1} + \gamma_{1}C_{it}^{1} + \alpha_{0}X_{it}^{1}\text{gender} + \mu_{it}
\]

Where \(Y_{it}\) is the dependent variable (DV) where \(i = \text{physician} \) and \(t = \text{time}\).

\(X_{it}^{1}\) represents six independent variables (IV).

\(\beta_{1}(k = 1, 2, 3, 4, 5, 6, 7)\) represents six independent variables (IV).

\(\beta_{1}(k = 1, 2, 3, 4, 5, 6, 7)\) is the coefficient for that IV.

\(C_{it}^{1}(n = 1, 2)\) represents six independent variables (CV).

\(\gamma_{1}(n = 1, 2)\) is the coefficient for that CV.

\(X_{it}^{1}\text{gender} \) is the Interaction term.

\(\alpha_{0}(k = 1, 2, 3, 4, 5, 6, 7)\) is the coefficient for that interaction items.

\(\mu_{it}\) is the error term.

### 5. Results

#### 5.1. Research model results

Table 2 and Table 3 report the summary statistics and correlation coefficient. According to Table 2, the large variance of benevolence and integrity shows that the content generated by different physicians on the physician’s homepage varies widely, which is in line with physicians’ habits and provides a good sample for research. The mean and variance of online rating mean that physicians’ overall evaluation is reasonable. The large variance of online votes, thanks letters, and virtual gifts indicates that patients’ perception of physicians’ service quality is more sensitive. The correlations among these variables are low and reported in Table 3.

Table 4 shows the results of our research models. The physicians’ personal quality hypothesis (H1) predicted that the physicians’ personal quality would affect patients’ selection (H1). According to column 3 of Table 4, the physicians’ competence, benevolence, and integrity have positive effect on patients’ selection (H1a, H1b, H1c) and provide supports for our hypotheses, because their coefficients \((\beta_{1} = 0.815, p < 0.01, \rho_{2} = 0.169, p < 0.01, \rho_{3} = 0.147, p < 0.01)\) are positive and statistically significant. These mean that when a physician’s competence, benevolence and integrity improve, he/she is more likely to gain the trust of patients. Therefore, physicians’ personal quality has a positive effect on patients’ selection.
The correlation coefficient.

Table 3

| Variable          | Mean | Std. | Dev. | Min   | Max   | Observations |
|-------------------|------|------|------|-------|-------|--------------|
| patients overall  | 1910.047 | 3417.943 | 0 | 75678 | N     | – 35715      |
| between patients  | 3267.624 | 1    | 72915.33 | n     | –     | 11905        |
| within patients   | 1002.779 | –37474.95 | 24172.05 | T     | –     | 3            |
| visits overall    | 1555589 | 459863 | 0 | 1.68E+08 | N     | – 35715      |
| between visits    | 4396942 | 1708 | 356586 | n     | –     | 11905        |
| within visits     | 1348498 | 7.96E+07 | 1.13E+08 | T     | –     | 3            |
| competence overall| 5.972 | 1.907 | 2 | 9     | N     | – 35715      |
| between benefits  | 1.907 | 2    | 9   | n     | –     | 11905        |
| within benefits   | 0     | 5.971 | 5.971 | T     | –     | 3            |
| benevolence overall| 198.484 | 194.951 | 1 | 589   | N     | – 35715      |
| between benevolence| 172.462 | 1 | 587  | n     | –     | 11905        |
| within benevolence| 90.921 | –190.849 | 590.4838 | T     | –     | 3            |
| integrity overall | 71.697 | 64.664 | 2 | 1000  | N     | – 35715      |
| between integrity | 64.665 | 2    | 1000 | n     | –     | 11905        |
| within integrity  | 0     | 71.697 | 71.697 | T     | –     | 3            |
| online votes overall| 448.421 | 308.415 | 1 | 1100  | N     | – 35715      |
| between online votes| 249.929 | 1 | 1094 | n     | –     | 11905        |
| within online votes| 180.717 | –273.578 | 1178.422 | T     | –     | 3            |
| thanks letters overall | 239.833 | 210.708 | 1 | 649   | N     | – 35715      |
| between thanks letters | 168.188 | 1 | 645.667 | n     | –     | 11905        |
| within thanks letters | 126.934 | –181.496 | 669.167 | T     | –     | 3            |
| virtual gifts overall | 656.898 | 445.239 | 1 | 1507  | N     | – 35715      |
| between virtual gifts | 370.729 | 1 | 1501 | n     | –     | 11905        |
| within virtual gifts | 246.587 | –331.767 | 1654.899 | T     | –     | 3            |
| online rating overall | 3.819 | 0.508 | 1.1 | 5     | N     | – 35715      |
| between online rating | 0.425 | 2.4 | 5   | N     | –     | 11905        |
| within online rating | 0.277 | 2.086 | 4.869 | T     | –     | 3            |

The physicians’ online reputation hypothesis (H2) predicted that online reviews and online rating would affect patients’ selection (H2). Column 3 of Table 4 supports for our hypothesis because the coefficients of online votes, thanks letters, virtual gifts, and online rating ($\beta = 0.160, p < 0.01, \beta_k = 0.198, p < 0.01, \beta_l = 0.283, p < 0.01, \beta_s = 0.033, p < 0.01$) are positive and statistically significant. Therefore, physicians’ online reputation has a positive effect on patients’ selection.

The moderating effect of physicians’ gender hypothesis (H3) predicted that the physician’s gender would play a moderating role in physicians’ personal quality online reputation and patients’ selection. According to column 4 of Table 4, our results show that physician’s gender moderates the relationship between online rating and patients’ selection, because the coefficients of star rating*gender ($\beta = 0.081, p < 0.01$) is positive and statistically significant. It means that when a physician’s gender is male, the influence of physician’s online rating on patients’ selection will be enhanced.

5.2. Robustness check

These results are robust to alternative specifications. First, we used the total visits to the physician’s homepage ($\ln\text{visits}$) as alternative variable of the patients’ selection (Table 5). Second, we used the pooled regression model to re-run the same sample (Table 6). They are consistent with the results of the previous model.

6. Conclusion and implications

6.1. Discussion and conclusion

Our research shows that the effective disclosure of physicians’ personal quality and online reputation information are not only a means for patients to choose a physician, but also an incentive to improve physicians’ service quality. Results show that physicians’ personal quality is related to patients’ selection. The higher the physician’s competence, benevolence and integrity which represent physicians’ personal traits, the easier to gain patients’ trust. In offline service, physician’s competence is the key factor of patients’ attention. Compared with offline situation, patients can get more personal traits of physicians. Our results indicate physicians’ personal quality is the basis of building trust between physicians and patients in online healthcare community. Physicians can convey information about their traits to patients, such as publishing popular science articles and stating in detail diseases’ types they are good at, through the online healthcare community platform to gain patients’ favor.

The positive information generated by platform and patients will affect the decision-making of online consulting patients. The information generated by the platform (the comprehensive situation of physicians’ online rating in the past two years) can show the stability of physicians’ service quality. The information generated by patients...
play a role in a short time. In addition, the gender discrimination may be more influential on patient
characteristics of female physicians, such as patience and friendliness, be more influential on patient
communication, male physicians can more quickly and effectively carry
consultation. Then, in the process of limited and costly consultation and more than three consultations are
charged. The clearer the topic of communication, the better the effect of
emotional \[61\]. In the offline communication process, the female
communicating with patients, while female physicians are more
reason for this result is the difference in the way physicians and patients
vice process. Therefore, physicians’ online reputation is a strong signal
to reflect the quality of physicians’ service, which deserves the attention
physicians.
Moreover, our research integrates trust theory with
healthcare community. Firstly, our research
moderating effect is that there is a certain degree of gender differ-
ences phenomenon in online healthcare communities.
physicians. Furthermore, the influence of physician’s online ratings on patient selection is basically consistent with that of the patients’ online reviews, which shows that the online ratings on www.haodf.com is reliable [59].

Moreover, we also found that physicians’ gender can positively moderate the relationship between physicians’ online rating and patients’ selection. Meanwhile, the service quality of male physicians may be more influential on patient’ selection. This research result is basically consistent with the conclusion of Marrero et al. [55], but it is contrary to the result of offline communication practice [54,56,60]. One possible reason for this result is the difference in the way physicians and patients communicate online and offline. Male physicians are more rational in communicating with patients, while female physicians are more emotional [61]. In the offline communication process, the female characteristics of female physicians, such as patience and friendliness, make it easier to form partnerships with patients [62,63]. The physicians in the community mostly use the way of online communication and telephone consultation, and more than three consultations are charged. The clearer the topic of communication, the better the effect of consultation. Then, in the process of limited and costly consultation and communication, male physicians can more quickly and effectively capture the needs of patients. The femininity of female physicians may not play a role in a short time. In addition, the gender discrimination may also be another reason. Studies have found that the proportion of female physicians is much smaller than that of male physicians [64], and the income of female physicians is only 70% of that of men [65]. Physician’s competence is an important factor to win the trust of patients [66]. The stereotypes of female abilities in people’s subconscious have also become an important reason for the low satisfaction of female physicians.

6.2. Theoretical implications

Our results have expanded the literature of online trust and online healthcare community. Firstly, our research integrates trust theory with online physician-patient relationship more effectively, and expounds the mechanism of trust theory from the perspective of trust provider and trust recipient. Secondly, A key contribution of our paper is to bring time effect into our model and improve the robustness of research results. We used longitudinal panel data to explore the impact of changes in online reputation on patient selection. Finally, this paper explores the moderating role of physicians’ gender in the relationship between physicians’ online service quality and patient selection. One possible explanation for the moderating effect is that there is a certain degree of gender differences phenomenon in online healthcare communities.

6.3. Managerial implications

Our findings have important managerial implications. First, for physicians in the online healthcare community, our research results can help them manage their personal traits, improve their online reputation, and win the trust of patients. In online image, we suggest that physicians

| VARIABLES | (1) | (2) | (3) | (4) |
|-----------|-----|-----|-----|-----|
| competence | 1.368*** | 0.815*** | 0.775*** | 0.168*** |
| (0.047) | (0.039) | (0.069) | (0.004) |
| benevolence | 0.291*** | 0.169*** | 0.168*** | 0.234*** |
| (0.004) | (0.003) | (0.005) | (0.016) |
| integrity | 0.234*** | 0.147*** | 0.144*** | 0.024*** |
| (0.013) | (0.012) | (0.024) | (0.013) |
| online votes | 0.186*** | 0.160*** | 0.150*** | 0.186*** |
| (0.004) | (0.004) | (0.007) | (0.004) |
| thanks letters | 0.222*** | 0.198*** | 0.204*** | 0.302*** |
| (0.004) | (0.004) | (0.006) | (0.004) |
| virtual gifts | 0.302*** | 0.273*** | 0.264*** | 0.069*** |
| (0.004) | (0.004) | (0.006) | (0.013) |
| online rating | 0.149*** | 0.017 | -0.526*** | -0.050* |
| (0.024) | (0.022) | (0.189) | (0.027) |
| gender | 0.103*** | 0.529*** | 0.167*** | 0.012* |
| (0.030) | (0.029) | (0.027) | (0.007) |
| online rating*gender | 0.081*** | 0.056 | 0.001 | 0.004 |
| (0.026) | (0.083) | (0.007) | (0.029) |
| City level | 0.121*** | 0.054*** | 0.035*** | 0.121*** |
| (0.010) | (0.009) | (0.008) | (0.009) |
| Hospital level | 0.045** | -0.057*** | -0.067*** | 1.087*** |
| (0.019) | (0.017) | (0.016) | (0.129) |
| Constant | 2.352*** | 0.327*** | 0.690*** | 0.097*** |
| (0.129) | (0.091) | (0.107) | (0.168) |
| Observations | 35,715 | 35,715 | 35,715 | 35,715 |
| Number of id | 11,905 | 11,905 | 11,905 | 11,905 |

| VARIABLES | (1) | (2) | (3) | (4) |
|-----------|-----|-----|-----|-----|
| competence | 2.180*** | 1.788*** | 1.653*** | 2.355*** |
| (0.051) | (0.046) | (0.083) | (0.046) |
| benevolence | 0.319*** | 0.200*** | 0.199*** | 0.208*** |
| (0.004) | (0.004) | (0.006) | (0.018) |
| integrity | 0.168*** | 0.144*** | 0.100*** | 0.168*** |
| (0.016) | (0.028) | (0.026) | (0.026) |
| online votes | 0.209*** | 0.174*** | 0.157*** | 0.209*** |
| (0.005) | (0.005) | (0.008) | (0.005) |
| online letters | 0.223*** | 0.192*** | 0.194*** | 0.223*** |
| (0.004) | (0.004) | (0.007) | (0.004) |
| virtual gifts | 0.282*** | 0.247*** | 0.238*** | 0.282*** |
| (0.004) | (0.004) | (0.007) | (0.004) |
| online rating | -0.304*** | -0.354*** | -0.443*** | 0.103*** |
| (0.015) | (0.015) | (0.026) | (0.030) |
| gender | 0.196*** | 0.196*** | 0.003 | 0.007 |
| (0.099) | (0.008) | (0.034) | (0.007) |
| online votes*gender | 0.026** | -0.002 | 0.014 | 0.014 |
| (0.010) | (0.009) | (0.009) | (0.008) |
| virtual gift*gender | 0.012* | 1.788*** | 0.194*** | 0.194*** |
| (0.007) | (0.004) | (0.046) | (0.046) |
| online rating*gender | 0.130*** | 0.223*** | 0.192*** | 0.223*** |
| (0.031) | (0.031) | (0.010) | (0.010) |
| City level | 0.201*** | 0.188*** | 0.154*** | 0.201*** |
| (0.011) | (0.011) | (0.010) | (0.010) |
| Hospital level | -0.050 | -0.019 | -0.067*** | 5.580*** |
| (0.021) | (0.021) | (0.019) | (0.019) |
| Constant | 5.580*** | 9.154*** | 5.580*** | 5.580*** |
| (0.141) | (0.113) | (0.129) | (0.201) |
| Observations | 35,715 | 35,715 | 35,715 | 35,715 |
| Number of id | 11,905 | 11,905 | 11,905 | 11,905 |

***p < 0.01, **p < 0.05, *p < 0.1.
is an imbalance in medical resources [67]. The sharing of healthcare resources between city level, hospital level and patient selection indicates that there is a more prominent position, so as to improve the use experience of patients.

Table 6

Results of Robustness Check (pooled regression model).

| VARIABLES | (1) | (2) | (3) | (4) |
|-----------|-----|-----|-----|-----|
| competence | 1.375*** | 0.627*** | 0.593*** | 0.593*** |
| (0.047) | (0.039) | (0.068) | |
| benevolence | 0.281*** | 0.169*** | 0.164*** | |
| (0.006) | (0.005) | (0.007) | |
| integrity | 0.239*** | 0.118*** | 0.123*** | |
| (0.017) | (0.013) | (0.022) | |
| online votes | 0.168*** | 0.135*** | 0.126*** | |
| (0.007) | (0.007) | (0.011) | |
| thanks letters | 0.229*** | 0.196*** | 0.202*** | |
| (0.006) | (0.006) | (0.010) | |
| virtual gifts | 0.314*** | 0.277*** | 0.274*** | |
| (0.006) | (0.005) | (0.009) | |
| online ratings | 0.723*** | 0.582*** | 0.489*** | |
| (0.019) | (0.018) | (0.033) | |
| gender | –0.045* | 0.141*** | 0.018 | –0.653*** |
| (0.027) | (0.023) | (0.022) | (0.201) |

| competence*gender | 0.048 | | | |
| benevolence*gender | 0.008 | | | |
| integrity*gender | –0.007 | | | |
| online votes*gender | 0.012 | | | |
| thanks letter*gender | –0.005 | | | |
| virtual gifts*gender | 0.005 | | | |
| online ratings*gender | 0.133*** | | | |
| City level | 0.122*** | –0.016* | –0.015* | –0.016* |
| (0.011) | (0.009) | (0.008) | (0.008) |
| Hospital level | 0.043* | –0.150*** | –0.131*** | –0.131*** |
| (0.023) | (0.018) | (0.018) | (0.018) |
| Constant | 1.094*** | 0.561*** | –0.697*** | –0.232 |
| (0.140) | (0.106) | (0.116) | (0.178) |
| Observations | 35,715 | 35,715 | 35,715 | 35,715 |
| R-squared | 0.239 | 0.449 | 0.507 | 0.507 |

***p < 0.01, **p < 0.05, *p < 0.1.

not only need to constantly learn professional knowledge and improve their professional level, but also maintain the information of their own personal homepage in time, such as perfecting personal information, releasing disease knowledge of patients’ concern, etc. In particular, women should pay more attention to the improvement of their own quality, give full play to their own advantages and break the stereotype of women. In addition, physicians should pay attention to communication skills to improve patients’ satisfaction in the process of online communication with patients. Therefore, physicians should make full use of the advantages of online healthcare community to attract more patients. Second, for patients in the online healthcare community, our research helps patients effectively search and select the right physicians. More importantly, patients should pay attention to the influence of physicians’ gender on decision-making when choosing a physician, so as to make a reasonable selection. Third, for platform managers, the results can help operators adjust the page layout of online physicians’ homepage, and set the information that patients pay more attention to in a more prominent position, so as to improve the use experience of patients. In addition, the introduction of digital twin technology into the field of healthcare management is of great significance to online healthcare platforms in the digital age. The significant correlation between city level, hospital level and patient selection indicates that there is an imbalance in medical resources [67]. The sharing of healthcare data and healthcare resources can reduce this imbalance. The smart medical platform can select superior medical resources online to solve various intractable diseases remotely to improve the overall level of human medical services.

6.4. Limitations and future research

Haodf.com not only discloses the text data of physician-patient communication, but also discloses the text data of patients’ medical experience. Text data usually contains multi-level information, but this paper only analyzes some quantitative data, and does not do deeper text mining. Future research can do deeper mining of text data in online healthcare community. Second, the research data in this paper only comes from haodf.com. But there are some differences between different online healthcare communities, so a single data source may affect the applicability of research conclusions. Multiple research backgrounds can be selected for future research. Moreover, the research data of this paper only comes from online. But in real life, online and offline medical systems are inseparable. In the future, online and offline data should be considered comprehensively.

Credit author statement

Gong Yingli: Conceptualization, Methodology, Software, Data curation, Writing – original draft preparation. Wang Hongwei: Conceptualization, Methodology, Supervision. Xia Qiangwei: Visualization. Shi Yunxiang: Data curation, Methodology. Zheng Lijuan: Supervision.

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Supplementary Materials

The supplementary materials submitted along with our manuscript include program codes of every algorithm, and datasets of this work. The materials have been uploaded to the Figshare database (https://doi.org/10.6084/m9.figshare.1312117.v4).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.techsoc.2020.101510.

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Y. Gong et al. Technology in Society 64 (2021) 101510

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