Doctoral Thesis

Study on Chinese Patients' Decision-Making in Online Health Communities

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Ritsumeikan University

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（中国のOHCsにおける患者の意思決定に関する研究）

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ABSTRACT

Background: The COVID-19 has posed a threat to the conventional health system and offline consultation. In this context, online healthcare communities provide a fresh avenue for both patients and physicians. However, because the problem of information asymmetry is more severe online than offline, patients are confronted with more information online and find it difficult to locate impactive information as signals of a suitable physician. Prior research has focused on patients' consultations, however, there is a shortage of in-depth studies addressing the determining factors of patients' consultations from a signaling theory standpoint.

Objectives: To clarify the physician-generated information (service quality, social support, and physicians' trusting belief) of the patients' consultations in an online healthcare community, as well as the moderating impact of system-generated information and patient-generated information.

Methods: A theoretical model was designed based on the signaling theory to identify the influence of physician-generated information (service quality, social support and physicians' trusting belief) on patients' consultations. We used a Python crawler to retrieve information from the Haodf.com website automatically. Between April 5 to 8, 2022, cross-sectional data on 2982 physicians were collected.

Results: Results show that physician-generated information (service quality, social support and physicians' trusting belief) positively affect patients' consultations. Moreover, the system-generated information and patient-generated information weakens the positive relationship between physician-generated information and patients' consultations.

Conclusions: This study has a profound importance for a deep understanding of the impact of patients' consultations and contributes to the literature on signaling theory, multisource information, patients' consultations. Also, this study provides implications for practice.

Keywords: Online health communities; Signaling theory; Online patients' consultations; Service quality; Social support theory; social influence theory ; multisource information

概要

背景: COVID-19 は、多くの感染者や患者を発生させ、従来の医療システムと対面での医療相談や診察に脅威をもたらしている。

この状況において、オンラインの健康コミュニティは、患者と医師の両方に新たな道を提供する。しかし、情報の非対称性の問題はオフラインよりもオンラインの方が深刻であるため、患者はオンラインでより多くの情報に直面し、適切な医師のシグナルとして有効な情報を見つけることが困難になる。以前の研究は患者の相談に焦点を当てられていたが、信号理論の観点から患者の相談の決定要因に対処する詳細な研究が不足している。

目的: オンライン健康コミュニティでの患者の診察について医師が生成した情報 （サービスの質、ソーシャル サポート)、および医師の個人的な質、およびプラットフォームが生成した情報と患者が生成する情報の調整効果を調査すること。

方法: シグナリング理論に基づいて理論モデルを設計し、医師が生成した情報 (サービスの質、社会的支援、医師の個人的な質) が患者の診察に与える影響を調査した。 Python クローラーを使用して、Haodf.com Web サイトから自動的に情報を取得した。2022 年 4 月 5 日から 8 日の間に、2982 人の医師に関する横断データが収集された。

結果: 結果は、医師が生成した情報 (サービスの質、社会的支援、医師の個人的な質) が患者の診察にプラスの影響を与えることを示している。さらに、プラットフォームが生成する情報と患者が生成する情報は、医師が生成する情報と患者の診察との間の正の関係を弱める。

結論： この研究は、患者の結論の影響を深く理解する上で非常に重要であり、シグナル伝達理論、複数の情報源、患者の相談に関する文献に貢献している。また、この研究は実践への応用方法を提供する。

キーワード： オンラインヘルスケア; シグナリング理論; オンライン診療; サービスの質; ソーシャルサポート; ソーシャルインフルエンス

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Chapter 1. INTRODUCTION

"In health service, asymmetric information arises from economic scarcity, because – like it or not – information is costly to obtain and credibly transmit."

—Stephen Shmanske

1.1 Overview of Introduction

This inquiry ultimately relates to the general topic of how patients choose a physician online based on online information in an asymmetric information environment. This topic is significant because people have difficulty selecting physician online, and the information asymmetry issue is more heated online than offline. This study focuses specifically on how diverse information sources influence online patients' consultations decisions. In this study, three empirical studies are undertaken with the aim of determining how multi-source information, which generated by physicians, patients, and systems, can influence online patients' consultations decisions. Individual study employs a distinct approach and distinct selection criteria for datasets. The usage of quantitative research methodology reflects the diversity of research issues addressed in each study. Following is a summary of the research context, a discussion of key terminology fundamental to this dissertation, and a description of the dissertation's structure.

1.2 Research Context

Online healthcare communities (OHCs) are a notable and widely accepted trend in the delivery of health care services (Anderson & Agarwal, 2011). In this study, online

healthcare, online healthcare refers to the health services delivery by using the Internet, such as medical consultation online and information related to health (X. Guo et al., 2016). In OHCs, patients can get health information and service from qualified healthcare professionals (W. Zhao et al., 2017). It is possible for a physician to achieve an external reputation if he or she delivers services in an OHC. This reputation can be distinctive from offline services, such as gifts and thank-you letters from patients. This topic is significant since OHCs can circumvent geographical and temporal limitations and offer clinicians with ease of accessibility to patients (X. Zhang et al., 2017). After the advent of the COVID-19, OHCs become increasingly significant for both physicians and patients (X. Zhang et al., 2022). OHCs can shield service users from infectious hazard; patients may also save healthcare expenses as well as save time by using an online OHC (H. Yang, Guo, & Wu, 2015). Recent research demonstrates that OHCs have substantial impacts of decreasing medical expenses, strengthening productivity and competitiveness, increasing the equality of healthcare resources, and ensuring patient happiness (J. Li et al., 2019).

Patients may make a more informed choice when selecting a physician for an online consultation since OHC platforms provide comprehensive information about service providers (physicians) (L. Li et al., 2020). Customers constantly prefer to purchase goods and services; hence, digital platforms have become a crucial channel for service providers in several industries (Gudigantala et al., 2016). Researchers suggest that between 25 and 70 percent of patients prefer healthcare that does not require an in-person visit (DiMatteo, 2004), and there is an enormous demand for online consultation services (Y. Li, Yan, et al., 2019). Online consultation can enhance traditional healthcare services and physician-patient connections (A. M. Shah et al., 2021). This innovative method of consultation

reduces both response time and travel expenses, which is one of its primary advantages (L. Chen et al., 2015). Due to the contagious nature of the COVID-19, in-person visits are difficult for patients to schedule. Online consultations maintain social distance and avoid the contagious danger and lengthy wait times associated with offline consultations in hospitals or clinics (Bryant et al., 2020). In light of the foregoing, OHCs amid the current COVID-19 outbreak are online consultation platforms for a variety of challenges.

Since the amount of information asymmetry in the healthcare industry is much greater than in the traditional healthcare industry (Laugesen et al., 2015), it is necessary to focus on the healthcare industry as a research topic. In traditional healthcare industry, it is hard for patients to access related information. Unlike traditional healthcare industry, OHCs allow patients to access health-related information more easily. Because of the technology of Internet, patients can access most basic medical knowledge online, the detailed information for academic medical journals or papers is not available for them, they will be quickly aware of the serious information asymmetry between them and physicians through online interaction with physicians. Generally, information asymmetry refers to a situation where some individuals possess more information than others (Spence, 1974). In OHCs context, information asymmetry is defined as the differential between the perceptions of patients, which regarding patients' own knowledge and the perceptions regarding physicians' knowledge (Laugesen et al., 2015). Healthcare services are primarily credential services, which are services whose utilitarian benefits are difficult or impossible to establish for customers (Dulleck & Kerschbamer, 2006). Credential goods are difficult to assess after purchase, as opposed to experience goods. This is mainly because the provider of these items is aware of the utilitarian impact of the

items, producing an asymmetric information condition (J. Li et al., 2019). According to signaling theory in the healthcare area, physicians as the signaler possess more information and knowledge than the receiver (the patient) (A. M. Shah et al., 2021).

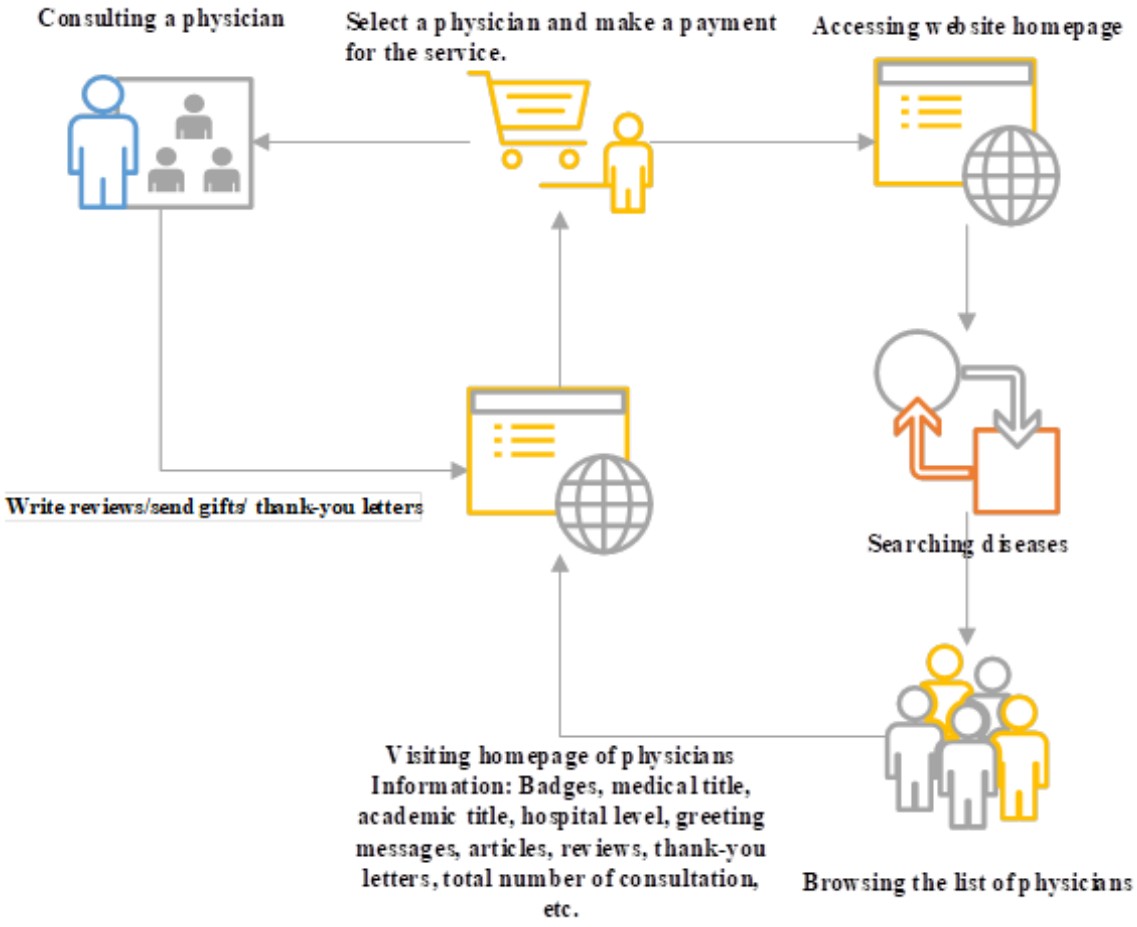


Figure 1 Online Patients' consultations decision process

This information asymmetry may drive physicians to commit fraudulent acts against patients, and this problem can be improved by one party reliably communicating facts about themselves to another (Spence, 1973). For online consultation, all users (including physicians and patients) can act as signalers to transmit messages to others regarding service providers and service quality (J. Li et al., 2019). Despite, patients are being bombarded with multiple information sources, making it difficult to select a physician

who is competent and appropriate. Instead of traditional medical care, OHCs provide patients with access to a wide range of information from the comfort of their homes. This allows them to assess and base their decision-making upon this information (Cao et al., 2017). In general, patients access a variety of sources to gather information before making an online purchase of a service (Y. Li et al., 2017).

The decision process is shown in Figure 1, it is vital to explore how the multisource information affects the online patients' consultations directly or moderately. However, there is a paucity of research on understanding and assessing the multisource information that influences online patients' consultations in OHCs.

1.3 Research Questions

The topic of what kinds of information influence online patients' consultations decisions and how they do so presents a challenge for both patients and healthcare providers. Patients tend to select a competent physician to consult when there is information asymmetry because there is a limited number of competent physicians available (J. Li et al., 2019). However, it remains uncertain to both patients and physicians how exactly these multisource information influence online patients' consultations. Generally, the majority of clients usually collect information about many products and services before making a purchase from a variety of sources (Beritelli et al., 2007). Correspondingly, when individuals choose physicians, they gather information on OHCs from many sources, and physicians' websites provide these kinds of information, such as system-generated information (e.g. Badges on OHCs, which certified the physician has a good performance) (H. Yang, Guo, Wu, et al., 2015), patient-generated information (e.g.

Patient comment) (Y. Li et al., 2017), online and offline information (e.g. Online and offline cases) (X. Guo et al., 2016), individual and organizational information (e.g. Articles on disease prevention) (X. Liu et al., 2016). For OHCs, patients and physicians are able to edit information on the websites about the healthcare services and physicians. In addition, the OHCs evaluates physicians' abilities, categorizes them into different levels, and awards badges to physicians with a solid reputation and excellent level of competence. Therefore, in this dissertation, the information on OHCs is split into three categories: information generated by physicians, information generated by patients, and information generated by the system (OHCs). It has been demonstrated that patients' decisions are affected by the information generated by both the system (OHCs) and the patients (H. Yang, Guo, Wu, et al., 2015). An investigation was conducted to determine the relationship between the information generated by the system, the physician, and the patient, as well as physician websites' conversion rates (the proportion of customers to visitors who successfully locate information and decide to consult) (Q. Chen et al., 2020). Since patients decide whether or not to consult with a physician online or offline after visiting the personal website of a physician, how to convert visitors of a website to customers is a critical issue for both physicians and managers of the OHCs. However, in the literature, little is known about how the information generated by the system, the physician, and the patient affects online patients' consultations.

Physician-generated information in OHCs can generally be found on the physician's own website, which include their personal information and online actions and behaviors (Y. Li, Ma, et al., 2019). Such as, greeting messages, academic and professional titles, hospital levels, articles, free/paid consultations, interactions with patients, and so forth.

Such information is crucial for both patients and physicians, since it can be utilized as a vital measurement when deciding on online patients' consultations. An individual's contribution to knowledge can be assessed by the number of articles that physicians have published, for example (J. Li et al., 2019), trusting belief (Y. Gong et al., 2021a) and professional position (S. Guo et al., 2017). Additionally, the length of text or voice messages is used to measure the social support that physicians provide to patients (J. Liu et al., 2022). Social support can be defined as a mechanism for exchanging information that encourages people to feel valued, respected, and a member of a socially cohesive group (Cobb, 1976). Patients should have access to all this information generated by their physicians when choosing a physician to consult with. According to signaling theory, due to the information asymmetry issue and possible interest conflicts (e.g., physicians lie to patients to earn extra medical payment) between signalers (physicians) and receivers (patients) in OHCs, signalers (physicians) send signals to receivers to demonstrate the quality of their service (A. M. Shah et al., 2021). In general, professional physicians are able to provide their patients with trustworthy and reliable information (A. M. Shah et al., 2021). For OHCs, patients (receivers) who wish to visit physicians (signalers) about their health state are expecting various signals from physicians (signalers) (L. Chen et al., 2020). To increase patient trust and make them more likely to opt for their physician, physicians offering online counseling services must communicate with patients by sharing more knowledge through the publication of online articles (S. Guo et al., 2017). Consequently, it is crucial for both physicians and patients to understand the impact of various signals on consultation decisions and to decrease information asymmetry by encouraging the signals between signalers and receivers. In addition, healthcare services

differ from other kinds of services in that life and death are serious, each patient has a unique condition, and substantial information asymmetry difficulties cannot be avoided. Patients must thus select physicians who can give excellent services, information, and emotional support, and whom they can trust to treat their sickness due to his or her personal qualities. This dissertation examines experimentally the impact of physician-generated information (service quality, social support, and physicians' trusting belief) on online patients' consultations. The purpose of this dissertation is to answer the following research questions:

RQ1: How does service quality of physicians affect online patients' consultations in OHCs?

RQ2: How does social support from physicians affect online patients' consultations in OHCs?

RQ3: How does trusting belief on physicians affect online patients' consultations in OHCs?

It is important to recognize that user behavior when it comes to healthcare information technology is dependent on its environment (X. Zhang et al., 2022). Furthermore, consumer decision-making is an extremely complex process (McDonald, 1994). A similar situation occurs in the OHC context, in which patients are faced with a variety of sources of information (physicians, patients, and systems) .Therefore, in order to further examine the limitations of online patients' consultations, this dissertation also investigates whether the impacts of physician-generated information (quality of service,

social support, and trusting beliefs) are influenced by the context of online healthcare multisource information. Patient-generated information is critical for patients as well as physicians, since it is a reflection of the outcomes of physician care (H. Yang, Guo, Wu, et al., 2015). Due to the fact that such information as compliments is the result of the time, knowledge, and even money invested by patients, they are more likely to consider compliments as a criterion when making health care decisions (Wu et al., 2020). As related to OHCs, compliments refer to positive assessments made by patients after receiving their physician's service, which reflect the quality of the service and the physician's efforts (Wu & Lu, 2017). In addition to electronic votes, patients may also send thanks letters and make online gifts to their physicians (J. Liu et al., 2022). It is widely recognized that compliments play a significant role in changing behavior in a positive manner (Tunçgenç et al., 2021). Given the information asymmetry in OHCs, social influence may reduce the extent to which patients understand the information provided by their physicians (Ho & Wei, 2016). Consequently, there will be less information asymmetry. Furthermore, as a system-generated information source, gamification badges are seen as more unbiased and informative (J. Chen et al., 2016). The gamification badge refers to icons in OHCs, such as a gold badge (see Table 7) representing the doctor's fame. It will be easier for patients to pay attention to physicians with badges. Since badges can be regarded as indicators of a physician's competence, this is a cost-effective way for patients to ascertain the quality of their physician's care. Therefore, the relationship between physicians' personal qualities and the quality of their consultations might be modified by gamification badges. We ask the following research

questions to examine the moderating impacts of patient-generated information between social support and online patients' consultations:

RQ4: How does patients' compliments moderate the relationship between social support and online patients' consultations in OHCs?

RQ5: How does gamification badges moderate the relationship between trusting beliefs and online patients' consultations in OHCs?

1.4 Aim and Scope

This dissertation aims to explore the effect of information on the OHC platforms from multi-sources (physician-generated information, patient-generated information and system-generated information) on patient consultation decision.

This dissertation aims to clarify how patient-generated information (patient compliments) moderates the relationship between social support and online patients' consultations. Additionally, to clarify the moderating effect of system-generated information on trusting beliefs and online patients' consultations.

2982 data from the homepages of physicians on Haodf.com between 6 and 8 April 2022, one of China's largest OHC platforms where information from multiple sources is available shall be used as the data for this dissertation.

1.5 Significance of the Study

Consultation with patients is an important issue that deserves the attention of researchers. Due to the overload of information available in OHCs, patients are often unable to select

a physician to consult with based on the information they are presented with (Wu & Lu, 2017). In previous studies, this problem has been noted and attempts have been made to determine how patients' consultations influences patient behavior. A list of studies regarding patients' consultations is presented in Table 1. The influence of information from multiple sources on a patient's decision to seek online consultation is still largely unknown.

Table 1 Previous research regarding patients' consultations

Theory	**Influencing Variables**	**Reference**
Signaling theory	System-generated information and patient-generated information	(H. Yang, Guo, & Wu, 2015)
Signaling theory	Web reputation and offline reputation of physicians and hospitals	(X. Liu et al., 2016)
N/A	Written consultation, telephone consultation, and physician reputation	(Wu & Lu, 2017)
N/A	Web-based service reviews, offline service reviews, and disease risk	(F. Liu et al., 2019)
N/A	Technical skills, interpersonal skills, and gender	(J. Li et al., 2019)
N/A	Web-based rating and activeness	(Y. Li, Ma, et al., 2019)
N/A	Physician effort and web reputation	(Deng et al., 2019)
Signaling theory	Log-in behavior, web reviews and offline status	(X. Lu et al., 2021)
Trust theory	Physicians' online reputation, physicians' trusting belief	(Y. Gong et al., 2021a)
The limited-capacity model of attention	Positive emotion, quantity of information, semantic topic diversity, and online reputation	(Ouyang, Wang, & Jasmine Chang, 2022)
N/A	Strong Ties Model, Weak Ties Model and Strong Ties *Weak Ties	(Y. Zhang et al., 2022)

The significance of this dissertation is that it makes several theoretical advances and adds to existing knowledge. First, the use of signaling theory in the consultation process with patients is a significant contribution to the literature on signaling theory.

Second, using physician-generated information on patients' consultations behavior as a signaling theory, this study makes a contribution to the literature regarding online patients' consultations. Though, the conversion rate of physicians' personal websites has been found to be positively influenced by physician-generated, system-generated, and patient-generated information (Q. Chen et al., 2020), only a few studies have examined how physician-generated information affects patients' consultations behavior. It has been merely found that information generated by the physician is positively correlated with patients' consultations decisions (Ouyang, Wang, & Jasmine Chang, 2022).

Further, this research extends the understanding of physician-generated information and system-generated through exploring the contingent impact of patient-generated information and system-generated information on patients' decisions to consult with physicians. Healthcare IT does not exist in a vacuum; physician and patient behavior is influenced by their environment (X. Zhang et al., 2022). Physician-generated information has a moderate effect on patients' decisions regarding consultations when combined with system-generated information and patient-generated information. By examining the impact of information from multiple sources on patients' consultations decisions on OHC platforms, a novel perspective is provided.

1.6 Outline of Dissertation

Overview of three research studies that are core chapters of this dissertation are shown in Figure 2 and Table 2.

In **Chapter 1**, the entire dissertation is summarized. The context of the dissertation is presented in this chapter, which contributes to the dissertation in two significant ways.

The background and objectives of this study are discussed in this section. Second, it discusses the significance of the topic and research issue. I conclude by providing a summary of each study's research methodologies.

Table 2 Overview of empirical studies

Study	Purpose	Methodology	Sample	Analytical Technique
Study 1	Investigate the impact of service quality on online patients' consultations.	Quantitative approach based cross-sectional data collected by Python crawler	Chinese OHC platform (Haodf.com)	Stata
Study 2	Examine the impact of social support on online patients' consultations, and the moderating impact of patient compliment on the relationship between social support and online patients' consultations			
Study 3	Investigation of the impact of trusting beliefs on patients' consultations, and the moderating impact of gamification badge on the relationship between trusting beliefs and online patients' consultations			

Chapter 2 summarizes all the main theories and concepts in this dissertation and provides an overview of the literature. Moreover, these concepts and fields have great significance.

It was described in **Chapter 3** how three research studies were conducted. This chapter describes research study individually in detail with information about the hypotheses, measurement, and results.

As discussed in **Chapter 4**, each empirical study presented its findings. In this chapter, a general overview of discussion is presented, and each study's discussion is also presented, in order to facilitate easy understanding of the discussion.

A summary of the conclusions of the dissertation is presented in **Chapter 5** along with the conclusions of the individual studies for ease of understanding.

Chapter 6 summarizes the contributions of this dissertation. A practical contribution is made to physicians, patients, and platform managers in this chapter, in addition to theoretical contributions to the field.

There are three research studies in this dissertation that have limitations, which are discussed in **Chapter 7**.

Chapter 8 discusses future research directions.

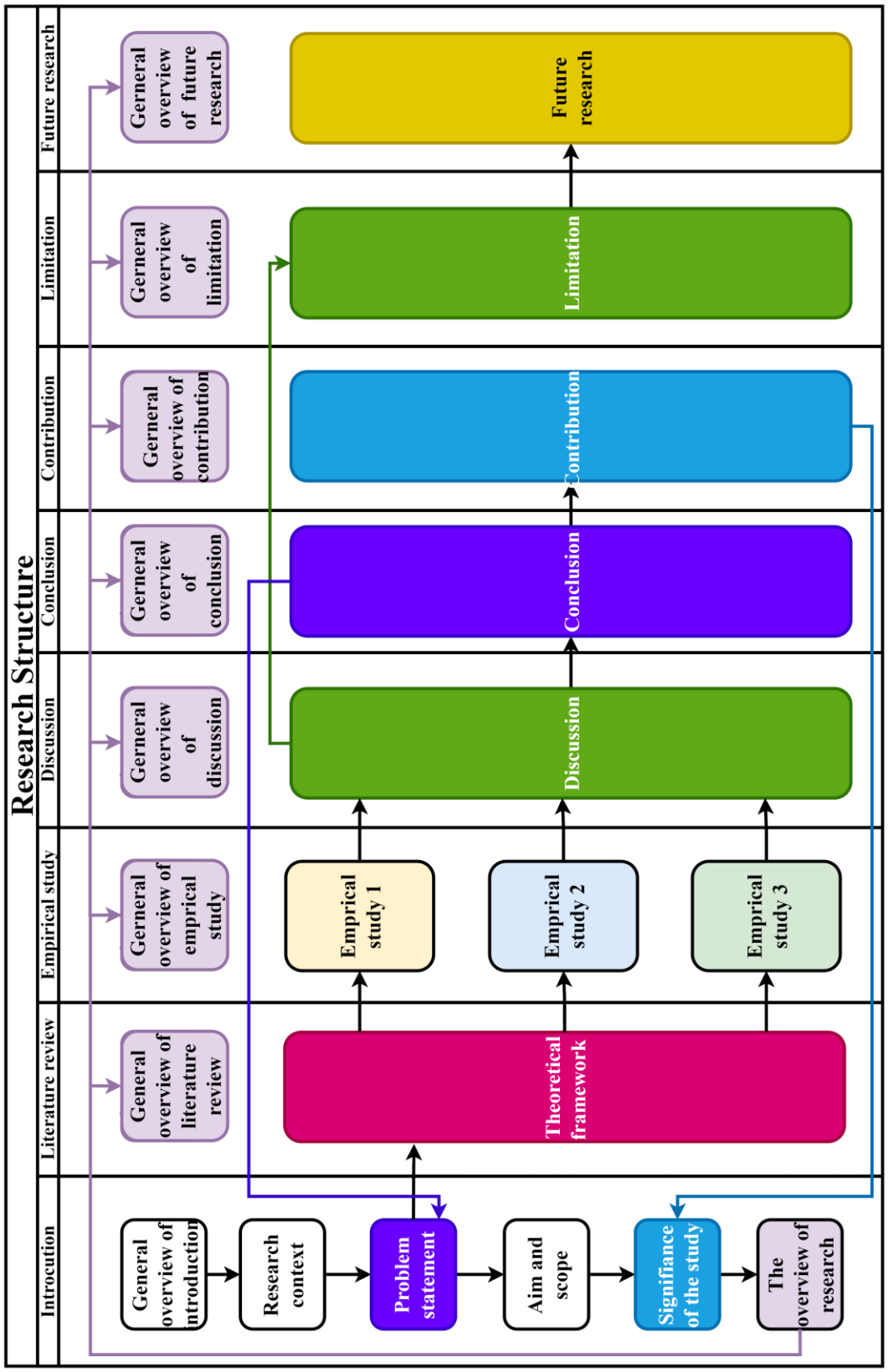


Figure 2 Research structure

Chapter 2. LITERATURE REVIEW

2.1 General Overview of Literature review

An overview and a literature review of signaling theory, multi-source information, and the main concepts that have been presented in this dissertation are presented in this chapter. There is a consideration of the following main concepts: online healthcare communities (OHCs); service quality; social support; trusting beliefs; personal qualities of physicians; and online consultations.

2.2 Online health communities (OHCs)

Healthcare has become increasingly reliant on online consultations in recent years (Y. Zhang et al., 2022). Patients and physicians are increasingly using OHCs as a result of the development of information technology (X. Lu et al., 2021). OHCs are communities built on websites that serve to facilitate physician-patient interaction and serve as central communication platforms for patients to receive, among other things, online medical services, information about their illness, and emotional support. They provide a medical ecosystem, provide physicians with access to patients, and serve as a platform for patient communication (Wu & Lu, 2016; Yan & Tan, 2014). Besides, OHCs also extend the traditional physician-patient relationship by providing patients with the opportunity to consult with physicians about certain health issues from anywhere and at any time (Q. Chen et al., 2021). In other words, OHC platforms enable patients to consult with physicians even when they are not physically present with them (Wu & Lu, 2017).

By offering patients' consultations online, physicians can meet the growing medical demand of patients and overcome the limitations of geography and time, allowing patients to choose physicians from a broader geographical area (K. Gong et al., 2020). The volume of consultations on OHC platforms has been considered an important indicator of physicians' activity (X. Zhang et al., 2022). OHC platforms are popular due to their efficiency and immunization capabilities. The use of online consultations in regard to immunization may help reduce the risk of spreading the COVID-19 by avoiding in-person contact (Ellis et al., 2020). Online consultations are an extremely efficient method for both patients and physicians. There have been major concerns during COVID-19 regarding medical facility shortages and overcrowding, and it is difficult for physicians to devote sufficient time and energy to their patients. The OHC platform offers an innovative approach to address physician-patient contradictions. It is also necessary for the lockdown strategy to demonstrate a negative COVID-19 test within 48 hours of the lockdown, which is an additional cost and a time-consuming procedure (Figueiras & Hajizadeh, 2020). Despite these challenges, OHC platforms can transcend time and space in order to overcome them (L. Chen et al., 2020).

Prior to choosing a physician, patients using OHC will be able to access the homepages of physicians; they will search for diseases, then review the list of all physicians, and visit these physicians' personal websites to obtain the information they require, including medical title, hospital level, recommended value, articles, etc. (Q. Chen et al., 2020). The patient is then able to make a decision regarding consultation after working through all these steps. Figure 3 illustrates how the OHC platform works.

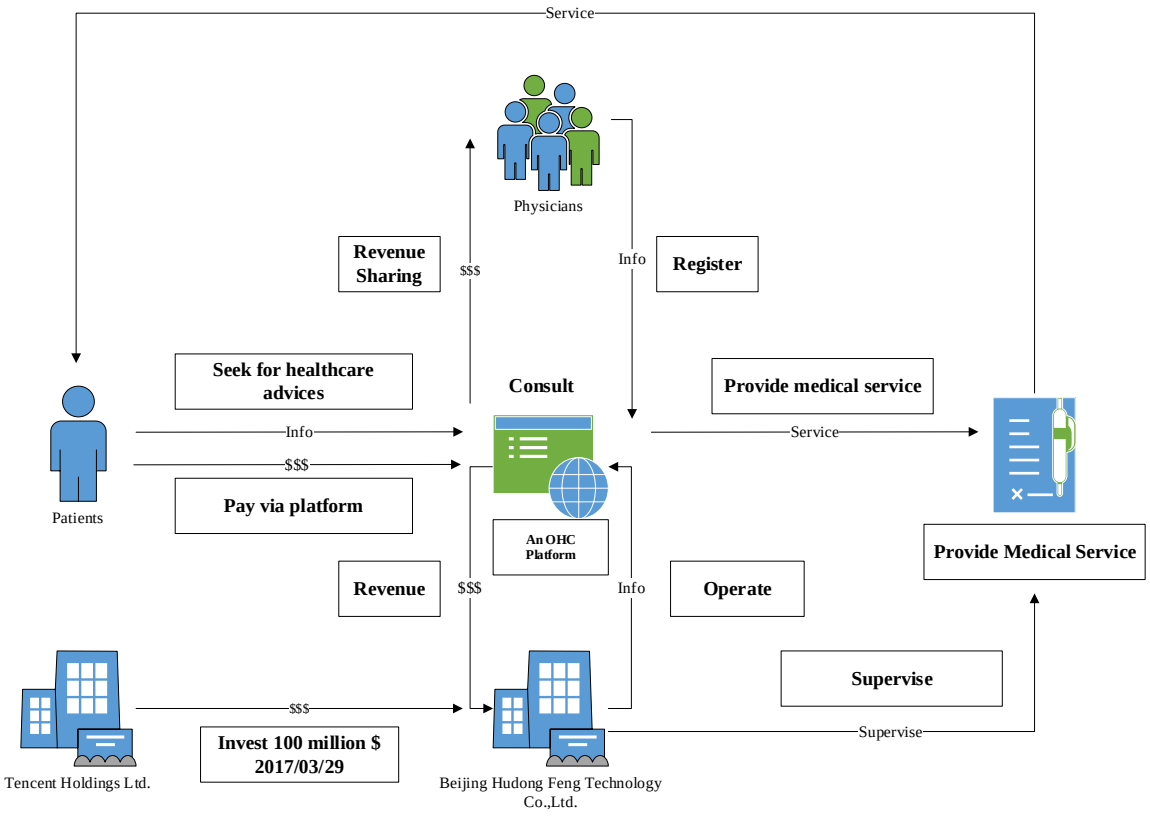


Figure 3 What is OHC platform

Different perspectives have been taken into account in some studies regarding the benefits of OHCs. Physicians can earn additional income from digital gifts and bonuses, and acquire rich clinical experience through these online services, and even build a better reputation online and off for their own self-fulfillment (S. Guo et al., 2017). A reduction in the cost of outpatient appointments and improved patient knowledge of health management will enable patients to access more comprehensive medical information without time or space constraints (J. Zhao et al., 2013). Physicians and patients will benefit from this new method of consultation in that it improves the efficiency and impact of diagnosis and treatment, reduces physician-patient conflict, and enables patients to

choose a physician who will help them recover as quickly and effectively as possible (H. Yang, Guo, Wu, et al., 2015).

The increasing importance of OHC platforms in the healthcare environment during COVID-19 has resulted in a significant information asymmetry between patients and physicians (Akçura & Ozdemir, 2017), which has developed into a serious issue that may compromise a patient's quality of care (Dulleck & Kerschbamer, 2006). There is difficulty in determining which physician is best suited to a patient's needs. In most cases, physicians are unaware of the exact nature of the patient's illness. In parallel with offline medical therapy, the diversity of physician information overload affects patient selection as well (Abrahao et al., 2017). Hence, OHC platforms must establish how to facilitate patient selection of the best physician for their specific disease features expeditiously in order to improve online service quality.

2.3 Online healthcare consultation

It is becoming increasingly common for individuals to use online resources to address their health-related concerns with the advent of digital technologies such as Health 2.0 (Q. Chen et al., 2021). By using App or website, OHC platforms enable practitioners to communicate with their patients in the healthcare field (Swan et al., 2019). As a result of the development of OHC platform technology, the number of OHCs has increased. Healthcare consultations regarding a variety of medical conditions are accessible to access through OHCs. In the meantime, OHC members may be able to provide support and knowledge regarding the experience of coping with disease (Mirzaei & Esmaeilzadeh, 2021; Yan & Tan, 2014). A physician and patient participate in an online healthcare

consultation from separate locations and communicate through an online healthcare consultation system (Wu & Lu, 2017). It is possible to streamline and reduce the cost of medical treatment by using a variety of consultation methods, in most cases, this can be accomplished via video, telephone, image-texting, or even live consultations. Additionally, online consultations provide physicians with the flexibility to work from anywhere and at any time (Yin et al., 2022). In response to the growing demand for medical services, online patients' consultations are generally recognized as an innovative approach. When choosing a physician around the world, online tools provide users with more options beyond geographical and temporal limitations (K. Gong et al., 2020).

Research has also been conducted on the importance of patients' consultations on OHCs. With the assistance of a web crawler, Li et al. (2019) compared the quality of telephone consultations between online and offline reviews. Gong et al. (2021) conducted a longitudinal panel study using haodf.com data to investigate the impact of physicians' character traits and reputations on patient choice. With the aid of a web crawler, Ouyang et al. (2022) evaluated the impact of self-disclosed information on the decision of patients to use OHC platforms.

In recent years, academics and healthcare practitioners have given extensive attention to online healthcare consultations (Q. Chen et al., 2021). During the period of the COVID-19 pandemic, Shah et al. (2021) examined how patients' consultations decisions were influenced by different online and offline signals and disease risks. An investigation of 907 Chinese OHC website physicians' online consultation behaviors based on reviews was conducted by Liu et al. (2019). An online medical consultation service's impact on patients' decisions to continue using the service was re-examined by Yang et al. (2021)

using a contextualized valence framework. In contrast, little research has been conducted on the social support physicians provide to their patients during their online consultations. As a consequence, it is imperative to examine the role played by physicians' social support in the decision-making process pertaining to online healthcare consultations.

2.4 Multisource Information in OHCs

The multiple information displayed on physicians' homepages on OHC platforms significantly influences patient decisions (Y. Li, Song, et al., 2019). The value of information derived from different sources varies, so it is important to take this into account when evaluating information (Q. Chen et al., 2020). For important purchase decisions, customers tend to use information from multiple sources, including information from other customers, third-party sources, and manufacturers (Beritelli et al., 2007; J. S. Kim & Ratchford, 2012; Y. Li et al., 2017). Some examples of multiple information source on OHC platform have been shown in Table 3.

Table 3 Multiple information sources

Information Type	Source	Example
Physician-generated information	Derived from physicians	Articles; Titles; Greeting message
Patient-generated information	Derived from patients	Digital gift; Thank-you letter
System-generated information	Derived from third-party	Annual badge; Rating

The impact of patient-generated (e.g., thank-you letters, and digital gifts), physician-generated, and system-generated information has been studied in previous studies (Q. Chen et al., 2020; H. Yang, Guo, Wu, et al., 2015). User-generated information and system-generated information have been the subject of a great deal of research over the

past decade (Archak et al., 2011; J. Chen et al., 2011). In spite of its widespread recognition as a credential good, medical services are seen as more of a professional service than merely an ordinary business transaction (Z. Huang et al., 2022).

Developed by individuals who have actually undergone an online consultation regarding their health issues, patient-generated information is based on the patient review functions within OHC platforms (Q. Chen et al., 2020). In addition to reflecting the outcome of the physician's service, patient-generated information could also be reflective of the patients' choice at different stages in the treatment process (Y. Li, Ma, et al., 2019). Information derived from a computer system or machine is referred to as "system-generated information" (Westerman et al., 2012). Because system-generated information originates from neutral parties, it is considered to be more objective and reliable (J. Chen et al., 2016). Because system-generated information originates from neutral parties, it is considered to be more objective and reliable (H. Yang, Guo, & Wu, 2015). As physicians generate more information than systems and patients on OHC platforms, physician-generated information has become increasingly important (Z. Huang et al., 2022). To gain a deeper understanding of how information from multiple sources influences patients' behaviour, further analysis is needed.

2.5 Signaling theory

Signaling theories contend that two parties (individuals or organizations) communicate using disparate information to convey their messages (Kromidha & Li, 2019). A theoretical framework is developed for the use of signals to communicate information about the quality of a service, thereby facilitating the purchase process (Wells et al.,

2011). Consequently, sellers can use signaling theory to communicate information about the quality of their service by using a powerful tool called a signaling theory. Customers can use a signal to determine the level of service quality they can expect from a seller. The quality of services rendered by unknown suppliers may not be able to be assessed before a buyer makes a purchase decision. As an alternative, signals are intrinsic and visible indicators, which are useful for providing reliable information regarding unobservable characteristics, such as the quality of sales. (Schlosser et al., 2006). There is a change in the perception of service quality once the information receiver understands the signal received. Finally, in order to understand the quality of service, signaling theory is crucial.

Also, there is an imbalance in information between signalers and receivers for OHC platforms, as signalers and receivers possess different amounts of information and information types (Kromidha & Li, 2019). In the case of a potential conflict between a physician and patient, for example, there may be a greater level of knowledge on the part of the physician (A. A. Shah et al., 2020). Physician-patient information asymmetry is greater during pre-purchase consultations than during in-person consultations (Laugesen et al., 2015), there is evidence that signals can assist in reducing the asymmetry of information (Ho & Wei, 2016). As a result of this situation, signalers provide high-quality medical care (A. M. Shah et al., 2021). In order to establish communication, signals are exchanged between a signal sender (physician) and a signal receiver (patient). Signalers are evaluated by their receivers for the quality of their service. Therefore, physicians' signals determine the degree of information asymmetry and, consequently,

the behavior of patients. Physicians (signalers) provide health information to patients (receivers) via OHC platforms (L. Chen et al., 2020).

Regardless of how unlikely a person is to provide an e-consultation, market signals and seller signals (offline reputation and online effort) have significant impacts on their decision to conduct an e-consultation (Shah et al., 2021). Using signaling theory as a guide, Wu & Lu (2017) investigated how online signals (physicians' log-in behavior and online reviews) affected online patients' consultations. Patients' information search and review quality were positively influenced by the service price, but purchasing and reviewing decisions were negatively impacted based on signaling theory (Wu et al., 2021). More details of studies based on signaling theory are shown in Table 4.

Table 4 Studies based signaling theory

Author	Years	Research
Yang et al	2015	The influence of system-generated information and patient-generated information on the online search, evaluation and decision of patients
Liu et al	2016	The impact of physician's web reputation and offline reputation, the hospital's web reputation and offline reputation on patients' decision
Lu et al	2017	Analyzing the impact of online signals, including physician log-in behaviors, on patients' consultations
Shah et al	2021	Investigate the impact of different online signals, offline signals, and disease risk on patients' physician selection choices during the COVID-19 crisis.
Wu et al	2021	Explore the relationship between service price, patients' information search and review quality.

Based on prior research, this study applied a signaling theory approach to examine how multiple information sources influences patients' consultations decisions online directly and moderately (X. Liu et al., 2016; H. Yang, Guo, & Wu, 2015).

2.6 Online health service quality

Service quality is determined by its overall performance or competitiveness as determined by its users (Zeithaml, 1987). Its inseparability and intangibility contribute to its exclusive and abstract nature (Parasuraman et al., 1985). Service quality can also be measured in terms of how well a service performs compared to expectations (Akter et al., 2013). Based on the findings, three categories of service evaluation were identified, which are summarized in Table 5.

Table 5 Categories of Services quality

Category	**The appropriate time to evaluate**	**Evaluation**
Search Properties	Before the Purchase	Namely credibility; Tangibility
Experience Properties	After the Purchase	Reliability, responsiveness, accessibility, courtesy, communications and empathy
Credence Properties	After the Evaluation	Hard to evaluate

It should be noted, however, that most research on quality of healthcare services makes use of either a two-dimensional model to measure functional quality and technical quality, or the SERVQUAL model to measure the patients' perception of quality of healthcare services (Grönroos, 2000; Parasuraman et al., 1985). There are four dimensions of quality in online services (Gummerus et al., 2004): need fulfillment, security, responsiveness, and user interface. It is not a physical issue, but a platform issue that determines the user interface. In this dissertation, service quality is seen as a signal generated by physicians in order to attract patients to OHCs. Further, it is essential that medical services are provided in a manner that ensures the safety of patients, the right solution for diseases at the right time and the right level of security (Akçura & Ozdemir,

2017; Fichman et al., 2011). As a result, the user interface dimension was excluded from this dissertation. This dissertation adopted (Gummerus et al., 2004)'s three-dimensional study of online service quality (security, need fulfillment, and service responsiveness) to examine physicians' service quality on OHC platforms. It is ultimately a dimension from a platform perspective. Consequently, this dissertation does not include the user interface dimension.

2.7 Social support theory

OHCs provide users with social, emotional, and informational support in addition to sharing their health-related experiences and questions (Eysenbach et al., 2004). Social support can be defined as a mechanism for exchanging information that encourages people to feel valued, respected, and a member of a socially cohesive group (Cobb, 1976). Supportive interactions provide users with different benefits depending on what they seek and how they seek it (Barbee & Cunningham, 1995). Patients who use OHCs require different types of support, and physicians who use OHCs provide these types of support, so it is of utmost importance to match users' needs for support (Chou et al., 2009).Thus, OHCs provide emotional support, information, and recommendations through verbal and nonverbal cues (Walther & Boyd, 2002).

In order to effectively provide social support, it is important to recognize its multiple dimensions. There are five distinct types of support that can be identified in previous research, including tangible, informational, network, esteem, and emotional support (Cutrona & Suhr, 1992). Lin and Kishore (2021) examined social support from three perspectives: informational support, experiential support, and emotional support. Online

users most commonly encounter informational and emotional support (Knobloch et al., 2018). Although online social support can provide both information and emotional support, such as sympathy and kindness, it is also possible to obtain information through online social support (L. Chen et al., 2020; Mirzaei & Esmaeilzadeh, 2021). The purpose of research is to investigate the effect of social support as one dimension of physician-generated information on patients' consultations. Thus, this research excluded experiential support, since it comes from a patient's perspective.

With the rise of OHCs, patients' consultations have been profoundly affected. Through the ability to communicate in more innovative ways between physicians and patients, they have been able to access essential information that they need. This is in order to meet each other's social needs in a more effective manner (Eysenbach et al., 2004). In order to give patients greater confidence in the information, physicians often post articles in OHCs regarding the treatment and prevention of illness, accompanied by their medical and academic titles. It is possible for patients to use this information when selecting a physician to treat their condition (Ouyang, Wang, & Jasmine Chang, 2022). The physician's words may also help ill patients feel more at ease since they desire attention from others. Thus, it is imperative to recognize that informational and emotional support are fundamental components of social support in OHCS. It has been reported in the past that the social support provided by physicians has a profound impact on the way they treat a disease. For instance, observations made by Thoits (1982) indicate that social support can assist patients in dealing with stressful events. A study conducted investigated the relationship between psychological well-being and social support (S.

Cohen & Wills, 1985). Psychiatric symptoms can be relieved by social support (McCorkle et al., 2008).

Table 6 Literature of social support

Author	Year	Research
McCorkle et al	2008	Social support boosts people's well-being and relieves psychiatric symptoms
Yang et al	2015	Examine patient satisfaction under varying levels of disease risk based on social support in OHCs.
Frow et al	2016	The function of social support in treating illness severity as a regulatory factor.
Wang et al	2017	Analyze OHC users' Web-based interactions, reveal which types of social support activities are related to users' participation, and predict whether and when a user will churn from the OHC.
Chen et al	2020	Proposes a model that explains the signaling roles of linguistic feature within OHC posts in promoting social support provision from OHC participants.
Liu et al	2020	Develops a model of how belongingness and social support affect the four value co-creation behaviors (i.e., information sharing, responsible, feedback, and advocacy behaviors) in OHCs based on need-to-belong theory and social support literature.
James et al	2022	Examines the mediating influence of OHC cohesiveness, altruism, and universality on the relationships between active and passive use and received OHC social support.

A study conducted by Kiyohara et al., (2001), reveals that a patient suffering from a serious illness expects the physician to provide with more social support online. Over the years, researchers have begun looking at the role social support plays in influencing consumer behavior in OHCs as time has progressed. Yang et al. (2015) examined the relationship between the level of satisfaction of patients across a range of disease risks in patients and social support. Social support was considered to be a regulatory factor in the treatment of illness severity in both the study by Frow et al. (2016) and Saggi and Jai (2018). It is possible for patients as well as physicians to participate in consultations conducted online for the purpose of creating value. As far as physician-generated

information is concerned, it has not been extensively studied how physicians' social support as one dimension of physician-generated information impacts their patients during consultations. It is, therefore, the purpose of this dissertation to explore the effect of social support on patients' consultations in the OHCs. In Table 6, the literature of social support was summarized. .

2.8 Trusting Beliefs

It has been noted that trust is a significant factor in a variety of different areas, for example performance appraisal, leadership, negotiation, interpersonal communication, and teamwork (J. (David) Xu et al., 2016). Many different fields of study have been conducted on trust in recent years, including psychology, sociology, management, and economics, and its significance has been generally acknowledged since the middle of the twentieth century (Y. Gong et al., 2021b). In essence, trust in a relationship is a belief in the trustworthiness and reliability of one party and in the ability and intentions of the other party (Morgan & Hunt, 1994). Trust is regarded as a precursor in many buyer-seller relationships, so consumers have high expectations for satisfying exchange relationships (Hawes et al., 1989). By reducing uncertainty and potential hazards for customers, trust facilitates business transactions in uncertain circumstances (Corritore et al., 2003). It is critical to establish trust not only in offline settings, but also when working online (Gefen et al., 2003; Gefen, 2000; Schoorman et al., 2007). The results of previous research demonstrate that consumers often refrain from transacting online due to perceived risk and uncertainty (McKnight et al., 2002). From minor inconveniences to fraud, uncertainty can be seen as a cost of doing business (Citera et al., 2005). The cost of such transactions can be reduced through trust (Cummings & Bromiley, 2016). Among

economists and sociologists, trust is predominantly considered to be a trait that lessens transactional fear and uncertainty (Zucker, 1986).

In the case of initial trust, it represents expectations regarding the development of trusting beliefs. As a result of social categorization, reputation, illusion (irrational thinking), dispositions, institutional roles, and structures, or the desire to instantly cooperate on an assignment (McKnight et al., 1998), trusting beliefs can be formed instantly (before parties have meaningful information about each other). As part of the process of building trust for e-commerce, a customer's trusting beliefs are significant in determining their trusting intentions in the process (McKnight et al., 2002).An individual's trusting belief in e-commerce refers to their perception that a particular web-based vendor offers them benefits (McKnight et al., 2002).

Three dimensions are generally associated with trusting beliefs: competence, benevolence, and integrity (Mayer et al., 1995). A trustee's competence is his or her ability to meet the beneficiary's expectations (Agyei et al., 2002). The trustee's benevolence is reflected in his or her desire to act in the beneficiary's best interest (Agyei et al., 2002). A trustee's integrity depends on his or her honesty and ability to fulfill their responsibilities (Agyei et al., 2002). In spite of the fact that these three dimensions of trusting beliefs may be related, they are distinct at the same time (Schlosser et al., 2006). It has been observed that purchasing behavior is influenced by trusting beliefs (integrity, benevolence, and competence) in buyer-seller relationships (Xu et al., 2016). As health care services are inherently associated with the lives of patients, patients and physicians suffer from a severe information asymmetry in OHCs (Akçura & Ozdemir, 2017; Fichman et al., 2011). Therefore, the trusting beliefs of patients as an indicator of the

quality of medical services provided by physicians play an important role within the context of OHCs.

2.9 Gamification

It has become increasingly popular to use gamification across multiple fields, including those related to information and business (Colbert et al., 2016; D. Liu et al., 2017). In health, education, sustainable consumption, marketing, and commerce, gamification is now being used as a new strategy for attracting customers (Hamari et al., 2014; Kankanhalli et al., 2012). The idea of gamification is to apply game design principles to non-game environments in order to enhance the user experience and increase engagement among users (Deterding et al., 2011). Gamification is the process of improving a service through the introduction of a game-like experience in order to increase the value users generate for themselves and their communities (Huotari & Hamari, 2012). In a variety of contexts, gamification was used in order to enhance the engagement of the users with the system (Ouyang, Wang, & Ali, 2022). There are a number of forms and patterns of gamification available. Badges, leaderboards, and points are common elements of gamification (Liang et al., 2017).

Gamification is not only an important marketing strategy, but it can also have a positive impact on customer experiences and intentions (Deterding et al., 2011; Mullins & Sabherwal, 2020). In addition, gamification plays a critical role in stimulating consumer behavior (Xi & Hamari, 2020). From the standpoint of social interaction, gamification design influences user engagement in online communities (Song et al., 2018), intention to purchase(Y. Xu et al., 2020), perceived value (Qian et al., 2022). On

physician homepages, badges are displayed in the most readily accessible location, below the profile picture, as shown in Table 7.

The OHC has exhibited a higher level of caution when making decisions than other types of online communities because patients are concerned about ineffective treatment and high risks. The gamification design of OHCs has been investigated by scholars in order to determine whether or not it has an impact.

Table 7 Description of the gamification design using the badge.

Gamification design	**Examples**
No badges	
One badge	

Five badges

For instance, a number of variables have been examined, including physicians' engagement in hospitals and clinics can be affected by discrepancies in professional seniority and gamification. (J. Liu et al., 2020) Despite substantial research into gamification's potential impacts, most of these studies focus primarily on its direct effects. Research remains inconclusive regarding the role that gamification badges can play in facilitating medical information exchange between physicians and patients.

Chapter 3. EMPIRICAL STUDY

3.1 General Overview of Empirical Study

The purpose of this chapter was to provide an overview of the hypotheses, research design, method, and sample used in three research studies. The data were analyzed using quantitative methods in all three studies. As the research background is based on Chinese OHC platforms, the data were collected from a Chinese OHC platform. The data was collected using a Python program in order to maintain a high level of accuracy and speed. Despite sharing the same sample and data, the equations and measurements used in each study differ according to its specific purpose. A general model of all the variables involved in three studies can be seen in Figure 4, which shows all the main variables involved. In order to make it clear what variables each study is addressing ,Figure 5,Figure 6 and Figure 7 show what parts of each study are included in the overall research model. It is the purpose of Study 1 to examine the impact of service quality as physician-generated information on the consultation of patients. Study 2 examines the impact of social support as physician-generated information on patients' consultations and the moderating effect of patients' compliments as patient-generated information on the relationship between social support and patients' consultations. The aim of study 3 is to examine the relationship between trusting beliefs and patients' consultations as physician-generated information, as well as the moderating effect of gamification badge design on patients' consultations as system-generated information. The raw data example see Figure 20 in Appendix.

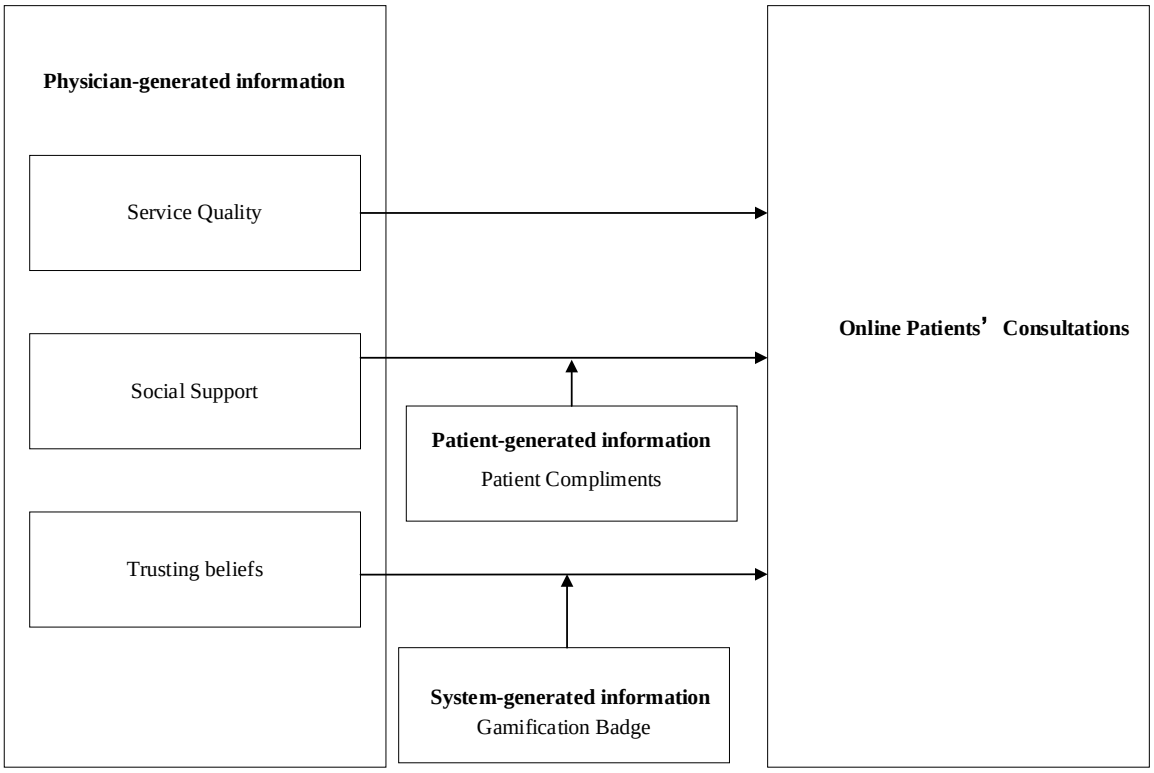


Figure 4 Research model

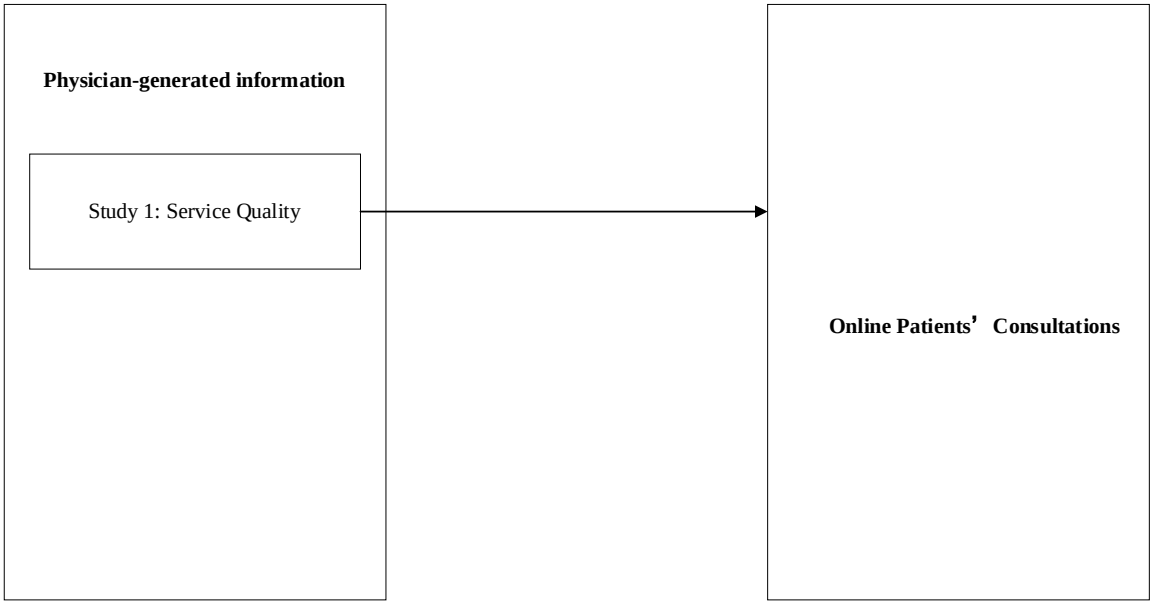


Figure 5 Research model of Study 1

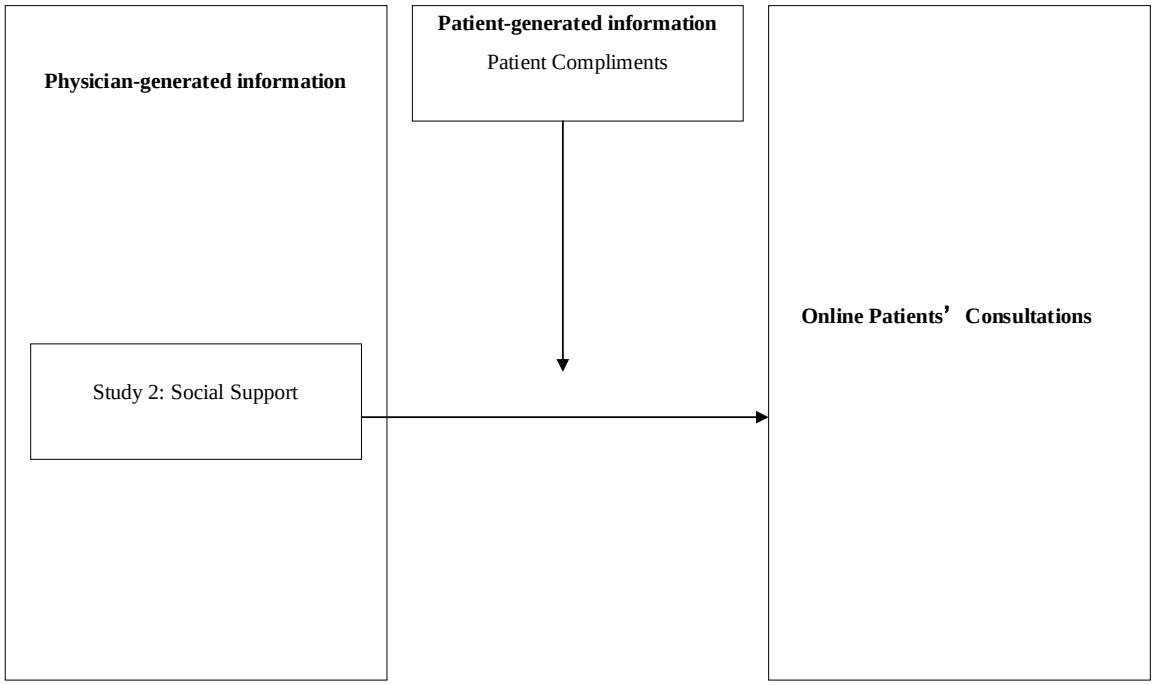


Figure 6 Research model of Study 2

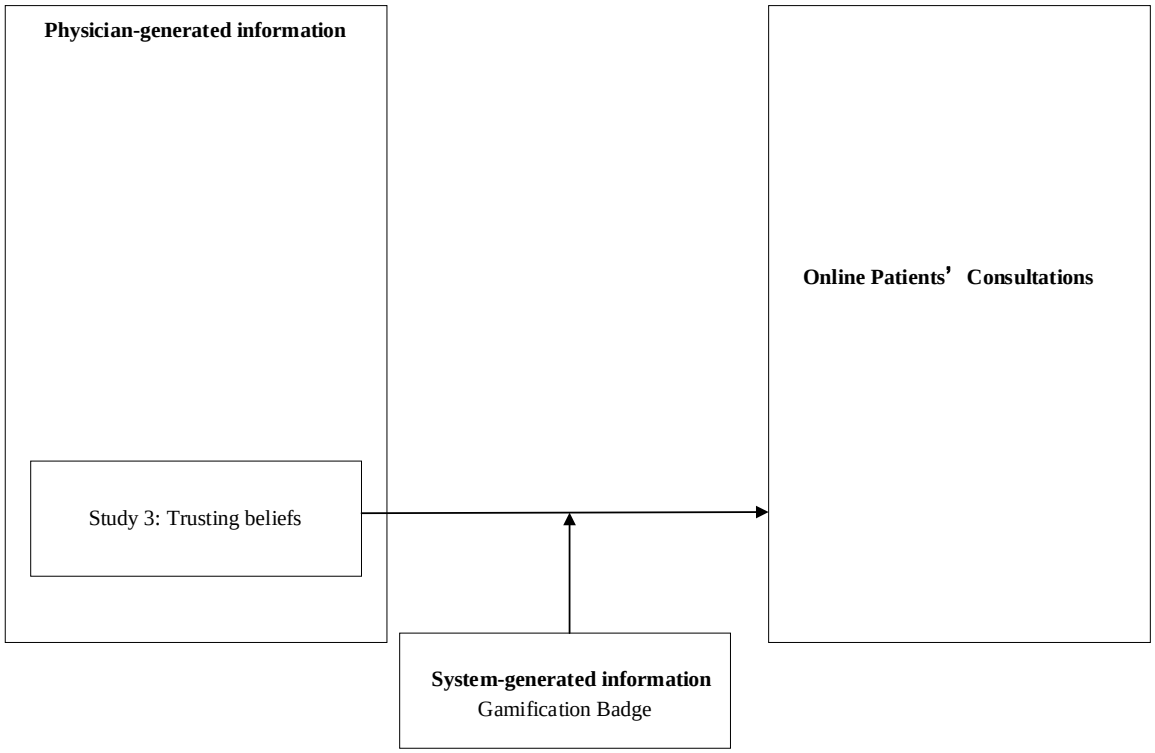


Figure 7 Research model of Study 3

3.2 Empirical Study 1

3.2.1 Hypotheses of Study 1

As COVID-19 has reached epidemic proportions, the traditional health care system has become inconvenient for both patients and physicians (Castelnuovo et al., 2020). Considering that the COVID-19 virus crisis is caused by an infectious disease, people should maintain social distance and reduce their chances of coming into direct contact with each other in order to decrease their chances of contracting it (Golinelli et al., 2020). As a result, online communities play a significant role in pandemic prediction, the response to pandemics, and crisis management in public health (X. Zhang et al., 2022). A growing number of health care services are being provided via the Internet in response to the increased need for healthcare services and the rapid growth of technology (Hardey, 2001). A healthcare community online provides both patients and physicians with a novel channel of consultation regarding health issues in an environment free of time and geographical limitations location (L. Chen et al., 2020). As a result of replacing traditional information systems with OHCs, hospitals improve their productivity of medical information systems, thereby reducing and controlling the spread of infectious diseases and ensuring greater patient and physician safety (Golinelli et al., 2020, 2020). In addition to providing patients with information, platforms such as these can assist them in finding a physician who practices in a particular manner (Neubeck et al., 2020). It is beneficial for patients to have access to the information on OHC platforms when deciding whether to consult with a certain physician and to be more prepared for the consultation (L. Li et al., 2020).

On the OHC platform, patients have a challenging task to solve - how to resolve information asymmetry to select physicians who provide high levels of service quality (J. Liu et al., 2022). Asymmetry of information is more serious than in traditional industries, and patients must overcome this problem in order to obtain the accurate information they require . Furthermore, unlike other services, healthcare is a matter of life and death, so there is a high level of importance placed on service quality in this situation. A growing number of consumers are demanding high standards of service, and healthcare researchers are focused on the role that service quality plays during the decision-making process of patients (Cao et al., 2017). The signaling theory can also be used to understand service quality as a signal. Due to the fact that it provides a visible and extrinsic indication, it may provide reliable information about something that cannot be seen (Schlosser et al., 2006). Information regarding service quality can be communicated between consumers and service providers through signals, thereby impassively reducing the asymmetry of information between them (J. Li et al., 2019). Considering this, the importance of conducting research on service quality within the healthcare industry cannot be overstated. In general, the term service quality is used to describe how users evaluate a service's overall superiority or brilliance.

It has been observed that some researchers have placed emphasis on service quality within the field of OHC platforms/OHC (Q. Chen et al., 2021). The quality of service has been defined as a one-dimension variable, and this variable positively influence on the consultation intention of patients, which means that a new patient will be registered next week as a result(Cao et al., 2017). Two-dimensional indicators of service quality have also been identified (functional quality and technical quality), which are positively

related to patients' choice (N. Lu & Wu, 2016). In spite of this, little research has been conducted concerning the impact of multidimensionality of service quality on the choice of consultations made by patients. There has been a tendency to view service quality in a multidimensional manner. In Gummerus's assessment, need fulfillment, security, responsiveness, and user interface are the four dimensions (Gummerus et al., 2004). In Akter's view, service quality can also be considered three-dimensional (data quality, system quality, and interaction quality) (Akter et al., 2013). This study is intended to address this gap between research by investigating how service quality affects patients' consultations from multiple perspectives.

It is important for consumers to check physician profiles on OHC platforms so that they can obtain information about the physicians' and determine whether or not he or she is capable of providing quality care. With regard to service quality, it indicates how well the service meets the expectations of the consumer (Lewis & Booms, 1983). Due to the high quality of medical services provided by physicians, as well as their diagnosis and treatment skills, OHC platforms are directly linked to disease diagnosis, treatment, and patient safety (Wu et al., 2020). Ren and Ma (2021) measured the quality of service by counting how many physicians provided answers during patients' consultations (Ren & Ma, 2021). Prior studies of OHC platforms have investigated quality of physicians' service in a one-dimensional manner. Through the display of pertinent online signals regarding service quality via OHC platforms, physicians can influence the selection of online consultations for their patients. Therefore, patients require high-quality signals provided by physicians as a result of their difficulty in obtaining relevant information regarding the quality of their physician's services as a result of information asymmetry

(Carlsson, 2000). Several factors can influence the quality of online services, according to a study conducted by Gummerus: security, responsiveness, need fulfillment, and user interface. Considering that the user interface is a dimension from platform perspective, this study considered social support from physician-generated information perspective, this dimension is not appropriate for this study. This study seeks to investigate the multidimensional aspects of service quality of physicians on OHCs by adopting three dimensions (security, need fulfillment, and service responsiveness) (Carlsson, 2000; Gummerus et al., 2004).

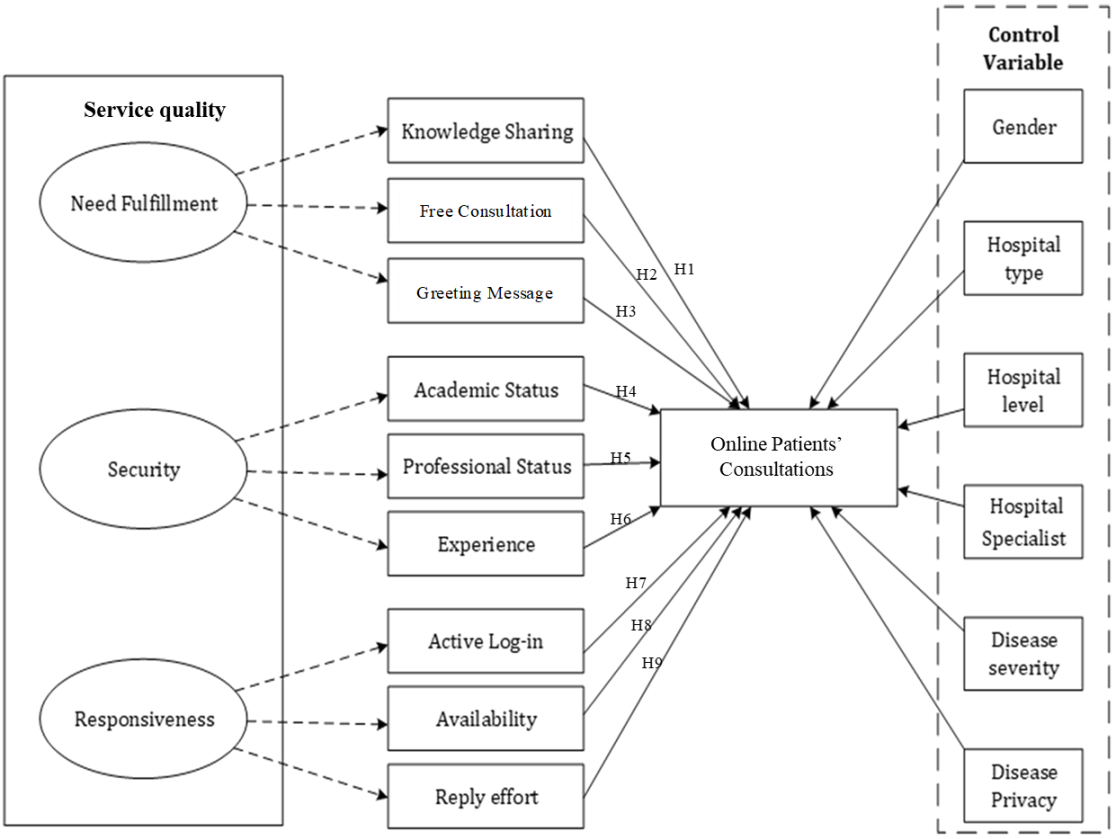


Figure 8 Research model of Study 1

Figure 8 illustrates a model of physician online service quality and patient online consultations. The model describes how service quality(security, response time, and

fulfillment of needs) of physician’s care affects the consultation decision of patients online based on signaling theory.

3.2.1.1 Need fulfillment and Online patients’ consultations

In general, the ability to fulfill a client's needs is one of the best indicators of trust and satisfaction with a service provider (Gummerus et al., 2004). It has been found by researchers that patients require informational and emotional support from online communities, as well as from OHCs in particular (Vlahovic et al., 2014). The OHC platforms allow health professionals (physicians) In order to offer patients information support, such as treatment advice and free medical knowledge sharing, the following resources are available. The process of patient consultation may be positively affected by this (X. Zhang et al., 2022). For instance, researchers have found that online consultations with patients are positively associated with the sharing of physician knowledge and a reflection of physician-patient relationships on OHC platforms (X. Zhang et al., 2022). The consultation of online patients is a cooperative endeavor in which both parties are involved. Due to the unforeseen nature of diseases, patients may require disease-related information at anytime and anywhere. Internet-based health platforms are accessible, reliable, and practical (Nicholas et al., 2002). A major function of the OHC platform is to provide patients with access to health information through physicians' free articles, which can be used to find pertinent information. Due to the ease of accessing and finding information on the Internet, there is a strong desire among patients to be involved in their medical decisions (McMullan, 2006). It has been observed that free consultations are offered by certain physicians in order to provide simple answers to patients' questions

posed to them by patients on OHC platforms, which may stimulate the next paid consultation.

Furthermore, researchers have found that participants in online communities and OHC platforms participate for a variety of reasons other than information gathering (Nambisan, 2011). Aside from information, some users (patients) need emotional support as well (Vlahovic et al., 2014), which includes empathy, supportiveness, understanding, warmth, encouragement, approval, consideration, and care (Nakikj & Mamykina, 2017). A physician's homepage greeting message provides emotional support within the context of OHC platforms. Reading the greeting messages of a physician can be helpful for patients in determining if the physician is capable of providing emotional support. In some cases, physicians write inspiring and motivating words, in other cases, physicians only write brief remarks about themselves or do not send any greetings. In view of the fact that patients use OHC platforms to receive emotional support, there is evidence that the presence of positive feelings in physicians' information or messages influences their decisions in a positive way (Ouyang, Wang, & Jasmine Chang, 2022; Yan & Tan, 2014). Accordingly, the following hypotheses are proposed:

H 1: Online patients' consultations are positively affected by knowledge sharing.

H 2: Online patients' consultations are positively affected by free consultation.

H 3: Online patients' consultations are positively affected by greeting message.

3.2.1.2 Security and Online patients' consultations

There has always been a disadvantage for patients due to healthcare features (Evans, 1974). These characteristics can be summarized as follows: first, every patient's health condition is different (Marx, 2006). Second, the issue of life and death is one of the most crucial (Fichman et al., 2011). Third, it is also imperative to note that physicians and patients have substantial information asymmetry, which complicates the clinical assessment and treatment procedure (Akçura & Ozdemir, 2017). Therefore, for many patients, choosing a physician with a high level of experience and trustworthiness is the most significant consideration when they use an OHC platform (Cao et al., 2017; Deng et al., 2019; F. Liu et al., 2019). As opposed to traditional encounters between physicians and patients, OHC platforms are designed to provide patients with information about a variety of health care providers, giving them the opportunity to select the physician who best suits their needs (Ba & Wang, 2013). Therefore, physicians provide information to receivers (patients) (for example, workplaces, web-based activities, titles, or patient reviews) (X. Liu et al., 2016), which provides patients with information about reliable physicians.

The concept of security refers to the absence of hazards, danger, and uncertainties (Grönroos, 2000), representing a stellar reputation and extensive medical experience. A patient may be influenced by the security of online consultations in making the decision to undergo one, and the role it plays is crucial in establishing trust between the patient and the physician (Gummerus et al., 2004). A patient who trusts their physician is more likely to choose him or her (Wan et al., 2020). In some cases, patients may believe that physicians who possess accurate and appropriate information provide high-quality

services, which may influence their decision-making process. Researchers have found that patients' decision to choose a physician is significantly affected by their perception of the reputation of physicians (i.e., professional and academic titles) (Deng et al., 2019). The online reputation of a seller can generally have a positive correlation with their sales (Forman et al., 2008). The same is true for online health care platforms, where patients prefer to select physicians whose reputation is excellent both online and offline (A. M. Shah et al., 2021), a wealth of experience is reflected in their academic and professional titles as well as their academic credentials. As a general rule, reputations of physicians both online and offline provide an indication of the overall capabilities of the individual. In various situations, physicians demonstrate competence and discernment as a result of their medical skills and experience (Chung, 2012) As well as the extensive practical expertise of physicians in diagnosing accurately (Hargreaves & Fullan, 2013). As a result, patients desire their physicians to be highly knowledgeable and highly skilled (Schattner et al., 2004). It is important to keep in mind that in OHCs context, physicians may be identified by their professional and academic titles, which represent their skills and expertise, as well as their past experience will be indicative of capability of physicians to render healthcare.

As a result, the following hypotheses are proposed:

H 4: Online patients' consultations is positively affected by academic title.

H 5: Online patients' consultations is positively affected by professional title.

H 6: Online patients' consultations is positively affected by experience.

3.2.1.3 Responsiveness and Online patients' consultations

The term responsiveness refers to the provider's ability to respond quickly to inquiries and proposals and to provide assistance in the event of a problem. (Zeithaml et al., 2000). A physician's responsiveness is a critical metric in online healthcare platforms that reflects consumers' (patients') perception of the provider's ability and readiness to respond to their inquiries (Gummerus et al., 2004). When it comes to service quality, consumers have become more aware of the significance of responding in a timely manner (Voss, 2000).

A physician's webpage may be considered to be responsive in OHC platforms based on some of its signals. First, the physician's frequent log-ins, availability, and responsiveness may demonstrate a high degree of responsiveness. A physician's log-in behavior is reflective of their active involvement in the OHC platforms. In terms of activeness and the number of consultations with online patients, there is a positive correlation (Y. Li, Ma, et al., 2019). A physician who is active on the Internet has a higher probability to be trusted by patients (Y. Li, Ma, et al., 2019; H. Yang, Guo, Wu, et al., 2015). Furthermore, some patients prefer to have physicians available when necessary in offline healthcare contexts (Holwerda et al., 2013). Patients may confirm a physician's availability by checking the physician's time for the appointment on OHC platforms. When patients require the services of a physician, it is considered to be more responsible if the physician takes longer than expected to schedule an appointment. Finally, it has been observed that both physicians' online initiatives have increased the amount of online consultations with patients (Deng et al., 2019). In order to improve customer perception of service, service providers' efforts are essential, the behaviors of physicians will

enhance the likelihood of customers making a purchase or continuing to make a purchase (Caruana, 2002). Patients can evaluate physicians using OHC platforms by measuring the length of the reply for each consultation. People favor physicians who are exert the greatest amount of effort online when deciding which physician to consult about health issues (Deng et al., 2019). As a result, the following hypotheses are proposed:

H 7: Online patients' consultations is positively affected by active log-in.

H 8: Online patients' consultations is positively affected by availability.

H 9: Online patients' consultations is positively affected by the reply effort.

3.2.2 Methodology and Measurement of Study 1

A leading online health care platform in China was established in 2006 by Good Physician Online (www.haodf.com). A variety of medical difficulties can be handled with the Good Physician Online App, the mobile website, the PC website, and other platforms, including online consultations and offline treatment appointments. The network of highly qualified medical providers registered on Good Physician Online will have served more than 740,000 patients by October 2021. It is estimated that 73% of these physicians are employed by large, high-level hospitals in China (*Good Physician Online*, 2022). A Python crawler is used in this dissertation to collect nationwide physician information at Good Physician Online in April 2022 in order to conduct research, no personal information is obtained. In this study, 14 diseases were classified in accordance with their degree of severity (Q. Chen et al., 2021). There are seven major causes of death: heart disease, Parkinson's disease, diabetes, hypertension, hypertension, heart disease, hypertension, liver cancer, lung cancer, and breast cancer. Infertility,

prostatitis, hepatitis B, menstrual disorders, pneumonia, depression, and pharyngitis are all low mortality issues. Good Physician Online physician profiles include online consultations, physician data, diagnostic evaluations, appointment times, and personal achievements popular science areas,. The final data included 2,982 physicians after eliminating those with missing values. As shown in Table 8, the data types and explanations are detailed. The data example of study 1 is shown in Table 26 in Appendix.

Table 8 Descriptive statistics of Study 1

Variable	Mean	S.D.	Min	Max
Consult	4581.30	5671.15	73.00	71678.00
Sharing	53.76	200.93	0.00	5720.00
Greeting	113.94	202.95	0.00	3975.00
Free	2.93	2.02	0.00	10.65
Aca_S	1.62	1.68	0.00	4.00
Pro_S	3.25	0.74	1.00	4.00
Exp	8.01	3.55	1.00	14.00
Login	2.37	0.59	1.00	3.00
Ava	7.18	5.34	0.00	35.00
Reply	4.65	3.53	0.00	65.75
Gender	0.34	0.47	0.00	1.00
H_type	0.99	0.08	0.00	1.00
H_level	2.99	0.12	1.00	3.00
H_Special	0.67	0.47	0.00	1.00
D_severity	0.37	0.48	0.00	1.00
D_Privacy	0.22	0.42	0.00	1.00

There are nine independent variables, six control variables, and one dependent variable as shown in Table 9. There is a dependent variable called ***Consult***, which counts the total number of online consultations from patients. In OHC platforms, the number of online patients' consultations is an essential measure of physician performance (X. Zhang et al., 2022). Independent variables include the number of articles that a physician has shared (***Sharing***), the length of the physician's greeting message (***Greeting***), the number of free consultations (***Free***), the physician's academic title (***Aca_S***), his or her

professional title (***Pro_S***), the year of online medical experience (***Exp***), the last time a physician logged on (***Login***), the time of appointment consultation that a physician has available (***Aval***), and the length of the physician's response to the consultation (***Reply***). Moreover, this study should control for physician and the characteristics of hospitals that may be relevant to patients' choices regarding consultations, such as the gender of the physician (***Gender***), hospital type (***H_type***), hospital level (***H_level***), whether or not the hospital is a specialist hospital, levels of mortality due to diseases (***D_Severity***) and privacy levels of diseases (***D_Privacy***). In Figure 9, the variables that appear on the physicians' website are illustrated.

Table 9 Variables Description of study 1

Variables	**Description**
Consult	Total number of Online patients' consultations
Sharing	Number of shared health articles
Greeting	The length of physicians' greeting message
Free	The total amount of free consultations
Aca_S	Academ\ic title of physician titles was classified into four levels, 1=teaching assistant, 2=lecturer, 3=associate professor, 4= professor
Pro_S	The medical titles of the physician were stratified into 4 stages, 1=the resident physician, 2=the attending physician, 3= associate chief director, 4=chief director.
Exp	The number of years that a physician begins online consultation on the platform
Login	Last online date 1=over 1 day ago, 2= within a day, 3= today
Aval	The number of half-day consultations that a physician has available
Reply	The average number of responses from physicians
Gender	Dummy variable indicating physicians' gender 0=Male, 1= Female
H_type	Dummy variable indicating the hospital type 0=Private, 1=Public
H_level	Hospital level: the scale of 1 to 3, with 1 being the lowest (1A or 1B) and 3 the highest (3A or 3B hospitals)
H_Special	Dummy variable indicating whether the hospital is a specialized hospital 0= Specialized, 1=General
D_severity	Dummy variable indicating the mortality of the disease 0=low, 1=high
D_Privacy	Dummy variable indicating the privacy level of the disease 0=low, 1=high

Figure 9 Variables on a physician's personal website

3.2.2.1 Model Specification of Study 1

In this study, Poisson regression and negative binomial regression were considered since the dependent variable is count data (the number of online consultations by patients). There is an excess of conditional variance over conditional expectation, resulting in excessive dispersion of data, Poisson regression cannot be applied. The following equation was examined in order to validate the model:

$$Consult_i = \alpha_0 + \beta_1 logSharing_i + \beta_2 logGreeting_i + \beta_3 Free_i + \beta_4 Login_i + \beta_5 Aval_i + \beta_6 Reply_i + \beta_7 Aca_{S_i} + \beta_8 Pro_{S_i} + \beta_9 Expertise_i + \beta_{10} D_{severity_i} + \beta_{11} D_{Privacy_i} + \beta_{12} Gender_i + \beta_{13} H_{type_i} + \beta_{14} H_{level_i} + \beta_{15} H_{special_i} + \mu_i + \mathcal{E}_i \quad (1)$$

where α_0 is the constant term, μ_i indicates the city impacts, and $\mathcal{E}_i$ means the residual error. This study employed (***Greeting****;* skewness = 8.382) data sets and log transformations to the (***Sharing****;* skewness = 15.072). Because Kim (2013) points out that data with an absolute value of kurtosis less than 7 and an absolute value of skewness less than 2 conform to a normal distribution when the sample size is greater than 300. This mathematical equation is used to calculate whether online service quality of physicians affect online patient consultations positively. Furthermore, robustness checks are performed separately using an alternative OLS regression model and the number of patient visits as an alternative dependent variable. This study transformed a log transformation on (***Consult****;* skewness = 3.212) in OLS. Since patients are only able to obtain consultation after they have visited the clinic first, as an alternative variable, the total number of patient visits may be used.

The city impacts are denoted by μ_i, the constant term is represented by α_0 and the residual error term is represented by $\mathcal{E}_i$. Log transformations are applied to both the ***Sharing*** and ***Greeting*** data sets, which have skewed distributions (skewness = 15.072 and 8.382, respectively). The equation is intended to estimate whether physicians' online service quality influence online patients' consultations in a positive manner. A robustness check is performed separately using a different OLS regression model, as well as, an alternative dependent variable for re-estimating the model is the total number of patient visits.

3.2.3 Results of study 1

All variables are correlated in Table 11. According to the results of study 1, ***Sharing*** (r=0.403***), ***Free*** (r=0.407***), ***Greeting*** (r=0.246***), ***Login*** (r=0.095***), ***Reply*** (r=0.097***), ***Aval*** (r=0.237***), ***Pro_S*** (r=0.182***), ***Aca_S*** (r=0.186***), and ***Exp*** (r=0.367***) are all statistically significant with ***Consult***. ***Sharing*** (r=0.403***) means that ***Sharing*** has a moderate positive association with ***Consult***. ***Free*** (r=0.407***) means that ***Free*** has a moderate positive association with ***Consult***. ***Greeting*** (r=-0.246 ***) means that ***Greeting*** has weak negative association with ***Consult***. ***Login*** (r=0.095***) means that ***Login*** has very weak positive association with ***Consult***. ***Reply*** (r=0.097***) means that ***Reply*** has very weak positive association with ***Consult***. ***Aval*** (r=0.237***) means that ***Aval*** has weak positive association with ***Consult***. ***Pro_S*** (r=0.182***) means that ***Pro_S*** *has weak positive association with* ***Consult***. ***Aca_S*** (r=0.186***) means that ***Aca_S*** has weak positive association with ***Consult***. ***Exp*** (r=0.367***) has moderate positive association with ***Consult***. Multicollinearity was estimated using the variance inflation factor (Table 10 showed Mean VIF = 1.18, VIF<10), which means all the values

of VIF are moderately correlated. When VIF greataer than 10, this would be though as a harmful signal of collinearity (Mason & Perreault, 1991).Thus, there is no significant multicollinearity that needs to be corrected.

Table 10 Variance inflation factor (VIF) of Study 1

Variable	VIF	1/VIF
Sharing	1.09	0.69
Greeting	1.06	0.73
Free	1.05	0.74
Pro_S	1.44	0.77
Aca_S	1.37	0.80
Expertise	1.36	0.84
Aval	1.14	0.84
Login	1.01	0.88
Reply	1.03	0.88
Gender	1.14	0.92
D_severity	1.25	0.94
D_Privacy	1.29	0.95
H_type	1.19	0.95
H_level	1.19	0.97
H_Special	1.05	0.99
Mean VIF: 1.18		

Table 11 Correlation coefficient matrix of Study 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Consult	1.000															
logSharing	.403***	1.000														
	(.000)															
logGreeting	.246***	.435***	1.000													
	(.000)	(.000)														
Free	.407***	.344***	.195***	1.000												
	(.000)	(.000)	(.000)													
Login	.095***	.037*	.015*	.070***	1.000											
	(.000)	(.044)	(.423)	(.000)												
Aval	.237***	.121***	.046*	.112***	-.038*	1.000										
	(.000)	(.000)	(.011)	(.000)	(.040)											
Reply	.097***	.117***	.053**	.085***	.065***	.018*	1.000									
	(.000)	(.000)	(.004)	(.000)	(.000)	(.329)										
Aca_S	.186***	.159***	.136***	.101***	-.002	.028*	-.065***	1.000								
	(.000)	(.000)	(.000)	(.000)	(.912)	(.128)	(.000)									
Pro_S	.182***	.140***	.124***	.075***	-.014*	.067***	-.111***	.448***	1.000							
	(.000)	(.000)	(.000)	(.000)	(.435)	(.000)	(.000)	(.000)								
Expertise	.367***	.358***	.274***	.124***	-.017*	.097***	-.074***	.352***	.419***	1.000						
	(.000)	(.000)	(.000)	(.000)	(.341)	(.000)	(.000)	(.000)	(.000)							
D_severity	.111***	-.009	.019*	-.064***	-.005	-.218***	-.005	.068***	.081***	.021*	1.000					
	(.000)	(.632)	(.290)	(.000)	(.771)	(.000)	(.793)	(.000)	(.000)	(.252)						
D_privacy	.075***	-.015*	-.047**	.039*	-.078***	.256***	-.000	-.059**	-.027*	-.020*	-.407***	1.000				
	(.000)	(.407)	(.010)	(.031)	(.000)	(.000)	(.993)	(.001)	(.142)	(.278)	(.000)					
Gender	.085***	.184***	-.124***	-.093***	-.030*	.180***	.022*	-.074***	.054**	-.135***	-.160***	.230***	1.000			
	(.000)	(.000)	(.000)	(.000)	(.105)	(.000)	(.238)	(.000)	(.003)	(.000)	(.000)	(.000)				
H_type	-.014*	.065***	-.016*	-.024*	.005	-.087***	-.018*	.022*	.002	.035*	.039*	-.090***	-.033*	1.000		
	(.453)	(.000)	(.389)	(.196)	(.796)	(.000)	(.314)	(.238)	(.926)	(.054)	(.033)	(.000)	(.070)			
H_level	.021*	-.028*	-.002	-.022*	.003	-.045*	.004	.064***	.001	.067***	.049**	-.077***	-.061***	.385***	1.000	
	(.245)	(.129)	(.930)	(.233)	(.887)	(.014)	(.815)	(.001)	(.941)	(.000)	(.008)	(.000)	(.001)	(.000)		
H_special	-.032*	.038*	.018*	.016*	-.013*	-.059**	-.022*	.175***	.024*	.006	.095***	-.028*	-.063***	.061***	.029*	1.000
	(.080)	(.036)	(.331)	(.380)	(.493)	(.001)	(.235)	(.000)	(.184)	(.760)	(.000)	(.125)	(.001)	(.001)	(.115)	

p-valus in parentheses. * *p < 0.05,* ** *p < 0.01,* *** *p < 0.001*

According to Table 12, main models 1 to 5 were fitted with negative binomial regressions, while models 6 and 7 were fitted with OLS and alternative variable for robustness check.

The control variables were estimated in model 1. There was a significant effect of all control variables on online patients' consultations. ***D_severity (-)***: Low disease severity receive more online patients' consultations than high disease severity. Maybe because high disease is more dangerous, patients need to go to hospital immediately. ***D_privacy (+)***: High privacy receive more online patients' consultations than low privacy. Maybe because the patients feel shame to consult with physician face to face when their disease privacy level is high. ***Gender (-)***: Male physicians receive more online patients' consultations than female physicians. This might because of stereotype, male physicians may be more professional. ***H_type (-)***: Private hospital receive more online patients' consultations than public hospital. This might because public hospital is more busy, private hospital could provide more careful service than public hospital. ***H_level (+)***: The higher level hospital is, the more online patients' consultations receive. This might because high level hospitals hire more high-quality physicians. ***H_special (-)***: Specialized hospital receive more online patients' consultations than public hospital. This might because it is easier for patients to find physicians from specialized hospital according to their symptoms. In models 2 to 4, the robustness of all hypotheses was tested by introducing three dimensions of online service quality. According to the results, online patients' consultations with service quality is influenced positively by each dimension.

Table 12 Regression result of Study 1

	Main Models					Robustness Models	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant	7.898***	5.535***	7.422***	6.988***	4.887***	4.722***	8.988***
	(.51)	(.31)	(.53)	(.52)	(.29)	(.31)	(.40)
D_severity	-.280***	-.283***	-.354***	-.226***	-.291***	-.259***	-.250***
	(.05)	(.04)	(.04)	(.05)	(.04)	(.03)	(.05)
D_privacy	.152**	.075*	.132*	.077*	.025	.085*	.145**
	(.06)	(.05)	(.06)	(.05)	(.04)	(.04)	(.05)
Gender	-.301***	-.008	-.184***	-.332***	-.022	-.037*	-.027
	(.05)	(.04)	(.04)	(.04)	(.04)	(.03)	(.04)
H_type	-.232*	.222*	-.170	-.077	.213*	.246*	.511*
	(.34)	(.21)	(.34)	(.36)	(.18)	(.20)	(.20)
H_level	.341*	.388***	.025	.218*	.154*	.041	-.019
	(.17)	(.12)	(.19)	(.19)	(.11)	(.11)	(.15)
H_special	-.071*	-.092*	-.096*	-.042*	-.081*	-.082*	-.114**
	(.05)	(.04)	(.04)	(.04)	(.04)	(.03)	(.04)
logSharing		.208***			**.135***	.127***	.238***
		(.01)			**(.01)**	(.01)	(.02)
logGreeting		.059***			**.029****	.044***	.038***
		(.01)			**(.01)**	(.01)	(.01)
Free		.167***			**.152***	.166***	.154***
		(.01)			**(.01)**	(.01)	(.01)
Aca_S			.044***		**.029****	.034**	.043**
			(.01)		**(.01)**	(.01)	(.01)
Pro_S			.071*		**.086****	.108***	.136***
			(.03)		**(.03)**	(.03)	(.03)
Exp			.130***		**.092***	.097***	.255***
			(.01)		**(.01)**	(.01)	(.01)
Login				.213***	**.174***	.164***	.148***
				(.04)	**(.03)**	(.03)	(.03)
Aval				.050***	**.029***	.026***	.027***
				(.00)	**(.00)**	(.00)	(.00)
Reply				.017***	**.010****	.015***	.024***
				(.00)	**(.00)**	(.00)	(.01)
City dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wal χ^2 (p)	0	0	0	0	0		0
N	2982	2982	2982	2982	2982	2982	2982

Standard errors in parentheses. * *p < 0.05,* ** *p < 0.01,* *** *p < 0.001*

All variables were included in model 5. The need fulfilment dimension consists of three variables, which concluded ***Sharing*** (β = 0.135***), ***Free*** (β = 0.152***) and ***Greeting*** (β = 0.029**). H1, H2 and H3 were supported. β value means that knowledge sharing increases 1 unit when online patients' consultation increases 0.135 unit. Free

consultation increases 1 unit when online patients' consultation increases 0.152 unit. Greeting message increases 1 unit when online patients' consultation increases 0.029 unit. A higher β value means a higher positive slope, steeper upward tilt to the line. Thus, according to the results of study 1, free consultation has higher positive slope than knowledge sharing and greeting messages. This means that patients' consultations change rapidly with free consultation. Greeting message has the most flatter slope, which means that the value of patients' consultation is not changing much with the greeting message.

The security dimension consists of three variables, which concluded ***Aca_S*** ($\beta = 0.029^{**}$), ***Pro_S*** ($\beta = 0.086^{**}$), and ***Exp*** ($\beta = 0.092^{***}$), respectively. As the result, H4, H5 and H6 were supported. β value means that online patients' consultation increases 0.029 unit when academic status increases 1 unit. When professional status increases 1 unit, online patients' consultation increases 0.086 unit. When experience increases 1 unit, online patients' consultation increases 0.092 unit. Experience has higher positive slope than academic status and professional status. This means that patients' consultations change more rapidly with experience. Academic status has most flatter slope. Which means that the value of patients' consultation is not changing much with the change of academic status.

Finally, The responsiveness dimension showed that ***Login*** ($\beta = 0.174^{***}$), ***Aval*** ($\beta = 0.029^{***}$) and ***Reply*** ($\beta = 0.010^{**}$). Consequently, H7, H8, and H9 were supported. β value means that when log-in increases 1 unit, online patients' consultation increases 0.174 unit. When availability increases 1 unit, online patients' consultation increases 0.029 unit. When reply effort increases 1 unit when online patients' consultation increases 0.010 unit. Log-in behavior has higher positive slope than availability and reply effort. This means

that patients' consultation change relatively rapidly with log-in behavior. Reply effor has the most flatter slope, which means that the value of patients' consultation is not changing much with the reply effort.

3.2.3.1 Robustness check of Study 1

Two alternative evaluation methods for robustness checks were used, which are OLS in model 6, and a substitution-dependent variable in model 7. As a result, the coefficients for the robustness check models are consistent with the main models. In light of this, the research model can be accepted, showing a positive relationship between the dimensions of the three independent variables when it comes to online patients' consultations. The overview of hypotheses of study 1 are shown in Table 13.

Table 13 Overview of hypotheses of Study 1

Hypotheses	**Results**
H 1: Online patients' consultations are positively affected by knowledge sharing.	Supported
H 2: Online patients' consultations are positively affected by free consultation.	Supported
H 3: Online patients' consultations are positively affected by greeting message.	Supported
H 4: Online patients' consultations is positively affected by academic title.	Supported
H 5: Online patients' consultations is positively affected by professional title.	Supported
H 6: Online patients' consultations is positively affected by experience.	Supported
H 7: Online patients' consultations is positively affected by active log-in.	Supported
H 8: Online patients' consultations is positively affected by availability.	Supported
H 9: Online patients' consultations is positively affected by the reply effort.	Supported

3.3 Empirical Study 2

3.3.1 Hypotheses of Study 2

As shown in Figure 10, this study developed a model incorporating social support of physicians and patient consultation. Social support and patient engagement have been examined in similar studies in OHCs (X. Wang et al., 2017), as well as the influence of linguistic signals on online social support (L. Chen et al., 2020). It has been demonstrated that social support in the context of social commerce influences the intention to purchase (Hu et al., 2019; Makmor et al., 2018). According to previous research, online social support has become an increasingly crucial component of studies related to OHCs (Tseng et al., 2022). Nevertheless, there has been a lack of studies investigating the relationship between relevant dimensions of social support and patients' consultations. Therefore, in this study, social support is explored in relation to patients' consultations. According to the social support theory, this study aims to discuss the effect of three dimensions of physician social support (information diagnosticity, source credibility, and emotional support) on patients' consultations from the physician-generated information perspective. Furthermore, the study examines how patients' compliments moderate the impact of the information support, and emotional support of physicians on patients' consultations.

3.3.1.1 Informational support and patients' consultations

As a dimension of social support, informational support plays a critical role in health-related decisions for OHC users (Lin et al., 2016; X. Wang et al., 2021). Among the behaviours associated with information support are personal experience, recommendations, suggestions, and feedback (D. Zhao et al., 2020). Informational

support from others is beneficial for individuals, particularly when it relates to stress-related issues (Ma et al., 2021). Informational support includes knowledge, suggestions, guidance, advice, and experience (Johnson & Lowe, 2015; Nadeem et al., 2021). The information support provided through the explanation of symptoms, suggestions, and personal experiences can assist users of online communities in resolving their health problems (Tseng et al., 2022). Alternatively, informational support is a service provided by physicians in response to concerns regarding the prevention and treatment of illnesses. Physician online consultation services are primarily designed to provide information and emotional support to patients (Y. Wang et al., 2020). Different channels in OHCs are perceived differently by patients. There are some OHCs that assist the patient in coping with emotional issues, while there are others that educate the patient about disease (Mirzaei & Esmaeilzadeh, 2021). It is common for physicians in OHCs to emphasize the importance of providing their patients with information (Ma et al., 2021). There are two dimensions of informational support in this study: information diagnosticity and source credibility.

As defined by Andrews (2013), information diagnosticity is the degree to which a piece of information contributes to the patient's decision-making process (H. Kim & Youn, 2019; J.-C. Wang & Chang, 2013). An important factor in the diagnostic usefulness of the information is its amount, intensity, and discernibility (Andrews, 2013). Information that is provided in more detail will have a significantly greater impact, and will increase patients' confidence. Having the ability to assess the authenticity of information facilitates consumer choice decisions. In previous studies, crowdfunding websites have been shown to provide consumers with positive information diagnosticity

that is likely to influence their participation in crowdfunding programs (Lee et al. 2021). According to Filieri (2015), information diagnosticity is partially influenced by the amount of information available and ultimately determines how consumers adopt information. By circumventing regional limitations, OHC can assist physicians in reaching their patients as soon as possible. The Internet has become a popular means of disseminating medical expertise, resulting in a growing number of physicians turning to the Internet (X. Zhang et al., 2022). OHCs can be used by physicians to provide information to patients on disease prevention and treatment. For individuals without specialized medical training or find it difficult to find medical information online, the availability of relevant medical information on the Internet is beneficial (Carlsson, 2000). By providing patients with more medical information, they are more likely to be able to make a more accurate assessment of the quality of their physicians' services. This can impact patients' choice of physician. Physicians are allowed to freely publish articles and provide consultations related to treatment and illness prevention to increase visits to their homepages, which patients may get healthcare services all year round and from anywhere (X. Zhang et al., 2022). It might make physicians in OHCs encourage patients to consult with them by providing diagnostic information to them. Therefore, the following hypothesis is proposed:

H1: Online patients' consultations is positively affected by information diagnosticity.

Information in all three forms needs to be credible in order to be accepted as trustworthy, whether that is source, informational (Fan & Lederman, 2018), or message credibility (X. Xu et al., 2021). Although the information disseminator may or may not be

an expert, information dissemination is regarded as credible primarily because the disseminator is an expert (R. R. Dholakia & Sternthal, 1977; Sussman & Siegal, 2003). Experts are generally regarded as reliable source of information for decision-making, and their opinions are generally believed to be accurate (Bonner et al., 2006). It is therefore important to consider the credibility of the source when researchers evaluate behaviours and attitudes of users (Sussman & Siegal, 2003). Source credibility has been studied extensively. In the context of online shopping in terms of consumer judgments regarding the credibility of information sources. For example, the effect of online reviews on the intention to purchase in e-commerce studies has been explored by Zhang et al. (2014) by examining the credibility of the sources. When used for online advertising, credibility of a source has been established and is contributing to the positive attitudes of consumers towards online products (Zhang et al. 2015). Due to the fact that patients are non-professionals, they are unable to make informed judgments regarding the professional degree of the physician. Therefore, they must rely on certain official endorsements, such as the title of the physician, to determine what level of qualifications the physician holds as a physician. In fact, many of the highest-quality platforms for OHC require physicians to have actual names as part of their certification process (X. Liu, Wang, et al., 2014; Y. Zhang et al., 2020). A further step to enhance credibility with patients is to include a physician's academic or professional title on their homepage profile. Moreover, individuals tend to select a physician who has built a solid reputation, hold a number of academic and professional titles, and possess extensive experience (A. M. Shah et al., 2021). It has been demonstrated in some studies that source credibility promotes patient adoption of information in OHCs. Fan and Lederman (2018) demonstrated that the

patients may utilize credible and trusted sources of health information in OHCs. Zhang et al. (2020) discovered that on- and off-line physician experiences, location of hospitals, and credibility level have impact on the knowledge adoption. As a result, patients may be more likely to seek consultations from physicians who are credible sources in OHCs. Therefore, it is proposed that the following hypothesis be considered:

H2: Online patients' consultations is positively affected source credibility.

3.3.1.2 Emotional support and patients' consultations

In general, emotional support refers to actions taken intentionally to reduce another's emotional distress (Burleson, 1985). It is a way for people, regardless of time, space, or geographical location, in order to share and seek support emotionally through online communities (Mirzaei & Esmaeilzadeh, 2021). A healthcare facility's emotional support plays a critical role in improving the health of its patients (Ma et al., 2021). In addition to demonstrating professional expertise, patients also expect their physicians to provide personal and compassionate care (Schattner et al., 2004). There is a need for emotional support for many individuals who need medical help (Vlahovic et al., 2014), including affirmation, empathy, validation, understanding, concern, and care (Nakikj & Mamykina, 2017). A physician's homepage greeting message is a means of expressing emotional support within an OHC. By reviewing the greeting messages from physicians, individuals can decide whether the service provider (physician) is able to offer emotional support. Physicians who write greeting messages, for example, may include encouraging and heartfelt language, while others may simply mention themselves without writing anything at all. Atanasova et al. (2018) found that physicians can provide emotional support to

patients. As well as receiving knowledge and emotional support, Abedin et al. (2020) also found that the majority of patients are also active participants in the OHC forum. A positive emotional tone in physicians' messages or information affects decision-making of patients in OHCs (Ouyang, Wang, & Jasmine Chang, 2022; Yan & Tan, 2014). An analysis of mobile network forum data and crawler technology was conducted, Wang et al. (2017) evaluated the contribution of emotional support to OHCs. Thus, physicians in OHCs can encourage patients to consult by providing emotional support. The following hypothesis is proposed:

H3: Online patients' consultations is positively affected by emotional support.

3.3.1.3 Moderating impact of Patients' compliments

Kelman (1958) suggests that social influence theory can be used to explain how attitudes and evaluative orientations are affected by group interactions. It is the act of influencing the behaviours of others through peer interaction (Alam et al., 2020). According to Kelman (1958), in social influence theory, three social processes are considered to influence people's behaviour: compliance (affecting the expectations of others), identification (recognize that oneself belong to a social group), and internalization (aligning one's objectives with others). A significant source of behaviour change is social influence from others, as determined by decades of research on human beings (Tunçgenç et al., 2021). In accordance with social influence theory, researchers have examined how social influence (e.g. the influence of patient praise on the evaluation of physicians by other patients) affects participation in virtual communities and, therefore, the behaviour that occurs in these communities (U. M. Dholakia et al., 2004; Zhou, 2011). Patients have

difficulty choosing a physician in OHCs because the physician-patient relationship is characterized by a significant information asymmetry (Kromidha & Li, 2019). Although the information asymmetry in online consultation is more serious than that in face-to-face consultation (Laugesen et al., 2015), social influence from other patients, such as compliments, helps to understand the medical level of doctors, thus reducing the degree of information asymmetry (Ho & Wei, 2016). Using OHC platforms allows patients to post comments that are readily accessible to everyone online, and these comments may encourage others to make use of technology as well. Furthermore, OHC platforms provide information related to article credibility regarding disease treatment and prevention, the level of a physician, as well as whether the physician in question is gentle, reliable, and cares for their patients. For evaluating these issues, it is also very important to obtain endorsements from other patients. The social influence from other patients is therefore critical to the provision of healthcare services through OHC platforms (Kamal et al., 2020). Because a patient's praise has an impact on how other patients evaluate a physician's medical care.

An expression of a positive assessment of another individual is called a compliment (Wolfson & Manes, 1980). Providing feedback through compliments is an effective means of improving performance (Kraft & Martin, 2001). A physician's reputation is enhanced by compliments in the context of a physician-run health centre (Wu & Lu, 2017). The physician can receive external compliments from patients after he or she has provided services to the patient in a healthcare facility, including letters of thanks, e-gifts, and electronic votes from the patient (J. Liu et al., 2022). It has been observed that in OHCs, there is an abundance of information, resulting in the search for knowledge by

patients and experiencing an overabundance of information (Swar et al., 2017). Xia et al. (2020) propose that a person is limited in their capacity to pay attention to multiple things at once. This is because they cannot exchange attention for tasks that are lower in priority.

The difficulty of choosing is also increased when consumers are presented with a large amount of information (Peng et al., 2021). While some patients require more time, effort, knowledge, and even financial assistance (gifts/money) Therefore, the effort, time, knowledge and even money (gifts) spent by other patients on the physician can make the consultation decision more credible (Wu et al., 2020). Due to the fact that compliments are social influences, the relationship between physician social support and patient consultation may be influenced by compliments from other patients. When physicians receive low compliment, physicians' social support plays a positive role in strengthening patients' consultation. The following hypothesis is proposed:

H4: The positive relationship between information diagnosticity and patients' consultations is negatively moderated by patients' compliments.

H5: The positive relationship between source credibility and patients' consultations is negatively moderated by patients' compliments.

H6: The positive relationship between emotional support and patients' consultations is negatively moderated by patients' compliments.

As shown in Figure 10, a research model was developed.

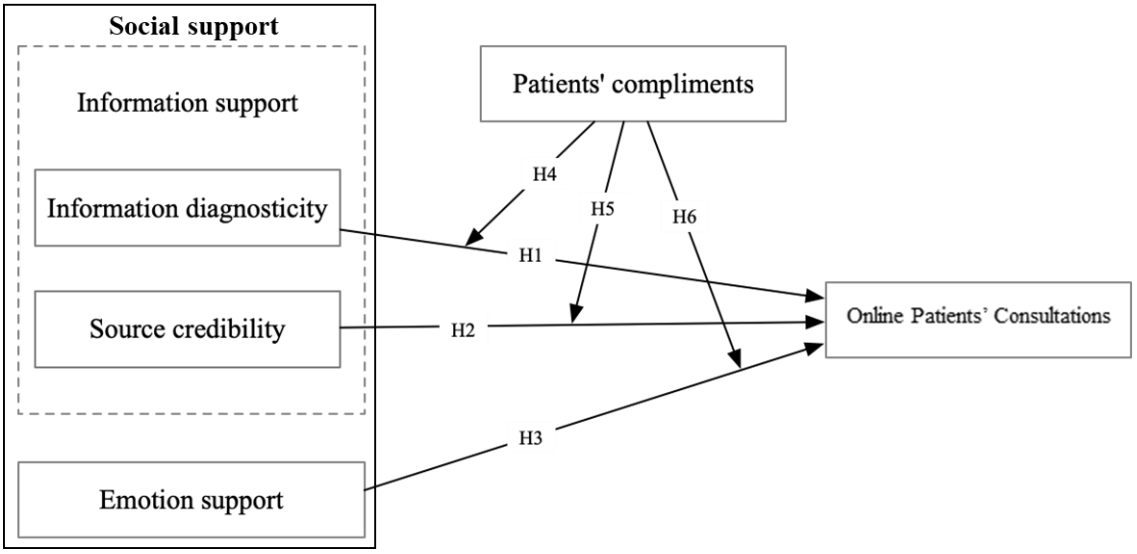


Figure 10 Research model of Study 2

3.3.2 Methodology and Measurement of Study 2

Data set was retrieved from Haodf.com by using the Python spider as same like Study 1.

Table 14 Descriptive statistics of Study 2

Variable	Mean	S.D.	Min	Max
Consult	4581.30	5671.15	73	71678
I_Diag	15.66	65.83	0	2018
S_Cre	3.25	0.74	1	4
Emotion	113.94	202.95	0	3975
Gender	0.34	0.47	0	1
H_type	0.99	0.08	0	1
H_level	2.99	0.12	1	3
D_severity	0.37	0.48	0	1
H_Special	0.67	0.47	0	1

Based on mortality, 14 diseases were classified into high and low risk. Diabetes, Parkinson, coronary artery disease, hypertension, lung cancer, breast cancer, and liver cancer are among the conditions that carry a high death risk. There is a low risk of death associated with the following conditions: menstrual disorders, hepatitis B, prostatitis, pharyngitis, pneumonia in children, depression, and infertility. The data from 2,982

physicians were obtained by removing entries that contained "spaces" or "missing values". The collinearity issue was examined, followed by descriptive statistics was formed, then correlation analysis and finally regression analysis was conducted. To test the robustness of the model, dependent variable replacement and statistical method replacement were used. Table 14 shows data about physicians' personal and consultation profiles as well as patient feedback. An overview of the variables in this study is presented in Table 15. Data example of Study 2 is shown in Table 27.

Table 15 Variables description of Study 2

Variables	Description
Dependent Variable	
Consult	The number of patients' consultations in total
Independent Variable	
I_Diag	Number of health-related articles
S_Cre	The medical titles of the physician were stratified into 4 stages, 1=the resident physician, 2=the attending physician, 3= associate chief director, 4=chief director.
Emotion	The length of greeting message
Moderating Variable	
Compliments	The standardized average of digital gifts, votes, and thank-you letters
Control Variable	
Gender	Dummy variable indicating physicians' gender 0=Male, 1= Female
H_type	Dummy variable indicating the hospital type 0=Private, 1=Public
H_level	Hospital level: the scale of 1 to 3, with 1 being the lowest (1A or 1B) and 3 the highest (3A or 3B hospitals)
D_severity	Dummy variable indicating the mortality of the disease 0=low, 1=high
H_Special	Dummy variable indicating whether the hospital is a specialized hospital 0= Specialized, 1=General

As a result, the dependent variable is the number of consultations received by physicians from patients (***Consult***). It is the Information Diagnosticity (***I_Diag***), the Source Credibility (***S_Cre***), and the Emotional Support (***Emotion***) variables that determine the

outcome of the study. Several health-related articles were collected for purposes of measuring information diagnosticity, physician titles for purposes of measuring the credibility of sources, and the length of greeting messages for purposes of measuring the degree of emotional support. Among the moderating variables is the number of compliments received from patients (***Compliments***), which represents the average of digital gifts, thank-you letters, and votes from patients (Wu et al., 2020). Several control variables are same as Study 1.

The variables that appear on the physicians' website are illustrated in Figure 11.

Figure 11Example of physician homepage

3.3.2.1 Model Specification of Study 2

In the main models, OLS regression is applied with fixed impact estimations. To test robustness, this study used OLS with the number of total patient visits as an alternative

dependent variable to the number of consultations made by patients. This is because patients can only decide to have a consultation after undergoing a visit (Data from offline consultations, which also shown in OHCs). The following main equations were built in this study in order to evaluate the model:

$$\log(Consult)_i = \alpha_0 + \beta_1 \log\left(I_{Diag}\right)_i + \beta_2 S_{Cre_i} + \beta_3 \log(Emotion)_i + \beta_4 D_{severity_i} + \beta_5 Gender_i + \beta_6 H_{type_i} + \beta_7 H_{level_i} + \beta_8 H_{special_i} + \mu_i + \mathcal{E}_i \quad (1)$$

$$\log(Consult)_i = \alpha_0 + \beta_1 \log\left(I_{Diag}\right)_i + \beta_2 S_{Cre_i} + \beta_3 \log(Emotion)_i + \beta_4 Compliment_i + \beta_5 \log\left(I_{Diag}\right)_i * Compliment_i + \beta_6 S_{Cre_i} * Compliment_i + \beta_7 \log(Emotion)_i * Compliment_i + \beta_8 D_{severity_i} + \beta_9 Gender_i + \beta_{10} H_{type_i} + \beta_{11} H_{level_i} + \beta_{12} H_{special_i} + \mu_i + \mathcal{E}_i \quad (2)$$

There are three terms for each impact: a constant term (α_0), an individual impact term (μ_i), and a residual error term ($\mathcal{E}_i$). A log transformation is performed on the ***Consult***, ***Emotion ,*** and ***I_Diag***, which are all skewed distributions (skewness = 3.211, 8.382, and 18.458). Kim (2013) points out that data with an absolute value of kurtosis less than 7 and an absolute value of skewness less than 2 conform to a normal distribution when the

sample size is greater than 300. In order to evaluate the effect of social support on a patient's consultation, three dimensions are considered: diagnosis (***I_Diag***), credibility (***S_Cre***), and emotional support (***Emotion***). Compliments from other patients (***Compliments***) may as a moderator between social support and patients' consultations.

3.3.3 Result of Study 2

A coefficient of determination value (R^2) less than or equal to 0.190 is considered weak (Newsted et al., 1998). Model 2 has a coefficient (R^2 = 0.282) while model 3 has a coefficient of (R^2 = 0.557), indicating that model 3 is able to make accurate predictions.

Table 16 Correlation coefficient matrix of Study 2

	1	2	3	4	5	6	7	8	9
log(Consult)	1.000								
log(I_Diag)	.418***	1.000							
	(.000)								
S_Cre	.272***	.151***	1.000						
	(.000)	(.000)							
log(Emotion)	.323***	.401***	.124***	1.000					
	(.000)	(.000)	(.000)						
D_severity	.154***	.030*	.081***	.019*	1.000				
	(.000)	(.105)	(.000)	(.290)					
Gender	.078***	-.187***	.054**	-.124***	-.160***	1.000			
	(.000)	(.000)	(.003)	(.000)	(.000)				
H_type	-.006*	-.039*	.002	-.016*	.039*	-.033*	1.000		
	(.752)	(.033)	(.926)	(.389)	(.033)	(.070)			
H_level	.014*	-.014*	.001	-.002	.049**	-.061***	.385***	1.000	
	(.441)	(.443)	(.941)	(.930)	(.008)	(.001)	(.000)		
H_Special	-.027*	.031*	.024*	.018*	.095***	-.063***	.061***	.029*	1.000
	(.143)	(.094)	(.184)	(.331)	(.000)	(.001)	(.001)	(.115)	

p-values in parentheses
**p < 0.05, ** p < 0.01, *** p < 0.001*

All variables are shown in Table 16 along with their correlation coefficients. As a result of the study, the results suggest that ***I_Diag*** (r=0.418***), ***S_Cre*** (r=0.272***), and ***Emotion*** (r=0.323***) are all statistically significant with ***Consult***. ***I_Diag*** (r=0.418***)

means that ***I_Diag*** has positive moderate association with ***Consult***. ***S_Cre*** ($r=0.272^{***}$) means that ***S_Cre*** has positive weak association with ***Consult***. ***Emotion*** ($r=0.323^{***}$) means that ***Emotion*** has positive weak association with ***Consult***.

Table 17 Regression result of Study 2

	Main models			**Robustness models**			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant	7.632^{***}	5.474^{***}	7.113^{***}	6.085^{***}	8.143^{***}	8.299^{***}	10.197^{***}
	(.39)	(.38)	(.38)	(.53)	(.55)	(.61)	(.60)
D_severity	$-.402^{***}$	$-.447^{***}$	$-.414^{***}$	$-.399^{***}$	$-.422^{***}$	$-.543^{***}$	$-.505^{***}$
	(.04)	(.04)	(.03)	(.04)	(.03)	(.05)	(.04)
Gender	$-.248^{***}$	$-.096^{*}$	$.050^{*}$	$-.118^{**}$	$.031^{*}$	$-.174^{**}$	-.006
	(.04)	(.04)	(.03)	(.05)	(.04)	(.05)	(.05)
H_type	-.129	.093	-.082	$.166^{*}$	-.083	$.395^{*}$	.190
	(.29)	(.23)	(.20)	(.21)	(.19)	(.42)	(.39)
H_level	$.168^{*}$	$.206^{*}$	.059	$.208^{*}$	-.084	$.370^{*}$	$.208^{*}$
	(.16)	(.15)	(.14)	(.19)	(.19)	(.23)	(.22)
H_Special	$-.036^{*}$	$-.071^{*}$	$-.071^{*}$	$-.088^{*}$	$-.057^{*}$	$-.054^{*}$	$-.057^{*}$
	(.04)	(.04)	(.03)	(.05)	(.03)	(.05)	(.05)
log(I_Diag)		**.276*** **	**.160*** **	$.247^{***}$	$.155^{***}$	$.491^{***}$	$.362^{***}$
		(.02)	**(.01)**	(.02)	(.01)	(.02)	(.02)
S_Cre		**.335*** **	**.207*** **	$.284^{***}$	$.157^{***}$	$.697^{***}$	$.546^{***}$
		(.02)	**(.02)**	(.03)	(.02)	(.04)	(.03)
log(Emotion)		**.092*** **	**.051*** **	$.082^{***}$	$.038^{***}$	$.151^{***}$	$.103^{***}$
		(.01)	**(.01)**	(.01)	(.01)	(.01)	(.01)
Compliments			**1.557*** **		1.599^{***}		1.996^{***}
			(.15)		(.15)		(.20)
log(I_Diag)*Compliments			**-.134*** **		$-.144^{***}$		$-.173^{***}$
			(.02)		(.02)		(.03)
S_Cre*Compliments			**-.093***		$-.092^{*}$		$-.149^{**}$
			(.04)		(.04)		(.05)
log(Emotion)*Compliments			**-.046****		$-.041^{**}$		$-.061^{**}$
			(.02)		(.01)		(.02)
City dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.036	.282	.557			.397	.555
adj R^2	.033	.279	.554			.395	.553
N	2982	2982	2982	2982	2982	2982	2982

Standard errors in parenthese

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

There is no significant multicollinearity that needs to be corrected (Table 18 showed VIF=1.12), since all variables are moderately correlated and lower than 10 (Mason & Perreault, 1991).

Table 18 Variance inflation factor (VIF) of Study 2

Variable	**VIF**	**1/VIF**
logI_Diag	1.24	0.81
S_Cre	1.05	0.83
logEmotion	1.20	0.85
Gender	1.08	0.85
D_severity	1.04	0.92
H_type	1.18	0.96
H_level	1.18	0.96
H_Special	1.02	0.98
Mean VIF: 1.12		

The main models of OLS regressions are shown in Table 17. Introducing the control variables in model 1 was the first step. ***D_severity (-)****: Low disease severity receive more online patients' consultations than high disease severity. Maybe because high disease is more dangerous, patients need to go to hospital immediately.* ***Gender (-):*** *Male physicians receive more online patients' consultations than female physicians. This might because of stereotype, male physicians may be more professional.* ***H_type (-):*** *Private hospital receive more online patients' consultations than public hospital. This might because public hospital is more busy, private hospital could provide more careful service than public hospital.* ***H_level (+):*** *The higher-level hospital is, the more online patients' consultations receive. This might because high level hospitals hire more high-quality physicians.* ***H_special (-)****: Specialized hospital receive more online patients' consultations than public hospital. This might because it is easier for patients to find physicians from specialized hospital according to their symptoms.* According to the

results, most of the control variables are statistically significant. A control variable and a dependent variable are included in model 2. The results indicate that H1 was supported and ***I_Diag*** ($\beta = 0.276^{***}$) increases 1 unit when when online patients' consultation increases 0.276 unit. In addition, the results suggest that H2 was supported and ***S_Cre*** ($\beta = 0.335^{***}$) increases 1 unit when when online patients' consultation increases 0.335 unit. Finally, the results suggest that H3 was supported and ***Emotion*** ($\beta = 0.092^{***}$) increases 1 unit when when online patients' consultation increases 0.092 unit. A higher β value means a higher positive slope, steeper upward tilt to the line. Thus, according to the results of study 2, source credibility has higher positive slope than information diagnosticity and emotional support. This means that patients' consultations change rapidly with source credibility. Emotional support has relatively flatter slope, which means that the value of patients' consultation is not changing much with the emotional support.

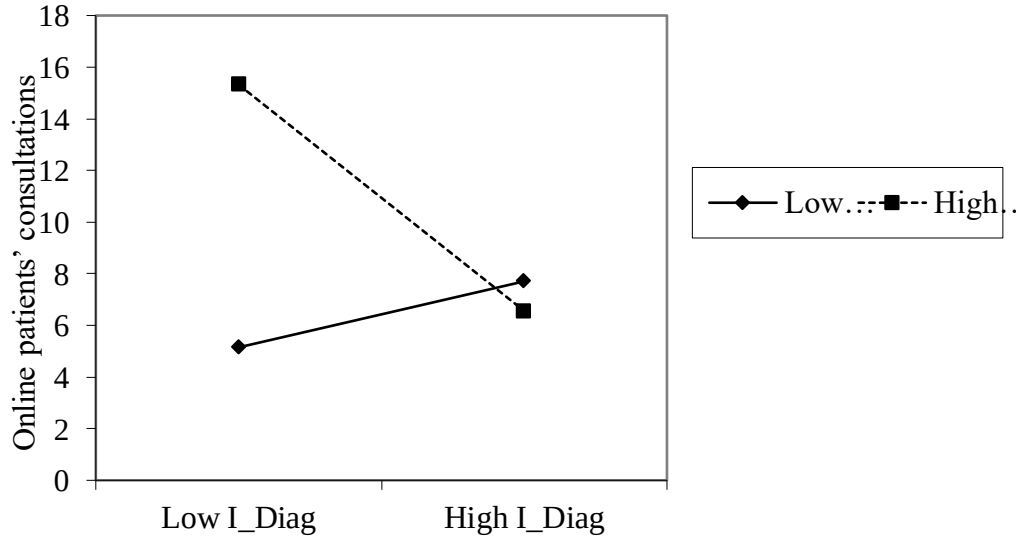


Figure 12 Moderating impact (Information diagnosticity)

A control variable, a dependent variable, and a moderating variable were included in model 3. To begin with, the results indicate that the interaction between ***I_Diag*** and ***Compliments*** ($\beta = -0.134^{***}$) negatively affects ***Consult***. When patients' compliments equal 0, information diagnosticity changes 1 unit, online patients' consultations will change 0.160 unit. When patients' compliments increase 1 unit, the impact of information diagnosticity on online patients' consultations will decrease 0.134 unit. When patients' compliments are 1, the impact of information diagnosticity on online patients' consultations is 0.026 (0.160 - 0.134 = 0.026). Starting from 2, patients' compliments change to negative effects. When patients' compliments take 2, the impact of information diagnosticity on online patients' consultations is -0.108 (0.160 - 0.134*2= - 0.108). In other words, the impact of information diagnosticity on online patients' consultations will gradually weaken as patients compliments increase. In Figure 12, ***I_Diag*** has a more significant impact on ***Consult*** when the number of ***Compliments*** is low. However, it has a smaller impact when the number of compliments is high. There is some support for H4, according to which the positive relationship between information diagnosticity and patients' consultations are undermined by patient compliments.

Additionally, the results indicate that the interaction between ***S_Cre*** and ***Compliments*** ($\beta = -0.093^{*}$) negatively affects ***Consult***. When patients' compliments equal 0, source credibility changes 1 unit, online patients' consultations will change 0.207 unit. When patients' compliments increase 1 unit, the impact of source credibility on online patients' consultations will decrease 0.093 unit. When patients' compliments are 1, the influence of source credibility on online patients' consultations is 0.114 (0.207 - 0.093 = 0.114). Starting from 3, patients' compliments change to negative effects. When patients'

compliments take 3, the impact of source credibility on online patients' consultations is -0.072 (0.207 - 0.093*3= - 0.072). In other words, the impact of source credibility on online patients' consultations will gradually weaken as patients' compliments increase As shown in Figure 13, ***S_Cre*** has a significant impact on ***Consult*** when ***Compliments*** are low; however, it has a lesser impact when Compliments are high. Providing compliments to patients reduces the positive relationship between the credibility of the source and the consultation of the patients, supporting H5.

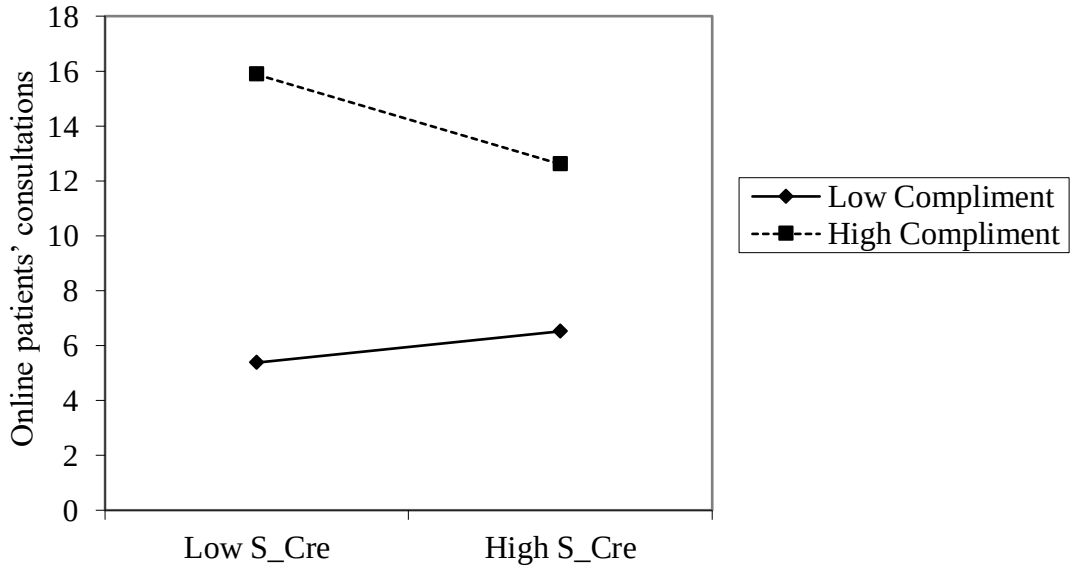


Figure 13 Moderating impact (Source credibility)

As a third result, the interaction between ***Emotion*** and ***Compliments*** ($\beta = -0.046^{***}$) negatively affects ***Consult***. When patients' compliments equal 0, emotion support changes 1 unit, online patients' consultations will change 0.207 unit. When patients' compliments increase 1 unit, the impact of emotion support on online patients'

consultations will decrease 0.051 unit. When patients' compliments are 1, the impact of emotion support on online patients' consultations is 0.005 (0.051 - 0.046 = 0.005). Starting from 2, patients' compliments change to negative effects. When patients' compliments take 2, the impact of emotion support on online patients' consultations is -0.041 (0.051 - 0.046*2= - 0.041). In other words, the impact of emotion support on online patients' consultations will gradually weaken as patients' compliments increase ***Emotion*** has a greater impact on ***Consult*** when ***Compliments*** are low, but a lesser impact when ***Compliments*** are high, as shown in Figure 14. Positive relationships between emotional support and patients' consultations are reduced when patients provide compliments, supporting H6.

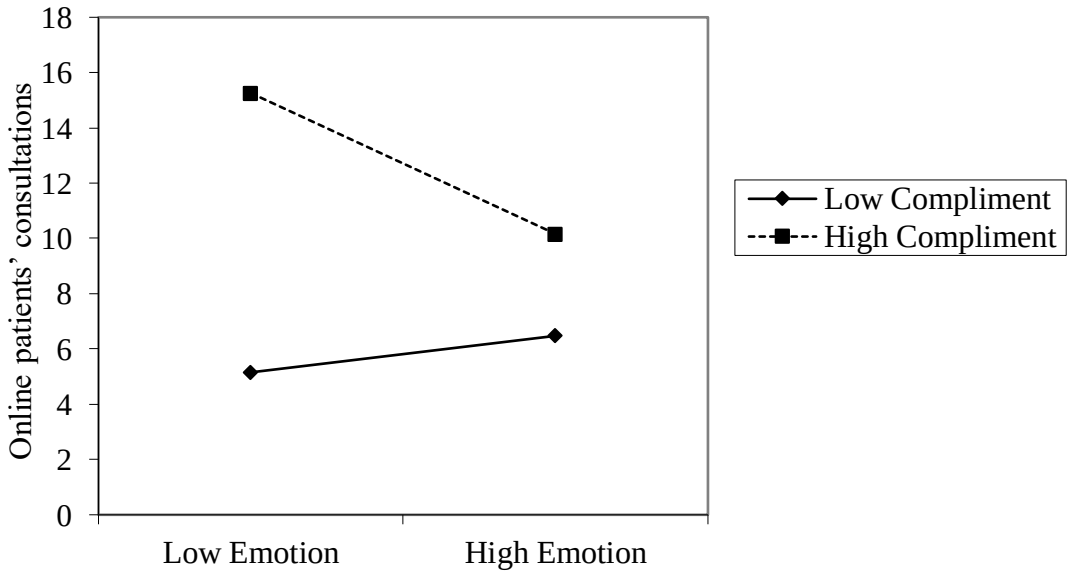


Figure 14 Moderating impact (Emotion support)

3.3.3.1 Robustness check of Study 2

A robustness check is performed on Model 4 through 7 in order to examine the effects of autocorrelation and heteroskedasticity. A robustness check is performed using negative

binomial regression in model 4 and 5. The robustness of Model 6 and 7 is checked by using the total number of patient visits as an alternative dependent variable. As a result, the coefficients for the robustness check models are consistent with the main models. Furthermore, the overview of hypothesis of study 2 is shown in Table 19.

Table 19 Overview of hypotheses of Study 2

Hypotheses	**Results**
H1: Online patients' consultations is positively affected by information diagnosticity.	Supported
H2: Online patients' consultations is positively affected source credibility.	Supported
H3: Online patients' consultations is positively affected by emotional support.	Supported
H4: The positive relationship between information diagnosticity and patients' consultations is negatively moderated by patients' compliments.	Supported
H5: The positive relationship between source credibility and patients' consultations is negatively moderated by patients' compliments.	Supported
H6: The positive relationship between emotional support and patients' consultations is negatively moderated by patients' compliments.	Supported

3.4 Empirical Study 3

3.4.1 Hypotheses of Study 3

3.4.1.1 Physician's Trusting Beliefs and Patients' consultations

It is important to understand that trusting beliefs have three dimensions: a belief in competence, a belief in generosity, and a belief in integrity (McKnight et al., 2002). Competence refers to a physician's capabilities or attributes that enable him or her to excel in a particular area; benevolence refers to a physician's willingness to serve others, rather than being motivated by pure self-interest (Y. Gong et al., 2021b). In order to increase the level of trust between a physician and his or her patients, integrity is the willingness of the physician to provide honest facts to the patient as well as reduce the imbalance of information between the two (Y. Gong et al., 2021b). The competence belief, benevolence belief, and integrity belief are evaluated in OHCs as indicators of physicians' trusting beliefs. It is possible that trusting beliefs may motivate patients to consult with physicians. A positive correlation exists between trusting beliefs and purchase intention on social networking sites (See-To & Ho, 2014). In the context of OHCs, competence, benevolence, and integrity play a significant role in the selection of patients (Y. Gong et al., 2021b). Thus, three dimensions of trusting beliefs about physicians may have a positive influence on patients' consultations.

An OHC physician with professional skills and high competencies will be able to provide a high quality of service to patients, however, physicians who provide superior services is limited (J. Li et al., 2019). In general, professional competence is determined by clinical skills and scientific knowledge (Xu et al., 2002). The title of a physician is

equivalent to the academic degree, practical skill, and years of experience. Therefore, physicians' titles may represent their competence in the OHCs context. Physician's title as a dimension of offline reputation affects the e-consultation choice of patients (A. M. Shah et al., 2021) Thus, competence belief about physicians may affect patients' consultations in OHCs at the same time. Therefore, the proposal is made:

H1: Online patients' consultations is positively affected by physician's competence.

OHCs allow physicians to conduct free patients' consultations. Some physicians with a high level of benevolence are prepared to offer services for free. Such effort exemplifies the benevolence of physicians (X. Liu, Guo, et al., 2014). Since free-hunting internet users significantly outweigh those wanting to pay for service (Hüttel et al., 2018). Furthermore, when physicians are benevolent, they will earn the patients' trust. A consumer's intention to purchase online is influenced positively by their trust in online retailers (Oliveira et al., 2017). Similarly, patients often prefer to select physicians with genuine benevolence (Y. Gong et al., 2021b). Therefore, the following hypothesis is proposed:

H2: Online patients' consultations is positively affected by physician's benevolence.

Information asymmetry has always been a key concern in OHCs, it also makes patients feel hard to select physicians to consult (Q. Chen et al., 2021; F. Liu et al., 2019). To remedy this issue, open and transparent mechanisms for disclosing medical information and evaluating patient responses should be implemented (N. Lu & Wu, 2016). Physicians with integrity will respond to patients with the same attitude and deliver the

almost same amount of information regardless of the price of the service type. Patients' satisfactions increase when physicians provide sufficient information and assistance regardless of the patients' payment and when patients receive more information and assistance than expected Integrity positively affects customer trust in e-commerce, and consumer trust positively influences purchase intention (Oliveira et al., 2017). In OHCs, the selection of patients is positively correlated with the integrity of physicians (Y. Gong et al., 2021b). The following hypothesis is proposed:

H3: Online patients' consultations is positively affected by physician's integrity.

3.4.1.2 Moderating Impacts of Gamification

In OHCs, gamification design enables invoke game-like experiences and enhances physician engagement by incorporating game components in the OHC context (Hamari, 2013). Besides, gamification badges are one of the system-generated information sources. In OHCs, independent of physicians and patients, the system generates information depending on the physician's contribution and reputation (H. Yang, Guo, Wu, et al., 2015). This internet information regarding items and services from unbiased sources is seen as more informative and neutral (J. Chen et al., 2016). Matching a customer's interests with those of the most comparable consumers simplifies the purchase procedure by reducing the number of available options and, therefore, the time spent investigating (Cezar & Ögüt, 2016). When patients seek information in OHCs, physicians with a greater number of annual badges will get more attention. Since the badges are a result of physicians' overall competence and service quality, they assist patients to evaluate a physician's service quality at a minimum cost. Consequently, physicians with more

badges may weaken the influence of trust beliefs on patients' consultations. When the level of physicians' gamification badges is high, patients are more likely to quickly transform the platform's affirmation of physicians into their trust in physicians, and then the positive impact of trust beliefs about physicians on patients' consultations is weakened. On the other hand, when the level of physicians' gamification badges is low, patients cannot screen physicians through third-party information, so they pay more attention to the trusting beliefs of physicians themselves. Therefore, the positive impact of trusting beliefs about physicians on patients' consultations is relatively strengthened. Hence, I suggest that gamification badge has a moderating impact on the relationship between trusting beliefs and patients' consultations. According to the discussion and analysis presented above, the hypotheses 4,5, and 6 are proposed:

H4: Gamification badge negatively moderate the positive relationship between competence belief and patients' consultations.

H5: Gamification badge negatively moderate the positive relationship between benevolence belief and patients' consultations.

H6: Gamification badge negatively moderate the positive relationship between integrity belief and patients' consultations.

The research model of study 3 see Figure 15.

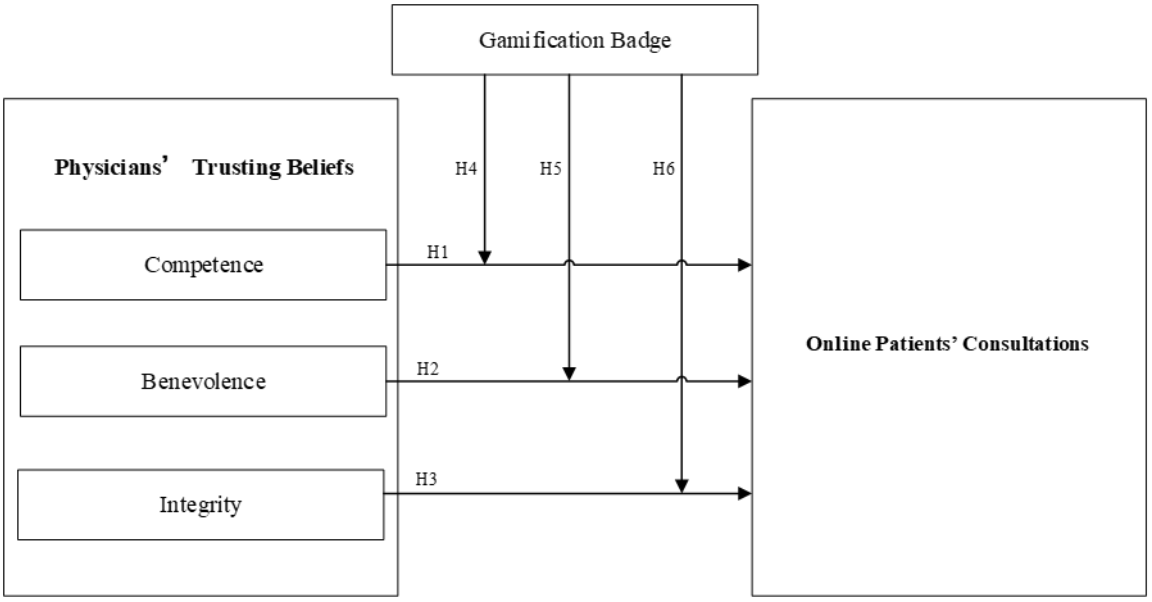


Figure 15 Research model of Study 3

3.4.2 Methodology and Measurement of Study 3

Study 3 uses the same dataset as Study 1 and Study 2. Data from 2,961 physicians was obtained after removing the lists with "space" or "missing value", see Table 20. Patients' feedback and physicians' personal profiles are included in the data. The example of physician homepage see Figure 16. The data sample of study 3 is shown in Table 28.

Table 20 Descriptive statistics of Study 3

Variables	Mean	S.D.	Min	Max
Consult	4581.30	5671.15	73	71678
Competence	3.25	0.74	1	4
Benevolence	2.93	2.02	0.00	10.65
Integrity	-2.87	3.44	-29.50	10.10
Badge	0.47	1.22	0	9
D_severity	0.37	0.48	0	1
Gender	0.34	0.47	0	1
H_type	0.99	0.08	0	1
H_level	2.99	0.12	1	3
H_Special	0.67	0.47	0	1

3.4.2.1 Model Specification of Study 3

Dependent variables

As shown in Table 21, online patients' consultations (***Consult***) are the first dependent variable. This term refers to a sort of consultation that occurs when physicians and patients are at different locations but communicate remotely via online health platforms. (Atanasova et al., 2018). A physician's online performance is measured by the number of patients' consultations in OHCs (X. Zhang et al., 2022).

Table 21 Variables Description of Study 3

	Description
Dependent Variable	
Consult	The number of patients' consultations in total.
Independent Variable	
Competence	The medical titles of the physician were stratified into 4 stages, 1=the resident physician, 2=the attending physician, 3= associate chief director, 4=chief director.
Benevolence	The number of free consultations by physicians.
Integrity	The difference in the average number of physicians' responding to online consultations at different prices.
Moderating Variable	
Badge	The number of consecutive "Annual Good Physician Badges" awarded by Haodf.com
Control Variable	
D_severity	Dummy variable indicating the mortality of the disease 0=low, 1=high
Gender	Dummy variable indicating physicians' gender 0=Male, 1= Female
H_type	Dummy variable indicating the hospital type 0=Private, 1=Public
H_level	Hospital level: the scale of 1 to 3, with 1 being the lowest (1A or 1B) and 3 the highest (3A or 3B hospitals)
H_Special	Dummy variable indicating whether the hospital is a specialized hospital 0= Specialized, 1=General

Independent variables

Based on the trust theory, trusting beliefs fall into three categories: competence belief,

benevolence belief, and integrity belief (Hao & Zhang, 2016). Based on previous research (Y. Gong et al., 2021b). The title of a physician determines the level of competence (***Competence***). It is due to the fact that the physician's title directly reflects the physician's academic background, years as a physician, and practical abilities. In the benevolence belief (***Benevolence***) is measured by the number of free consultations by physicians. It is extremely charitable of physicians to offer free consultations. Physicians are not compensated for this type of consultation, and it is entirely based on their personal preferences. Accordingly, it could indicate physicians' ethical guidelines based on how many free consultations they provide. A physician is more likely to help patients if he or she offers more free consultations. Physician integrity involves telling honest facts to patients and reducing the information imbalance between them to build trust between them (Y. Gong et al., 2021b). The patient can expect excellent care when the physician is willing to provide the same quality of care to all patients, regardless of the cost of the service. The average number of physicians responding to online consultations at different price points was used to measure integrity belief (***Integrity***). Competence belief (***Competence***) was measured by physician title, benevolence belief (***Benevolence***) by the number of free consultations provided by physicians, and integrity belief (***Integrity***) by how many physicians responded to online consultations for different prices on average.

Moderating variables

It consists of the number of consecutive "Annual Good Physician Badges" that Haodf.com awards every year to members as the moderating variable (***Badge***). (Ouyang, Wang, & Ali, 2022).

Control variables

The following control variables were included in this study to ensure the model had a high degree of accuracy based on previous research. There are three control variables: the physician's gender (***Gender***), which has male and female physicians, the hospital type (***H_type***), which has public and private hospitals, the level of the physician's hospital (***H_level***), the higher the level, the specialist hospital (***H_Special***), which indicates whether it is a specialist hospital for treating the disease; and the degree of mortality of the disease (***D_Severity***).

Figure 16 Example of physician homepage

The number of patients' consultations received by a physician, along with votes, gifts, and thank-you letters. In order to reach the results presented in this study, Poisson

regression and negative binomial regression were considered. As a result, Poisson regression is rejected since the conditional variance exceeds the conditional expectation. The model analysis is based on the following equation:

$$Consult_i = \alpha_0 + \beta_1 Competence_i + \beta_2 Benevolence_i + \beta_3 Integrity_i + \beta_4 D_{severity_i} + \beta_5 Gender_i + \beta_6 H_{type_i} + \beta_7 H_{level_i} + \beta_8 H_{special_i} + \mu_i + \mathcal{E}_i \quad (1)$$

$$Consult_i = \alpha_0 + \beta_1 Competence_i + \beta_2 Benevolence_i + \beta_3 Integrity_i + \beta_4 Badge_i + \beta_5 Competence_i * Badge_i + \beta_6 Benevolence_i * Badge_i + \beta_7 Integrity_i * Badge_i + \beta_8 D_{severity_i} + \beta_9 Gender_i + \beta_{10} H_{type_i} + \beta_{11} H_{level_i} + \beta_{12} H_{special_i} + \mu_i + \mathcal{E}_i \quad (2)$$

The city impacts are denoted by μ_i, the constant term is α_0, and the residual error term is $\mathcal{E}_i$. I examine whether patients' trusting beliefs regarding physicians, competence belief (***Competence***), benevolence belief (***Benevolence***), and integrity belief (***Integrity***), are associated with a positive influence on consultation (***Consult***). Using equations 2 and 4, I estimate whether gamification badges (***Badges***) influence patients' consultations (***Consults***) less than three dimensions of trusting beliefs. The robustness checks employed the same method as Study 1.

3.4.3 Result of Study 3

Table 22 showed VIF=1.09<10, which means that all variables are moderately correlated (Mason & Perreault, 1991). Thus, there is no significant multicollinearity that needs to be corrected.

Table 22 Variance inflation factor (VIF) of Study 3

Variable	VIF	1/VIF
Competence	1.06	0.94
Benevolence	1.09	0.92
Integrity	1.06	0.95
Badge	1.10	0.91
Gender	1.08	0.93
D_severity	1.05	0.95
H_level	1.20	0.84
H_type	1.19	0.84
H_Special	1.02	0.98
Mean VIF: 1.09		

The results show that ***Competence*** (r=.182***), ***Benevolence*** (r=.407***), and ***Integrity*** (r=.196***) are all statistically significant with ***Consult***. ***Competence*** (r=.182***) means that ***Competence*** has very weak positive association with ***Consult***. ***Benevolence*** (r=.407***) means that ***Benevolence*** has moderate positive association with ***Consult***. ***Integrity*** (r=.196***) means that ***Integrity*** has very weak positive association with ***Consult***. The details are shown in Table 23.

Table 23 Correlation coefficient matrix of Study 3

	1	2	3	4	5	6	7	8	9	10
Consult	1.000									
Competence	.182***	1.000								
	(.000)									
Benevolence	.407***	.075***	1.000							
	(.000)	(.000								
Integrity	.196***	.163***	.108***	1.000						
	(.000)	(.000)	(.000)							
Badge	.652***	.129***	.248***	.061***	1.000					
	(.000)	(.000)	(.000)	(.001)						
D_severity	-.111***	.081***	-.064***	.019*	.036*	1.000				
	(.000)	(.000)	(.000)	(.299)	(.049)					
Gender	-.085***	.054**	-.093***	-.129**	-.118***	-.160***	1.000			
	(.000)	(.003)	(.000)	(.000)	(.000)	(.000)				
H_type	-.014*	.002	-.024*	-.005	.020*	.039*	-.033*	1.000		
	(.453)	(.926)	(.196)	(.780)	(.282)	(.033)	(.070)			
H_level	.021*	.001	-.022*	-.012	.035*	.049**	-.061***	.385***	1.000	
	(.245)	(.941)	(.233)	(.519)	(.055)	(.008)	(.001)	(.000)		
H_Special	-.032*	.024*	.016*	.027*	-.003	.095***	-.063***	.061***	.029*	1.000
	(.080)	(.188)	(.380)	(.147)	(.890)	(.000)	(.001)	(.001)	(.115)	

p-values in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In Model 1, a map of the main OLS regression models is shown in Table 24. A control variable was introduced. ***D_severity (-)***: Low disease severity receive more online patients' consultations than high disease severity. Maybe because high disease is more dangerous, patients need to go to hospital immediately. ***Gender (-)*****:** Male physicians receive more online patients' consultations than female physicians. This might because of stereotype, male physicians may be more professional. ***H_type (-)*****:** Private hospital receive more online patients' consultations than public hospital. This might because public hospital is more busy, private hospital could provide more careful service than public hospital. ***H_level (+)*****:** The higher-level hospital is, the more online patients' consultations receive. This might because high level hospitals hire more high-quality physicians. ***H_special (-)***: Specialized hospital receive more online patients' consultations

than public hospital. This might because it is easier for patients to find physicians from specialized hospital according to their symptoms.

Table 24 Regression result (Patients' consultations) of Study 3

	Main models			**Robustness models**	
	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	7.992***	8.447***	6.609***	14.313***	11.206***
	(.49)	(.46)	(.33)	(.79)	(.50)
D_severity	-.333***	-.405***	-.425***	-.435***	-.485***
	(.05)	(.04)	(.03)	(.07)	(.06)
Gender	-.279***	-.115**	-.042*	-.258***	-.206***
	(.05)	(.04)	(.03)	(.07)	(.06)
H_type	-.287*	-.293*	-.046	-.748*	-.346*
	(.34)	(.31)	(.19)	(.55)	(.36)
H_level	.343*	.128*	.161*	.322*	.425*
	(.17)	(.16)	(.12)	(.25)	(.17)
H_Special	-.070*	-.089*	-.074*	-.165*	-.134*
	(.05)	(.04)	(.03)	(.07)	(.06)
Competence		.298***	.264***	.653***	.571***
		(.03)	(.03)	(.05)	(.05)
Benevolence		.206***	.166***	.240***	.168***
		(.01)	(.01)	(.02)	(.02)
Integrity		.043***	.062***	.092***	.150***
		(.01)	(.01)	(.02)	(.01)
Badge			.927***		1.057***
			(.08)		(.11)
Badge*Competence			-.122***		-.133***
			(.02)		(.03)
Badge*Benevolence			-.041***		-.054***
			(.01)		(.01)
Badge*Integrity			-.013***		-.025***
			(.00)		(.00)
City dummies	Yes	Yes	Yes	Yes	Yes
Wald chi2	0	0	0	0	0
N	2961	2961	2961	2982	2961

Standard errors in parentheses
* $p < 0.50$, ** $p < 0.01$, *** $p < 0.001$

The control variables were found to be significant according to the results. Without taking into account the moderating variables, Model 2 indicates that ***Competence*** (β = 0.298***), ***Benevolence*** (β = 0.206***) and ***Integrity*** (β =0.043***) are significant. β value

means that when competence increases 1 unit, online patients' consultation increases 0.298 unit. When benevolence increases 1 unit, online patients' consultation increases 0.206 unit. When integrity increases 1 unit when online patients' consultation increases 0.043 unit. A higher β value means a higher positive slope, steeper upward tilt to the line. Thus, according to the results of study 3, competence has higher positive slope than benevolence and integrity. This means that patients' consultations change rapidly with competence. Integrity has the most flatter slope, which means that the value of patients' consultation is not changing much with the integrity. There is support for H1, H2, and H3. According to the results of Model 3, the interaction term between ***Badge*** and ***Competence*** (β = -0.122***), ***Badge*** and ***Benevolence*** (β = -0.041***), and ***Badge*** and ***Integrity*** (β = -0.013***) is significant and negative. When gamification badges equal 0, physicians' competence changes 1 unit, online patients' consultations will change 0.264 unit. When gamification badges increase 1 unit, the impact of physicians' competence on online patients' consultations will decrease 0.122 unit. When gamification badges are 1, the impact of physicians' competence on online patients' consultations is 0.142 (0.264 - 0.122 = 0.142). Starting from 3, gamification badges change to negative effects. When gamification badges equal 3, the impact of physicians' competence on online patients' consultations is -0.102 (0.264 - 0.122*3= - 0.102). In other words, the impact of physicians' competence on online patients' consultations will gradually weaken as gamification badges increase.

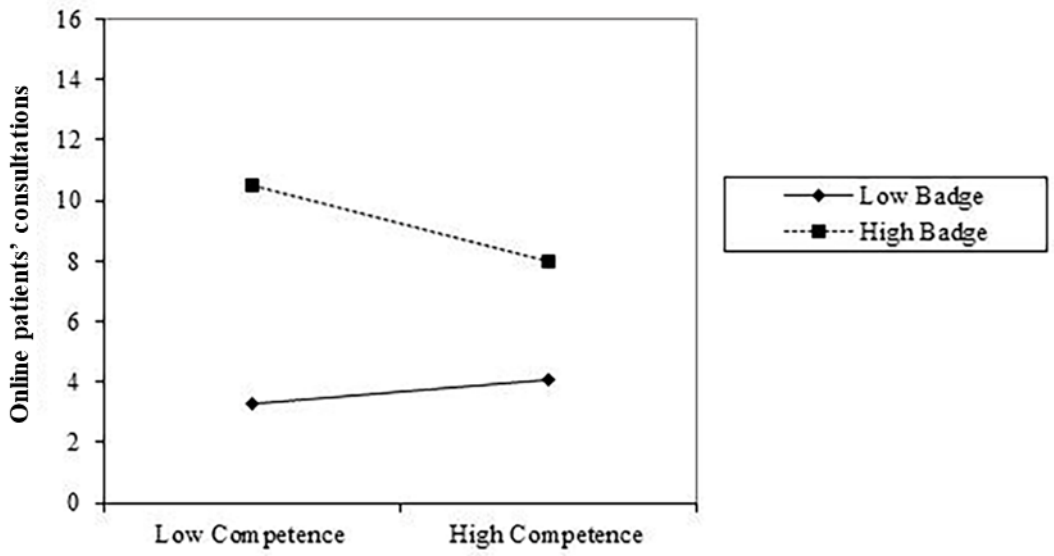


Figure 17 Moderating impact (Competence)

When gamification badges equal 0, physicians' benevolence changes 1 unit, online patients' consultations will change 0.166 unit. When gamification badges increase 1 unit, the impact of physicians' benevolence on online patients' consultations will decrease 0.041 unit. When gamification badges are 1, the impact of physicians' benevolence on online patients' consultations is 0.125 (0.166 - 0.041 = 0.125). Starting from 5, gamification badges change to negative effects. When gamification badges take 5, the impact of physicians' benevolence on online patients' consultations is -0.039 (0.166 - 0.041*5= - 0.039). In other words, the impact of physicians' benevolence on online patients' consultations will gradually weaken as gamification badges increase.

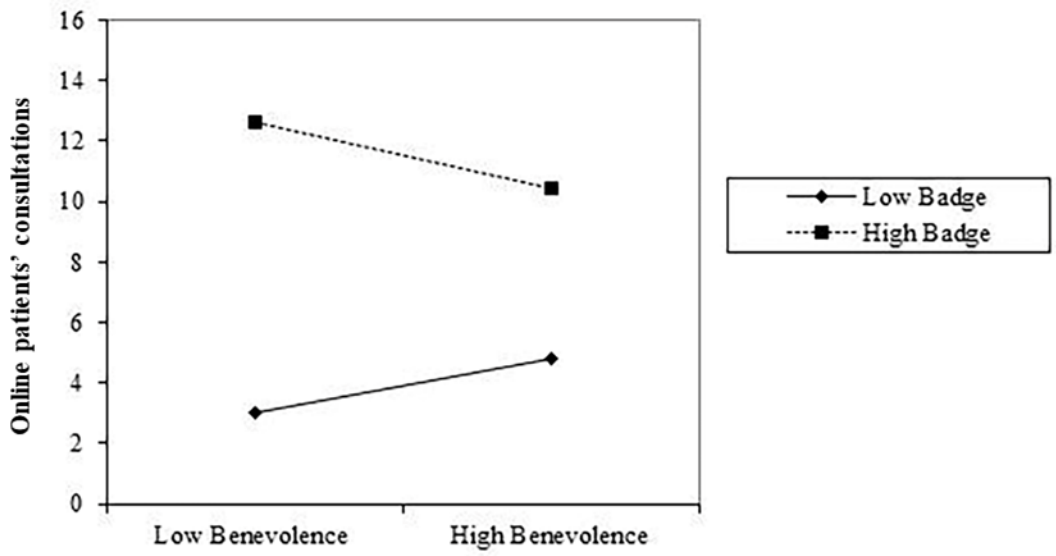


Figure 18 Moderating impact (Benevolence)

When gamification badges equal 0, physicians' integrity changes 1 unit, online patients' consultations will change 0.062 unit. When gamification badges increase 1 unit, the impact of physicians' integrity on online patients' consultations will decrease 0.013 unit. When gamification badges are 1, the impact of physicians' integrity on online patients' consultations is 0.049 (0.062 - 0.013 = 0.049). Starting from 5, gamification badges change to negative effects. When gamification badges equal 5, the impact of physicians' integrity on online patients' consultations is -0.003 (0.062 - 0.013*5= - 0.003). In other words, the impact of physicians' integrity on online patients' consultations will gradually weaken as gamification badges increase.

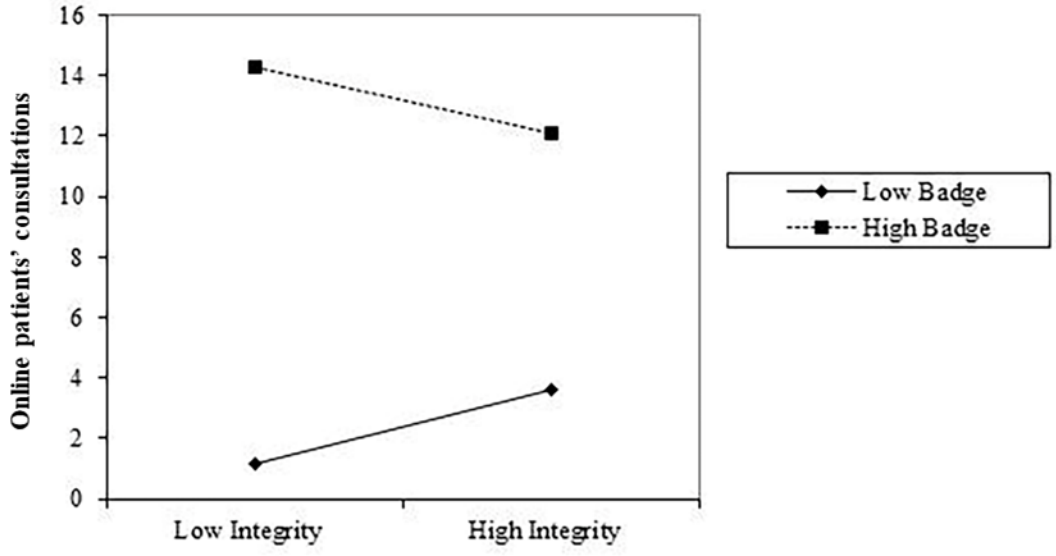


Figure 19 Moderating impact (Integrity)

This finding suggests that the relationship between ***Competence***, ***Benevolence***, ***Integrity*** and ***Patients' consultations*** can be negatively moderated by the gamification badge. In other words, the positive relationships between three dimensions of trust beliefs about physicians and patients' transactional engagement (***Patients' consultations***) are weakened when the number of badges is high, as illustrated in Figure 17 to Figure 19. Thus, H4, H5, and H6 are supported.

3.4.3.1 Robustness Check

Furthermore, as shown in Table 24, model 4 and 5 illustrate robustness checks with the alternative dependent variable of patient visits. As an alternative to the total number of patients' consultations, the total number of patients' visits can be used. This is because patients are only permitted to consult after they have visited first. Model 4 indicated that ***Competence*** ($\beta = 0.298^{***}$), ***Benevolence*** ($\beta = 0.206^{***}$) and ***Integrity*** ($\beta = 0.043^{***}$) were

positively and significantly related to patients' consultations. Model 5 showed that the coefficient of the interaction term of ***Competence*** and ***Badge*** (β = -0.122***), ***Benevolence*** and ***Badge*** (β = -0.041***) and ***Integrity*** and ***Badge*** (β = -0.013***) on patients' consultations was negative and significant. The overview of hypotheses of Study 3 is shown in Table 25.

Table 25 Overview of hypotheses of Study 3

Hypotheses	**Results**
H1: Online patients' consultations is positively affected by physician's competence.	Supported
H2: Online patients' consultations is positively affected by physician's benevolence.	Supported
H3: Online patients' consultations is positively affected by physician's integrity.	Supported
H4: Gamification badge negatively moderate the positive relationship between competence belief and patients' consultations.	Supported
H5: Gamification badge negatively moderate the positive relationship between benevolence belief and patients' consultations.	Supported
H6: Gamification badge negatively moderate the positive relationship between integrity belief and patients' consultations.	Supported

Chapter 4. DISCUSSION

4.1 General Overview of Discussion

In this chapter three studies are discussed. This chapter include the findings of three research studies and the extent to which these findings differ or are consistent with previous research.

4.2 Discussion

Following the COVID-19 outbreak, online healthcare community platforms and online consultations have become indispensable tools for disease prevention and crisis management. Four significant findings were identified as a result of this research based on signaling theory. As a result of the findings of this study, the influencing and moderating factors in the process of patients' consultations were examined.

Specifically, this research found that physician-generated information positively affects patients' consultations. Therefore, physicians who provide high-quality information to their patients as a signal of quality service, reliable social support, and trusting beliefs will be more likely to attract patients. Physician-generated information is divided into service quality (need fulfillment, security, and responsiveness), social support (information, and emotional support), and trust beliefs (competence, benevolence, and integrity). When the level of compliments received was low, patients' opinions about online consultations were more influenced by physicians' social support (emotional support, source credibility, and information diagnosticity), and vice versa. Information

generated by the system (gamification badge) weakens the relationship between patients' trusting beliefs and their consultations with the physician. The following is an explanation of the significance of these results in terms of service quality.

In **Study 1**, online patients' consultations were affected positively by need fulfillment of service quality, which means physicians using OHC platforms are actively spreading disease-related articles and topics. An online healthcare community platform may increase the likelihood that patients will select a physician if they receive friendly expressions and some free consultations. It is consistent with the findings of Gummerus et al. (2004) that need fulfillment has a positive correlation with trust. Meeting patients' needs may improve their trust in physicians to improve their decisions of online consultation. Trust is considered to be a critical factor when determining the willingness of patients to make a decision (Wan et al., 2020). As a result, the need fulfillment dimension plays an important role in determining the patient's consultation decision behavior.

Secondly, physician security contributes to online patients' consultations. Based on the results of this study, there is a significant correlation between all factors.. This indicates that patient consultation selection behavior is positively influenced by academic and professional titles, as well as previous treatment experiences. Thus, the higher the grade of a physician, the greater the likelihood that the physician will be chosen. Patients prefer to choose physicians with high status and substantial professional experience (Wan et al., 2020). It is imperative that physicians of significant standing (academic and professional) provide extensive security assurance, in view of the significant dangers

associated with health services. Consequently, security affects the patient's choice of consultations in a positive manner.

Finally, the responsiveness of the physician to the quality of service provided to his/her online patients affect positively their consultation. Patients believe physicians are more motivated when they are responsive, that diseases are diagnosed and treated more effectively, and that problems are resolved faster when they are responsive. Thus, high responsiveness indicators lead to patients trusting physicians. In previous studies, similar findings were reported (Y. Li, Ma, et al., 2019; H. Yang, Guo, Wu, et al., 2015).

Study 2 indicates that social support positively affects online patients' consultations, including emotional support and information support (diagnostic information and source credibility). The main concern of patients in OHCs is finding a physician who is competent. In making these decisions, physicians should provide informational and emotional support to their patients (Uchino, 2009). The correlation between diagnostic information and patients' decision-making has been found to be positive, for example, articles concerning disease treatment and prevention. This is a form of informational support offered by physicians. It is possible to increase the number of patients a physician can attract by improving diagnostic information. This is done by providing them with Based on the findings of Gurney et al. (2019) in an online sales context, information diagnosticity positively influences purchase intention online.

Furthermore, this study confirms that source credibility positively affects patients' consultations. Credibility can be determined by the reliability of a physician's professional title as a source of credibility. As a result of the rank reflecting a physician's

expertise, it is more likely that patients will choose and trust a physician with a higher rank. In addition, the study recommends that physicians include their professional titles on their online healthcare profiles whenever possible. This will increase the credibility of their sources, given that OHCs encourage physicians to identify themselves by actual names and including professional titles. Consequently, the reliability of the information source influences patients' decisions regarding online consultations. Also, Farhadpoor and Dezfuli (2021) and Qi and Kuik. (2022) have found a similar relationship between patients' consultations and source credibility in the e-commerce context. Additionally, it appears that Study 2 indicates that emotional support has a positive influence on patient consultations. Greeting message length can be used as an indicator of the level of emotional support provided by physicians. Physicians who used more words in their greeting messages were perceived as being more patient, gentle, and caring by patients. Considering that all of these platforms offer this function, based on findings of this study, physicians should write longer greeting messages so they can demonstrate more emotional support to individuals. This is consistent with Wang et al. (2019), who found that intentions of purchase in WeChat context is positively associated with emotional support.

Finally, the relationship between patient consultation and social support is moderated by patients' compliments. When the level of compliments received was low, patients' opinions about online consultations were more influenced by physicians' social support (emotional support, source credibility, and information diagnosticity), and vice versa. It is possible that social support from other physicians and compliments from other patients may substitute for a patient's own consultation. The information have received

compliments from other patients may be more credible than that posted by physicians. As a result, the positive relationship between physicians' social support and patient consultation is diminished. The patient must rely on the information provided by the physician when other patients' testimonials are insufficient. As a result, physicians' social support positively impacts patients' consultations. The results indicate that physicians should strive to receive positive feedback from their patients in order to attract patients to consult. The results supports Huang et al. (2003)'s findings, which indicate that customer compliments, for example, eWOM, have a significant impact on other customer's buying decision. Thus, other patients' compliments are of utmost importance in OHCs.

In **Study 3**, it was revealed in the last study that trusting belief (competence, benevolence, and integrity) positively affects patients' consultations, but the gamification badge sent by systems and platforms weakens the relationship between trusting beliefs and patients' consultations. As a result, this indicates that trusting beliefs about physicians are the foundation for establishing trust and confidence between physicians and their patients (Y. Gong et al., 2021b). Physicians are trusted by patients for both their professional skills(J. David Xu et al., 2002) as well as their ability to provide high quality medical care (J. Li et al., 2019). The higher the level of competence and benevolence of a physician, which are both reflected in their personality attributes, the easier it will be to attract more patients to the consultation. This finding was consistent with the results of Gong et al., (2021), which examined that competence, benevolence and integrity positively affect patients' selection.

Second, this study clarified that the gamification badges weaken the relationship between trusting beliefs and patients' consultations. This means that physicians with more badges will be able to attract more patients' interest, but it will also distract patients from the intention to trust the information they provide. Since badges are a type of system-generated information , which is more objective and useful than physician-generated information (J. Chen et al., 2016). Consequently, patients tend to pay more attention to objective information than to information generated by physicians that appears subjective, weakening the positive correlation between trusting beliefs and patients' consultations.

Chapter 5. CONCLUSION

5.1 General Overview of Conclusion

This chapter provides conclusions based on three studies, as well as a summary of the findings of three empirical studies.

5.2 Conclusion

Due to the COVID-19, traditional healthcare systems have been challenged and consultation methods have undergone significant changes. A signaling theory analysis was applied to conduct three studies to determine whether physician-generated information (service quality, social support and trusting belief) impacts the consultation of patients, and if patient-generated information (patients' compliments) and system-generated information (gamification badges) affect the relationship between physician-generated information (social support, trusting belief) and patients' consultations. The study was based on cross-sectional data collected from a Chinese OHC platform called Haodf.com, which is one of the largest in China, allowing large amounts of data to be collected. As a result of this research, physician-generated information, including service quality, social support, and trusting beliefs, positively influenced patients' consultations. Information generated by patients (compliments of patients) negatively moderates (weakens) the relationship between social support and patients' consultations, while information generated by the system (gamification badge) negatively moderates (weakens) the relationship between patients' consultations and trusting beliefs. Further, this research contributes to theoretical contributions to signaling theory, multi-source

information (physician-generated information, patient-generated information, and system-generated information), and patients' consultations behavior. There are also some practical implications of this research for physicians, patients, and platform administrators.

Chapter 6. CONTRIBUTION

6.1 General Overview of Contribution

This section provides a description of each study's theoretical and practical contributions. A theoretical contribution to each field related to this dissertation is included, as well as a practical contribution to the people concerned, such as physicians, patients, and managers of OHC platforms.

6.2 Contribution

6.2.1 Theoretical Contribution

From the perspective of signaling theory, this dissertation contributes to the literature concerning online patients' consultations on OHC platforms. Researchers have shown considerable interest in the consultation of patients. Researchers have investigated a range of factors that influence patient consultation decisions, including physicians' self-disclosure (Ouyang, Wang, & Jasmine Chang, 2022), online and offline reviews (F. Liu et al., 2019), system-generated and patient-generated information (H. Yang, Guo, & Wu, 2015), logged-in offline status and web reviews (X. Lu et al., 2021). In the case of OHC platforms, there is a significant imbalance in the flow of information between the signalers and the receivers (Kromidha & Li, 2019). Currently, there is no research that has investigated the impacts and moderating impacts of multisource information on patients' consultations from the perspective of signaling theory. As a part of this dissertation, signaling theory was used to investigate the impacts of multisource

information on patients' consultations in a direct and moderate manner, contributing to the literature on signaling theory.

As a second contribution, this dissertation illuminates the signaling mechanisms of multi-source information in online patients' consultations, which contribute to the literature on multi-source information. In multisource information, physician-generated information has been noticed by researchers because it is important for patients when they need to gather information to decide which physician to consult with. The number of articles published by physicians has been examined in prior research in order to understand how this affects the patients' choices and activities. As a result, the information generated by physicians is vast and may reflect a variety of signals, such as the quality of the services rendered, the ability of the physician to offer social support, and the trusting beliefs. It is currently unknown whether physician-generated information in patients' consultations has a multidimensional influence on treatment outcomes. In this dissertation, physician-generated information is divided into three dimension, service quality, social support and trusting beliefs, these three signals of physician-generated information has been examined positively affect patients' consultations.

Besides, the moderating impact of patient-generated, and system-generated information on the relationship between physician-generated information and patients' consultations. Previously, studies focused on the influence of system-generated, and patient-generated information on patients' consultations (Z. Huang et al., 2022; H. Yang, Guo, Wu, et al., 2015). An examination of the relationship between physician-generated information (social support) and patients' consultations was conducted through the use of

patient-generated information (patient compliments). As well, this dissertation examined how system-generated information (gamification badge) influences physician-generated information (trusting beliefs) in relation to patients' consultations. This dissertation contributes to the literature on multisource information by investigating the impacts and moderating effects of multisource information in the context of occupational health care.

6.2.2 Practical Contribution

A number of practical implications arise from the results of this dissertation for physicians, patients, and administrators of OHCs who use these services.

As a first point, the various forms of physician information available on the OHCs have the potential to influence patients' consultations decisions in a significant way, as these signals serve as indicators of both the quality of a physician's service and his or her ability to provide social support to patients. It is imperative that physicians recognize the significance of the information they generate. Patients may be more inclined to consult physicians who generate high-quality information. The physician should pay more attention to the sections on the OHC platform where he or she can generate information, such as the greeting message bar, the article, and their own titles pertaining to medical and academic disciplines. Patients may assume that physicians are qualified to provide emotional support and good healthcare if they receive a long and warm greeting message. Moreover, if the physician shares additional articles to demonstrate the extent of his or her expertise to patients, and replies to more patient messages, patients will be more inclined to approach them as being able to trust them to handle their health problems because an available and responsive physician with high professional skill sets will make

patients feel comfortable. The management of patient information in an appropriate manner may help physicians attract more patients.

Secondly, patients could analyze the information generated by the physician before deciding who to consult. It is recommended that patients review all the information on the homepage, paying attention to the greeting message and reply time to ensure that their physician is able to provide them with emotional support. There is no doubt that professionalism is of great importance, so titles, badges, and patient reviews should be taken into consideration since these signals can provide insight into a physician's ability to provide quality medical care. Moreover, the last time this physician logged in is critical, as this information may reflect whether he or she has been available in recent times. It is important that patients choose their physicians wisely in order to ensure the safety of their lives and to receive high quality medical care. In this regard, it is important for them to analyze all available information before making a decision about consulting.

In conclusion, platform administrators should make a greater effort to encourage physicians to generate more high-quality information in order to attract more patients and guide them to physicians who provide high-quality information. A manager may introduce patients to physicians by submitting articles and offering free consultations. It is also possible for managers to refer patients to physicians who respond more frequently and who possess higher medical and academic titles. The quality of the service and patient safety will be ensured. Rewards and badges may be more helpful to both physicians and patients, as physicians are likely to generate more information and patients are more likely to access these signals. For physicians unfamiliar with the OHC

platform, administrators need to ensure that all parts of the platform are easy to use, reduce the obstacles they face when generating information and provide assistance when they are unsure how to use it. Overall, administrators need to provide rewards and support to physicians so that they can generate quality information and deliver quality healthcare.

Chapter 7. LIMITATION

7.1 General Overview of Limitation

In this chapter, a summary of the limitations of the three studies included. It is essential to be aware of limitations in research context, sample size, and data collection tools.

7.2 Limitations

Even though this dissertation provided fascinating discoveries and made valuable contributions both theoretically and practically, it is unavoidable that many drawbacks could be identified and corrected.

Firstly, as the data all came from Haodf.com, a Chinese online healthcare community platform with a large number of users, the results may not apply to other nations or platforms.

Secondly, only cross-sectional data have been gathered by the Python crawler, so the data only reflect the results of a certain period and cannot be used to determine changes in trends over time.

Thirdly, on OHCs, patients who consult online may not be easily distinguished from those who consult offline. Because physicians can also upload some cases of offline patients as cases to be presented on OHCs. In addition, due to our use of cross-sectional data, there are some accounts canceled monthly when we conduct collection. Thus, there may be some missing data, but not much.

As a final point, this dissertation uses a quantitative method along with an evaluation of the impact, which may contribute to a lack of understanding of the impacts of this dissertation.

Chapter 8. FUTURE RESEARCH

8.1 General Overview of Future Research

In this chapter, future research directions are discussed in light of the limitations of three research studies. It is important to understand the context of a study, the size of the sample, as well as the methodology used to collect the data in order to be able to understand future research directions.

8.2 Future Research Directions

In light of its limitations, it is possible that this dissertation will provide some helpful directions for future research. First, it is essential to target a range of countries and types of platforms of different sizes to ensure that future research can be applied to a wide range of OHCs across a wide range of countries and platforms.

Second, it may be useful to collect long term data for more impacts on future studies, such as about a half of year on physicians' homepages, in order to observe how the results, change with time.

Thirdly, It may be possible to further investigate by adding additional information to the study in the future.

As a final point, future studies may use in-depth interview in order to gain a deeper understanding of the relationship between the variables in the study.

Appendix

Table 26 Data example of Study 1

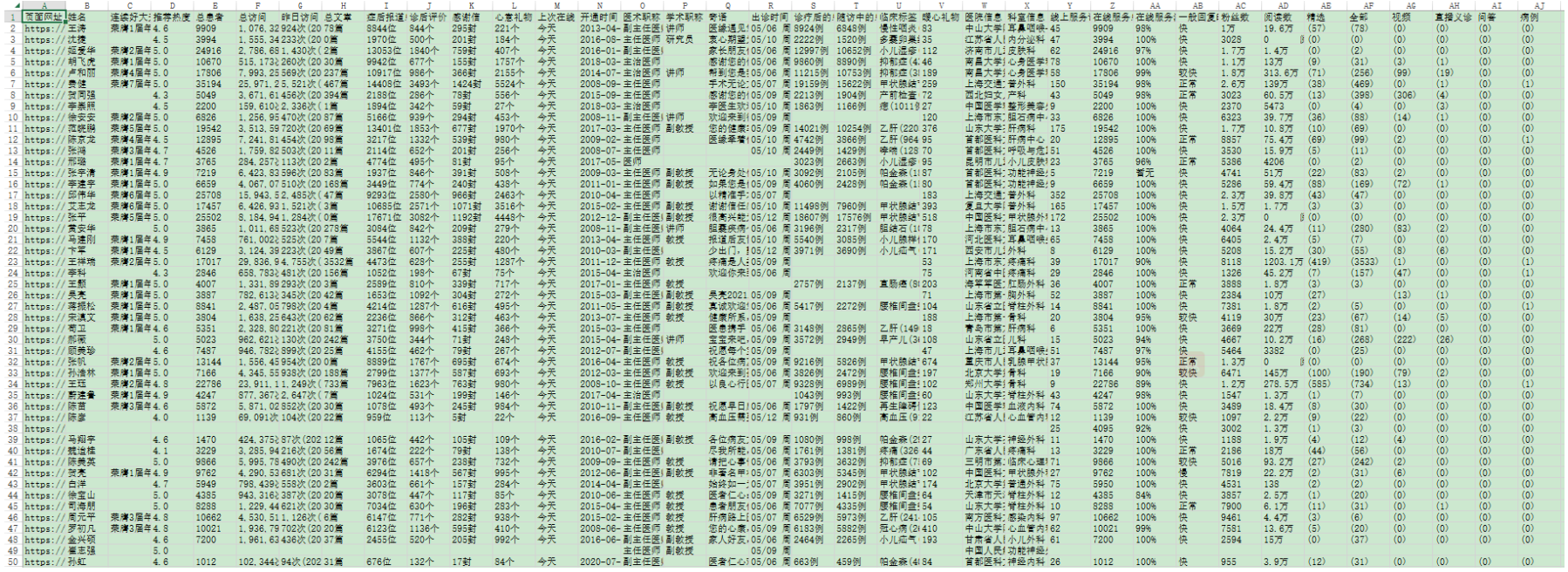
ID	Consult	Sharing	Greeting	Free	Login	Avail	Reply	Aca_S	Pro_S	Expertise	D_severity	D_Privacy	Gender	H_type	H_level	H_Special
1	9616	74	78	4	2	35	5	2	3	9	0	0	0	1	3	1
2	3919	0	18	4	2	8	4	4	4	6	1	0	0	1	3	1
3	24645	2	414	6	3	24	3	0	3	6	0	0	1	1	3	0
4	10401	27	41	0	3	16	6	0	2	4	0	0	0	1	3	1
5	17691	238	322	6	2	13	17	2	2	8	0	0	1	1	3	1
6	35068	133	95	6	3	16	66	0	4	14	1	0	0	1	3	1
7	4968	382	236	1	2	6	4	0	4	7	1	0	0	1	3	0
8	2142	1	37	4	2	8	2	0	2	4	0	0	0	1	3	0
9	6779	87	71	4	2	10	5	2	3	14	1	0	0	1	3	1
10	19295	69	18	1	3	10	7	3	4	5	0	1	0	1	3	1
11	12802	98	506	3	3	4	1	0	4	13	0	1	0	1	3	0
12	4441	11	0	2	2	4	4	0	4	14	1	0	1	1	3	1
13	3586	2	0	4	3	0	8	0	1	5	0	0	1	1	3	0
14	7181	80	310	3	2	4	2	3	4	13	1	0	0	1	3	1
15	6598	168	110	3	2	8	3	3	4	11	1	0	0	1	3	1
16	7226	7	429	6	2	10	3	4	4	9	0	0	0	1	3	1
17	6078	46	256	3	3	2	2	0	3	12	0	0	0	1	3	0
18	16930	3352	96	7	2	10	3	4	4	11	0	0	0	1	3	1
19	2803	156	200	7	2	4	3	0	2	7	0	0	0	1	3	0
20	3994	3	0	0	3	4	8	4	4	5	1	0	0	1	3	1

Table 27 Data example of Study 2

ID	Consult	I_Diag	S_Cre	emotion	D_severity	Gender	H_type	H_level	H_Special
1	9616	48	3	78	0	0	1	3	1
2	3919	0	4	18	1	0	1	3	1
3	24645	0	3	414	0	1	1	3	0
4	10401	9	2	41	0	0	1	3	1
5	17691	71	2	322	0	1	1	3	1
6	35068	25	4	95	1	0	1	3	1
7	4968	13	4	236	1	0	1	3	0
8	2142	0	2	37	0	0	1	3	0
9	6779	36	3	71	1	0	1	3	1
10	19295	10	4	18	0	0	1	3	1
11	12802	69	4	506	0	0	1	3	0
12	4441	5	4	0	1	1	1	3	1
13	3586	0	1	0	0	1	1	3	0
14	7181	22	4	310	1	0	1	3	1
15	6598	88	4	110	1	0	1	3	1
16	25659	43	4	3842	1	0	1	3	1
17	17418	3	4	35	1	0	1	3	1
18	25416	0	3	140	1	0	1	3	1
19	3832	11	3	246	1	0	1	3	1
20	7226	5	4	429	0	0	1	3	1
21	6078	30	3	256	0	0	1	3	0
22	16930	419	4	96	0	0	1	3	1
23	2803	7	2	200	0	0	1	3	0
24	3994	3	4	0	1	0	1	3	1
25	3853	27	3	133	1	0	1	3	1

Table 28 Data example of Study 3

ID	Consult	Competence	Benevolence	Integrity	Badge	D_severity	Gender	H_type	H_level	H_Special
1	9616	3	4	-12	1	0	0	1	3	1
2	3919	4	4	-1	0	1	0	1	3	1
3	24645	3	6	-3	2	0	1	1	3	0
4	10401	2	0	-5	1	0	0	1	3	1
5	17691	2	6	-1	4	0	1	1	3	1
6	35068	4	6	-29	7	1	0	1	3	1
7	4968	4	1	-2	0	1	0	1	3	0
8	2142	2	4	-4	0	0	0	1	3	0
9	6779	3	4	-1	2	1	0	1	3	1
10	19295	4	1	-4	5	0	0	1	3	1
11	19295	4	1	-4	5	0	0	1	3	1
12	12802	4	3	0	4	0	0	1	3	0
13	4441	4	2	-6	3	1	1	1	3	1
14	3586	1	4	-5	1	0	1	1	3	0
15	7181	4	3	1	1	1	0	1	3	1
16	6598	4	3	0	1	1	0	1	3	1
17	25659	4	3	-1	6	1	0	1	3	1
18	17418	4	4	-1	6	1	0	1	3	1
19	25416	3	3	-1	5	1	0	1	3	1
20	3832	3	3	-3	0	1	0	1	3	1
21	7226	4	6	-2	1	0	0	1	3	1
22	6078	3	3	0	1	0	0	1	3	0
23	16930	4	7	0	2	0	0	1	3	1
24	2803	2	7	-7	0	0	0	1	3	0
25	3994	4	0	-2	1	1	0	1	3	1



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1	首面网址	姓名	连续好大	推荐热度	总患者	总访问	昨日访问	总文章	症后报道	诊后评价	感谢信	心意礼物	上次在线	开通时间	医术职称	学术职称	寄语	出诊时间	诊疗后的	随访中的	临床标签	缓心礼物	医院信息	科室信息	线上服务	在线服务	在线服务	一般回复	粉丝数	阅读数	精选	全部	视频	直播义诊	问答	病例
2	https://…	王涛	乘满1届	4.6	9909	1,076,32	924次(20	78篇	8844位	844个	295封	221个	今天	2013-04-	副主任医师	讲师	医缘遇见	05/06	周	8924例	6848例	慢性咽炎	83	中山大学附	耳鼻咽喉	45	9909	98%	快	1万	19.6万	(57)	(78)	(0)	(0)	(0)	(0)
3	https://…	沈捷		4.5	3994	1,555,34	233次(20	0篇	1970位	500个	201封	184个	今天	2016-08-	主任医师	研究员	衷心期望	05/10	周	2222例	1520例	多囊卵巢	35	江苏省人民	内分泌科	47	3994	100%	快	3028	0	8	(0)	(0)	(0)	(0)	(0)	(0)
4	https://…	陆爱华	乘满2届	5.0	24916	2,786,68	1,430次(2	0篇	13053位	1840个	759封	407个	今天	2016-01-	副主任医师		家长朋友	05/06	周	12997例	10652例	小儿遗尿	112	济南市儿童	皮肤科	62	24916	97%	快	1.7万	1.4万	(0)	(2)	(0)	(0)	(0)	(0)
5	https://…	胡飞虎	乘满1届	5.0	10670	515,173	260次(20	30篇	9942位	677个	155封	1757个	今天	2018-03-	主治医师		感谢您的	05/06	周	9860例	8890例	抑郁症(4	46	南昌大学附	心身医学	78	10670	100%	快	1.1万	13万	(9)	(31)	(3)	(1)	(0)	(0)
6	https://…	卢和丽	乘满4届	5.0	17806	7,993,25	569次(20	237篇	10917位	936个	366封	2155个	今天	2014-07-	主治医师	讲师	帮到您是	05/06	周	11215例	10753例	抑郁症(3	189	南昌大学附	心身医学	58	17806	99%	较快	1.8万	313.6万	(71)	(256)	(99)	(19)	(0)	(0)
7	https://…	袁佳	乘满7届	5.0	35194	25,971,25	521次(4	467篇	14409位	2493个	1424封	5524个	今天	2008-09-	主任医师		手术无论	05/07	周	19159例	15622例	甲状腺结	259	上海交通大	骨外科	150	35194	98%	正常	2.6万	139万	(38)	(469)	(0)	(1)	(0)	(1)
8	https://…	贺同强		4.3	5049	3,671,61	456次(20	394篇	2188位	286个	75封	556个	今天	2015-09-	主任医师		感谢您的	05/09	周	2213例	1904例	产前检查	72	西北妇女儿	产科	43	5049	98%	正常	3022	60.5万	(13)	(398)	(306)	(4)	(0)	(0)
9	https://…	李燕辉		4.5	2200	159,610	2,336次(1	1篇	1894位	342个	59封	27个	今天	2018-03-	主治医师		李医生您	05/10	周	1863例	1166例	癌(1011	27	中国医学科	整形美容	9	2200	100%	快	2370	5473	(0)	(4)	(0)	(3)	(0)	(0)
10	https://…	徐安安	乘满2届	5.0	6826	1,256,95	470次(20	87篇	5166位	939个	294封	453个	今天	2008-11-	副主任医师	讲师	欢迎来到	05/09	周				120	上海市东方	胆石病中	33	6826	100%	快	6323	39.7万	(36)	(88)	(14)	(1)	(0)	(0)
11	https://…	范晓鹏	乘满5届	5.0	19542	3,513,59	720次(20	69篇	13401位	1853个	677封	1970个	今天	2017-03-	主任医师	副教授	您的健康	05/09	周	14021例	10254例	乙肝(220	376	山东大学附	肝病科	175	19542	100%	快	1.7万	10.8万	(10)	(69)	(0)	(0)	(0)	(0)
12	https://…	陈京龙	乘满4届	4.5	12895	7,241,81	454次(20	98篇	3217位	1332个	539封	980个	今天	2009-02-	主任医师		医缘牵着	05/10	周	4742例	3866例	乙肝(964	95	首都医科大	肝病中心	20	12895	100%	正常	8857	75.4万	(69)	(99)	(2)	(0)	(0)	(1)
13	https://…	张鸿	乘满3届	4.7	4526	1,759,82	503次(20	11篇	2114位	652个	201封	256个	今天	2008-07-	主任医师			05/10	周	2449例	1429例	哮喘(128	70	首都医科大	呼吸与危	51	4526	100%	快	3530	15.9万	(5)	(11)	(0)	(0)	(0)	(0)
14	https://…	邢璐	乘满1届	4.7	3765	284,257	113次(20	2篇	4774位	495个	81封	95个	今天	2017-05-	医师					3023例	2663例	小儿遗尿	95	昆明市儿童	小儿皮肤	23	3765	96%	正常	5386	4206	(0)	(2)	(0)	(0)	(0)	(0)
15	https://…	张宇清	乘满1届	4.9	7219	6,423,83	596次(20	83篇	1937位	846个	391封	508个	今天	2009-03-	主任医师	副教授	无论身处	05/10	周	3092例	2105例	帕金森(1	87	首都医科大	功能神经	5	7219	暂无	快	4741	51万	(22)	(83)	(2)	(0)	(0)	(0)
16	https://…	李建平	乘满1届	5.0	6659	4,067,07	510次(20	168篇	3449位	774个	240封	438个	今天	2011-01-	主任医师	副教授	如果您是	05/09	周	4060例	2428例	帕金森(1	80	首都医科大	功能神经	9	6659	100%	快	5286	59.4万	(88)	(169)	(72)	(1)	(0)	(0)
17	https://…	邵伟华	乘满6届	5.0	25708	15,943,52	485次(47篇		9293位	2580个	966封	2463个	今天	2010-04-	主任医师		以精准手	05/07	周				183	上海交通大	普外科	352	25708	100%	快	2.3万	39.8万	(43)	(47)	(0)	(0)	(0)	(0)
18	https://…	艾玉波	乘满6届	5.0	17457	6,426,93	1,521次(2	2篇	10685位	2571个	1071封	3516个	今天	2015-02-	主任医师	副教授	谢谢信任	05/10	周	11498例	7960例	甲状腺结	393	复旦大学附	普外科	165	17457	100%	快	1.5万	1.7万	(3)	(3)	(0)	(0)	(0)	(0)
19	https://…	张平	乘满5届	5.0	25502	8,194,94	1,284次(0	篇	17671位	3082个	1192封	4448个	今天	2012-12-	副主任医师	副教授	信赖兴趣	05/12	周	18607例	17576例	甲状腺结	518	中国医科大	甲状腺外	172	25502	100%	快	2.3万	0	8	(0)	(0)	(0)	(0)	(0)
20	https://…	黄安华		5.0	3865	1,011,68	523次(20	278篇	3084位	842个	209封	279个	今天	2008-11-	副主任医师	讲师	腺囊疾病	05/06	周	3196例	2317例	腺结石(1	78	上海市东方	胆石病中	13	3865	100%	快	4064	24.4万	(11)	(280)	(82)	(2)	(0)	(0)
21	https://…	马建刚	乘满1届	4.9	7458	761,002	525次(20	7篇	5544位	1132个	388封	220个	今天	2013-04-	主任医师	教授	报道后友	05/10	周	5540例	3085例	小儿脑神	170	河北医科大	耳鼻咽喉	65	7458	100%	快	6405	2.4万	(5)	(7)	(0)	(0)	(0)	(0)
22	https://…	卞军	乘满1届	4.5	6129	3,124,39	223次(20	49篇	3867位	607个	225封	480个	今天	2010-03-	副主任医师		少出门,	05/12	周	3971例	3690例	小儿癫气	171	西安市儿童	外科	8	6129	100%	快	5208	15.2万	(30)	(55)	(8)	(6)	(0)	(0)
23	https://…	王祥瑞	乘满2届	5.0	17017	29,836,94	755次(3532篇		4473位	628个	255封	1287个	今天	2011-12-	主任医师	教授	疼痛是人	05/09	周				53	上海市东方	疼痛科	39	17017	90%	快	8118	1203.1万	(419)	(3533)	(1)	(0)	(0)	(1)
24	https://…	李科		4.3	2846	658,783	481次(20	156篇	1052位	198个	67封	75个	今天	2015-04-	主治医师		欢迎你来	05/06	周				75	河南省中医	疼痛科	29	2846	100%	快	1326	45.2万	(7)	(157)	(47)	(0)	(0)	(1)
25	https://…	王麟	乘满1届	5.0	4007	1,331,89	293次(20	3篇	2589位	810个	339封	717个	今天	2017-01-	主任医师	教授				2757例	2137例	直肠癌(9	203	海军军医大	肛肠外科	36	4007	100%	正常	3888	1.9万	(3)	(3)	(0)	(0)	(0)	(0)
26	https://…	吴亮	乘满1届	5.0	3887	782,613	345次(20	42篇	1653位	1092个	304封	272个	今天	2015-03-	副主任医师	副教授	吴亮2021	05/09	周				71	上海市第一	胸外科	52	3887	100%	快	2384	10万	(27)		(13)	(1)	(0)	(0)
27	https://…	蒋振松	乘满1届	5.0	8841	2,487,05	798次(20	4篇	4214位	1287个	616封	495个	今天	2011-05-	主任医师	副教授	真诚欢迎	05/06	周	5417例	2272例	腰椎间盘	104	山东省立医	骨柱外科	14	8841	100%	快	7381	1.8万	(2)	(5)	(0)	(0)	(0)	(1)
28	https://…	宋清文	乘满1届	5.0	3804	1,638,25	643次(20	62篇	2236位	566个	312封	463个	今天	2013-07-	主任医师	教授	健康所系	05/09	周				188	上海市第一	骨科	20	3804	95%	较快	4119	30万	(23)	(67)	(14)	(5)	(0)	(0)
29	https://…	蒋卫	乘满1届	4.6	5351	2,328,80	221次(20	81篇	3271位	998个	415封	366个	今天	2015-03-	主任医师		医患携手	05/06	周	3148例	2865例	乙肝(149	18	青岛市第六	肝病科	6	3669	22万	(28)	(81)	(0)	(0)	(0)	(0)
30	https://…	郑南		5.0	5023	962,621	130次(20	242篇	3750位	344个	71封	248个	今天	2015-04-	副主任医师	讲师	宝宝来吧	05/09	周	3572例	2949例	早产儿(3	108	山东省立医	儿科	15	5023	94%	快	4667	10.2万	(16)	(268)	(222)	(26)	(0)	(0)
31	https://…	顾美珍		4.6	7487	946,782	399次(20	25篇	4155位	462个	79封	267个	今天	2012-07-	副主任医师		祝愿每个	05/09	周				47	上海市儿童	耳鼻咽喉	51	7487	97%	快	5464	3382	(0)	(25)	(0)	(0)	(0)	(0)
32	https://…	张帆	乘满2届	5.0	13144	1,556,45	954次(20	0篇	8899位	1767个	695封	674个	今天	2016-04-	主任医师	教授	祝各位病	05/09	周	9216例	5826例	甲状腺结	674	重庆市人民	乳腺甲状	37	13144	95%	正常	1.3万	0	8	(0)	(0)	(0)	(0)	(0)
33	https://…	孙淮林	乘满1届	5.0	7166	4,345,55	938次(20	188篇	2799位	1377个	587封	693个	今天	2012-03-	主任医师	副教授	欢迎来到	05/06	周	3826例	2472例	腰椎间盘	197	北京大学附	骨科	19	7166	90%	较快	6471	145万	(100)	(190)	(79)	(2)	(0)	(0)
34	https://…	王珏	乘满2届	4.8	22786	23,911,11	249次(7	733篇	7963位	1623个	763封	980个	今天	2008-10-	主任医师	教授	以良心行	05/07	周	9328例	6989例	腰椎间盘	102	郑州大学附	骨科	9	22786	89%	快	1.2万	278.5万	(585)	(734)	(13)	(0)	(0)	(1)
35	https://…	靳建春	乘满1届	4.9	4247	877,367	2,647次(7	篇	1024位	531个	199封	146个	今天	2017-04-	主治医师					1043例	993例	腰椎间盘	60	山东大学附	骨柱外科	43	4247	98%	快	1547	1.3万	(1)	(7)	(0)	(0)	(0)	(0)
36	https://…	陈苗	乘满3届	4.6	5872	5,871,02	852次(20	30篇	1078位	493个	245封	984个	今天	2010-11-	副主任医师	副教授	祝愿早日	05/06	周	1797例	1422例	再生障碍	123	中国医学科	血液内科	74	5872	100%	快	3489	18.4万	(8)	(30)	(0)	(0)	(0)	(0)
37	https://…	陈摩		4.0	1139	69,091	104次(20	22篇	959位	113个	5封	22个	今天	2016-09-	主任医师	教授	高血压科	05/12	周	931例	860例	高血压(9	22	江苏省人民	心血管内	12	1139	100%	较快	1097	2.2万	(9)	(22)	(0)	(0)	(0)	(0)
38	https://…																						25						4095	92%	快	3002	1.3万	(1)	(3)	(0)	(0)	(0)	(0)
39	https://…	马迎宇		4.6	1470	424,375	87次(202	12篇	1065位	442个	105封	109个	今天	2016-02-	副主任医师	副教授	各位病友	05/09	周	1080例	998例	帕金森(2	27	山东大学附	神经外科	11	1470	100%	快	1188	1.9万	(4)	(12)	(4)	(0)	(0)	(0)
40	https://…	魏道振		4.1	3229	3,285,94	216次(20	56篇	1674位	222个	79封	138个	今天	2010-07-	副主任医师		尽我所能	05/08	周	1761例	1381例	疼痛(326	44	广东省人民	疼痛科	13	3229	100%	正常	2186	18万	(44)	(56)	(0)	(0)	(0)	(0)
41	https://…	陈美英		5.0	9866	5,995,73	490次(20	242篇	3976位	657个	236封	732个	今天	2009-09-	主任医师	教授	请把心意	05/06	周	3792例	3632例	抑郁症(7	69	三明市第二	临床心理	71	9866	100%	较快	5016	93.2万	(27)	(242)	(2)	(0)	(0)	(0)
42	https://…	贺亮	乘满1届	4.9	9762	4,290,53	681次(20	31篇	6294位	1418个	567封	995个	今天	2012-06-	副主任医师	副教授	非常名甲	05/07	周	6303例	5345例	甲状腺结	102	中国医科大	甲状腺外	27	9762	100%	慢	7819	22.2万	(2)	(31)	(6)	(0)	(0)	(0)
43	https://…	白洋		4.7	5949	798,439	558次(20	2篇	3603位	661个	157封	284个	今天	2014-04-	主任医师		始终如一	05/07	周	3951例	2902例	甲状腺结	174	北京大学人	普通外科	75	5950	100%	快	4531	139	(2)	(2)	(0)	(0)	(0)	(0)
44	https://…	徐宝山		5.0	4385	943,316	387次(20	20篇	3078位	447个	117封	85个	今天	2010-06-	主任医师	教授	医者仁心	05/09	周	3271例	1415例	腰椎间盘	64	天津市天津	脊柱外科	12	4385	84%	快	3857	2.5万	(1)	(20)	(0)	(0)	(0)	(0)
45	https://…	司海朋		5.0	8288	1,229,44	621次(20	30篇	7034位	630个	196封	283个	今天	2015-04-	主任医师	教授	患者朋友	05/06	周	7077例	4335例	腰椎间盘	54	山东大学附	脊柱外科	10	8288	100%	正常	7900	6.1万	(11)	(31)	(0)	(1)	(0)	(0)
46	https://…	周元平	乘满3届	4.8	10662	4,330,51	1,126次(6	篇	6147位	771个	282封	938个	今天	2015-02-	主任医师	教授	肝病路上	05/07	周	6529例	5973例	乙肝(241	105	南方医科大	感染内科	97	10662	100%	快	9461	4.4万	(3)	(6)	(0)	(0)	(0)	(0)
47	https://…	罗初凡	乘满3届	4.8	10021	1,936,79	702次(20	20篇	6123位	1136个	595封	410个	今天	2008-06-	主任医师	教授	您的心意	05/09	周	6183例	5882例	冠心病(2	410	中山大学附	心血管内	62	10021	99%	快	7581	13.6万	(5)	(20)	(0)	(0)	(0)	(0)
48	https://…	金兴领		4.6	7200	1,961,63	436次(20	37篇	2455位	520个	205封	992个	今天	2016-06-	副主任医师	副教授	家人好友	05/06	周	2464例	2265例	小儿癫气	193	甘肃省人民	小儿外科	61	7200	100%	快	2594	15万	(0)	(37)	(0)	(0)	(0)	(0)
49	https://…	董志强		5.0											主任医师	副教授		05/09	周					中国人民解	功能神经												
50	https://…	孙虹		4.6	1012	102,344	94次(202	31篇	676位	132个	17封	84个	今天	2020-07-	副主任医师		医者仁心	05/06	周	663例	459例	帕金森(4	84	首都医科大	神经内科	26	1012	100%	快	955	3.9万	(12)	(31)	(0)	(0)	(0)	(0)

Figure 20 Raw data example in dissertation

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