Improve Chinese Patients' Trust in Physicians

A Thesis Submitted to the Faculty of the Interactive Design and Game Development Department in Partial Fulfillment of the Requirements for the Degree of Master of Fine Arts in Interactive Design and Game Development at The Savannah College of Art and Design

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Abstract

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The patient-physician relationship poses a problem that attracts more attention in Chinese society than it does in most other countries. Medical disputes, for example, can also further exacerbate these trust problems within patient-physician relationships. This research study reveals that most patients prefer to go to the hospital directly due to a belief that physicians do not care about their needs and a subsequent lack of confidence in physicians' decisions. With the release of "Internet + medical care" in China, several medical care products were produced to provide more efficient medical services and popularize public medical knowledge. To address the growing public concern about interpersonal trust in the patient-physician relationship, this study recommends applying Barbara Misztal's sociological theory integrated with an interactive design in order to improve Chinese patients' trust in physicians. The "Trust in Physician Scale," influenced by Misztal's trust theory, uses measurement instruments by Anderson and Dedrick to assess these patient-physician relationships.

Keywords: Trust, Interpersonal Trust, Patient-physician Relationship

1. Introduction

Trust promotes the development of a stable relationship, and it is the foundation of communication and a necessary condition for everyday interaction. Within the context of a physician-patient relationship, the establishment of trust between patients and medical programs or specific medical personnel is crucial. A patient's trust in physicians is an assessment of how trustworthy a physician is, and the level of patient-physician trust ultimately affects the patient's choices. Inappropriate trust in physicians can result in misunderstandings and medical mistakes, such as iatrogenic disease. Iatrogenic disease is "a disease against a patient's physical and mental health due to inappropriate words and behavior of physicians in the process of diagnosis and treatment for prevention of diseases (医源性疾病, Baidu Baike)."

In China, research has demonstrated that many patients do not have high trust in doctors. Chinese patients tend to expect too much from hospitals and sometimes feel unsatisfied with their services. However, there are certain mitigating factors to consider, such as the fact that there are significant differences in medical knowledge between patients and medical professionals. Complex medical procedures also make the process of treatment difficult for many patients. A survey conducted by the *China Youth Newspaper* in 2013 found that approximately 70% of patients did not trust physicians in China. If the medical results are unsatisfactory, 86.5% of the patients doubt or complain about the doctors (孙震，中青在线). In urban hospitals, there are even more severe problems in physician-patient relationships because of the concentration of patients in large hospitals; this place more pressure on physicians and patients than would occur in a small hospital in a remote location.

This study will focus on the patients in an urban hospital and apply Misztal's theory of sociological trust in an interactive system to improve Chinese patients' trust in the physician. Misztal is a professor at the University of Leicester who is interested in

sociological theory and whose research emphasizes the problems of trust, social cooperation, dignity, forgiveness and collective memory, and political sociology. In her work, she demonstrates that trust could contribute to social order in a variety of ways. Using her theory, interpersonal trust in the patient-physician relationship would be improved, thereby providing high quality medical care. Meanwhile, patients will use the "Trust in Physician Scale" to assess their trust in the physician. The scale would present a patient's trust in a physician based upon doctor's words and behaviors rather than the physician's ability and skills.

1.1. Objective

The study aims to

- Explore the context and reasons for patients' lack of trust in physicians.
- Evaluate techniques or methods to improve Chinese patients' trust in physicians.
- Review the theory about trust in modern societies by Misztal.
- Explain how the interactive system complements previous research.
- Evaluate the interactive system using Trust in Physician Scale.

1.2 Research Questions

- How the current trusting relationship between Chinese patients and physicians?
- How do the patients communicate with the physicians?
- What methods and techniques will allow the patients to connect with physicians?
- Why do Chinese patients not trust their physician?
- What is the most effective way to implement the above research into an actionable strategic plan?

2. Chinese Patient-Physician Relationship Study

2.1 Background

Previous research concerning the "sociological research on physician-patient relationship" in China states there are four dimensions to measure the patients' behavior, such as accessibility, communication, trust, and satisfaction with hospital/physicians' service (Qiu et al. 147). Based on an analysis of patients' behavior, the research indicated the reason for the strained relationship between patients and physicians from a different perspective. One potential reason is information asymmetry, or when one party has more or better information than the other; Kenneth Joseph Arrow first described this phenomenon in 1963. The physician has expertise beyond the reach of patients. A lack of equal and effective communication between physicians and patients, and significant differences in medical cognition leads to information asymmetry (Qiu et al. 144). Moreover, complex medical procedures affect patients while receiving treatment. In addition, when patients expect too much from the hospital and believe that the hospital can cure the disease, medical disputes can easily arise.

2.2 Reasons for the Chinese Intensity of the Patient-Physician Relationship

From the perspective of physician-patient communication, patients may play medical self-helper, help-seeking partners, refuse to help, and feel helpless. However, the helper and the role of the physicians from the biomedical expert ultimately to the server role to realize the equality of status with the patient (Qiu et al. 145). From the perspective of the policy system, the current allocation of medical and health resources in China is unreasonable. Based on the hospital classification system and people's traditional ideas, large hospitals' concentration of medical resources shows inadequate medical technology in small and medium-sized hospitals (Qiu et al. 145). Therefore, people tend to seek treatment in large

hospitals, which results in a resource shortage, physicians under tremendous pressure, a heavy workload, and a strained relationship between physicians and patients.

3. Trust of International Study

3.1 Definition of Trust

Discussing trust, betrayal, doubt, responsibility, and irresponsibility is a central component of human relationships; however, scholars are increasingly paying more attention to the importance of "trust" in human life. In fact, “The common usage of ‘trust’ is the notion of expectation or predictability” (Deutsch 265). The trust refers to the expectation of an event that does not harm the interests of the individual. On the contrary, the suspicion about the event's occurrence is detrimental to one's welfare (Deutsch 267).

When considering trust within the context of relationships, expressing trust is when person 1 believes that person 2 is doing something, person 1 usually implies that person 2 will be aware of the person 1’s trust, but if person 2 does not do it, person 2 will disappoint person 1 and cause harm. In general, when a person trusts someone, it feels like the person will do what he wants him to do and somehow be obligated to fulfill that behavior (Deutsch 267). Trust requires both unilateral trust and mutual trust. In addition, the establishment of trust can lead to more effective and open communication between people and thus produce mutual trust. Mutual trust exists in a social trust in which two people have complementary behaviors. They believe that the other person will behavior in a certain way and are willing to do what he trusts he can do. Everyone can feel that the other person is aware of the other’s intentions and the trust of others.

3.2 Facilitating the Development of Trust

Deutsch’s studies indicated that subjects are likely to facilitate the development of trust under the motivational orientation of cooperation. Since cooperation leads individuals to make cooperative motivational orientation and produce mutual benefit and win-win results,

then competition will lead individuals to male non-operative motivational orientation. When individuals tend to trust, communication, power, and third parties affect the establish mutual trust (Deutsch 271). Research demonstrates that before making a choice, an individual can trust others if an individual can communicate freely. That is, with the improvement of communication and the understanding of each other, trust and co-operation will increase (Deutsch 273).

Similarly, without communication, someone who has been treated with kindness or under the condition of mutual trust will respond positively to the other person (Deutsch 277). In addition, the relationship between two people can be influenced by their relationship with a "third party" (Deutsch 2778). When an individual has a sense of mutual opposition to a third party, he or she has a greater incentive to be trustworthy or to believe in someone else's trustworthiness. Therefore, the involvement of a "third party" has an influence on the development of trust in the relationship.

To conclude, Deutsch's study indicated the opportunity and capacity to fully communicate in the cooperative system define mutual responsibility. When one has untrust motivational behavior, another individual could use his or her trustworthy behavior to influence others, which may elicit more trustworthiness. Everyone has an opportunity to know what another person will do before they can irreversibly choose to trust.

3.3 Trust in Business Relationships

A lack of trust widely exists within the context of physician-patient relationships in China. This problem can easily lead to poor cooperation between physicians and patients, which is not conducive to receiving effective treatment. To provide a different perspective, Debra l. Shapiro studied trust within the context of relationships in the business industry. He stated that trust brings significant benefits in a business relationship. Monitoring behavior will decrease under a mutual trust which can also increase the speed of decision-making.

Furthermore, Shapiro identifies the three bases of trust that may factor in developing a business relationship: deterrence-based trust, knowledge-based trust, and identification-based trust (Shapiro et al. 365).

Deterrence-based trust is the measure to prevent hostilities, but it comes with a high risk. It exists when the potential costs of terminating the relationship outweigh the short-term benefits of distrustful actions (Shapiro et al. 366). Therefore, it is not a perfect method to establish mutual trust and may still result in potential harm for each party. It might work for a business relationship but not for a physician-patient relationship. Knowledge-based trust occurs when one has enough information about others to understand them and accurately predict their likely behavior. Therefore, the more contact between both sides, the more they understand and can predict others' behavior (Shapiro et al. 369). In addition, identification-based trust is the highest order of trust. It indicates that people typically trust others who are in the same group as them (Shapiro et al. 371). Insufficient information and insufficient communication are the leading causes of patients' lack of trust. For the patient-physician relationship, regular communication, cooperation for the same goals, and familiar parties could raise trust between physicians and patients. As a result, all parties should maintain a respectful attitude of positive communication.

One central aspect of the physician-patient relationship is the fact that Chinese patients often feel that physicians have an obligation to fulfill their responsibility to treat them well. If the physician does not meet this standard, the patient’s trust in the physician will be greatly reduced, resulting in patient doubt of the physician. Therefore, the physician-patient relationship is sensitive and malleable in China. Patients cannot let themselves be caught in a strange and unpredictable situation or one that may have potential risks. Thus, the best way to establish trust within a physician-patient relationship is to adopt the knowledge-based trust in business relationships.

3.4 Trust in Modern Society

Mizthal also elaborated on the implications and meaning of trust for the social orders. She indicated that “Social theories tend to conceive of trust by pointing to the range of benefits that trust provides. It is seen as essential for stable relationships, vital for the maintenance of cooperation, fundamental for any exchange, and necessary for even the most routine of everyday interactions” (Misztal 12). Through her research, she proved that trust could contribute to social orders differently.

Trust is formed from habits, reputations, and collective memory. It is a foundation of stable social order, such as a person’s daily routine and it can create a feeling of safety (Misztal 102) so that people can live happier lives. Trust in this context is based on familiarity, bonds of friendship, and bonds with family, friends, and society can create a cohesive social order. Finally, people need trust to face others' behaviors and promote cooperation. In the collaborative social order, the reciprocity of trust helps overcome the harmful effects that cannot rely on others.

3.4.1 Trust as Habits

In social orders, normal habits include regular social interaction, having property, responding to feedback, and having sustainable interactions. A person interacting more or less successfully with other community members is an ability to form a habit. Misztal proposed dividing habit into three types: social habits of conduct or routinized practices; mental habits or background/taken-for-granted assumptions (Misztal 105). The first type of habit is routinized interpersonal interaction, which explains our repetitive behavior to others or in connection with others. The second type is mental habits or background assumptions. The third type is ceremonial habits or rituals, meaning important events in our lives and improving the feeling of group solidarity and identity. A habit is a method of reducing social complexity. It plays the same role as trust in reducing the length of the deliberation process.

Moreover, it allows people to make a decision without spending unnecessary time. If a person considers that something fits his life pattern, he will believe it, and vice versa, he will not believe it.

Trust as habits also could refer to reputation. When people are in a confusing situation, they tend to identify people, things, and events according to preconceived concepts, established reputations, or stereotypes (Misztal 120). However, public opinions are easily manipulated and stereotyped. Furthermore, when someone has a trustworthy or good reputation, people will expect proper behavior from them. Therefore, trust promotes cooperation by improving the probability of carrying out promises. Moreover, people usually trust something they already know when they face something new. Memory impacts people's decisions, and it is constructed by, maintained, and transmitted from personal and other groups. To facilitate a trusting relationship, people need mutual knowledge as a foundation.

3.4.2 Trust as Passion

Sociological research has demonstrated that people tend to trust their family, friends, and fellow rather than others. Family is the primordial source and location of trust (Misztal 157). In addition, when the family is no longer the source of belonging, friendship could satisfy the belonging requirement. For instance, people have higher trust in members of their nation than they trust foreigners.

3.4.3 Trust as Policy

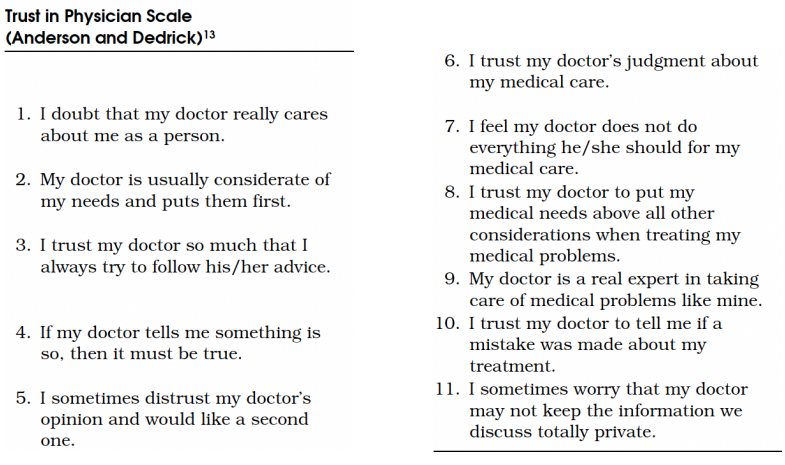
In Misztal's research, solidarity requires trust, mutual benefit, and moral obligation. These qualities only can arise within the scope of shared values. Misztal stated that trust is one of the elements of promoting unity. To reach a rational consensus with others requires mutual understanding and common interests. Furthermore, policies need to be formulated to promote and strengthen trust and solidarity. An individual needs opportunity to be an effective agent in a relationship with the knowledge, skill, information, and time. But also,

identity, an identity that can be taken seriously and perform the obligation, such as freedom of association or freedom of expression (Misztal 219).

Misztal also indicated the relationship between trust and toleration, for harmony or social cohesion to select a behavior that does not interfere with others' dislike or disapproval (Misztal 228). However, mere toleration cannot construct mutual trust, and social harmony might make an individual more selfish and closed off. Therefore, for better development, encouraging people to participate in common discussions and negotiations can eliminate at least some meaningless options, and such exploration constitutes a significant contribution to mutual understanding and trust (Misztal 244). So that, polices need to be formulated to promote and strengthen trust and solidarity.

4. Trust in the Physician Scale

Anderson and Dedrick developed a measurement of interpersonal trust in medical care, the trust in physician scale (figure 1). It is helpful for understanding patients' desire for control and explaining patients' behaviors related to disease management. Interpersonal trust refers to trust in an ongoing relationship. The patients' trust in physicians is defined as a person's belief that a physician's words and behaviors are trustworthy and reliable. Patients who demonstrate trust believe their physicians would provide the best support and assistance in treatment and medical care (Anderson and Dedrick 1091).



Trust in Physician Scale (Anderson and Dedrick)[13]

1. I doubt that my doctor really cares about me as a person.
2. My doctor is usually considerate of my needs and puts them first.
3. I trust my doctor so much that I always try to follow his/her advice.
4. If my doctor tells me something is so, then it must be true.
5. I sometimes distrust my doctor's opinion and would like a second one.
6. I trust my doctor's judgment about my medical care.
7. I feel my doctor does not do everything he/she should for my medical care.
8. I trust my doctor to put my medical needs above all other considerations when treating my medical problems.
9. My doctor is a real expert in taking care of medical problems like mine.
10. I trust my doctor to tell me if a mistake was made about my treatment.
11. I sometimes worry that my doctor may not keep the information we discuss totally private.

Figure 1. "Trust in Physician Scale"

There are three dimensions of trust that were assessed in this measurement:

- The reliability of the physician.
- The confidence in the knowledge and skills of the physician.
- The confidentiality of information between the physician and the patient.

The scale has three items containing negative words and eight items with positive words, and the words are interspersed with positive and negative to avoid bias in the response (Anderson and Dedrick 1092). The scale is presented in a five-point Likert format with response options ranging from "strongly agree" to "strongly disagree." Dedrick stated that this scale assesses differences in patient involvement in medical interactions and subsequent adherence to treatment recommendations (Anderson and Dedrick 1099).

The study also indicated that there is a disadvantage associated with patients' high trust. The patient who has high trust has lower desires for personal control in the medical interaction, which might turn into a passive role in the medical interaction (Anderson and Dedrick 1099). The study of the scale influences the establishment of trusting relationships between patients and physicians while illustrating how the communication process affects the development of trust.

5. Examining Approaches to Improve Patients' Trust in Physicians

5.1 Open Notes

In 1998, with the rise of electronic health records, U.S. health systems and technology companies began developing secure online websites for both patients and health care providers. These websites allow patients access to some personal health information in their medical records. By using these portals, patients can read information, such as prescription information and limited test results. However, patients cannot see the notes written by the physicians after the visit.

In 2001, outstanding health professionals, patients advocate, artists, journalists, and social scientists in many countries had established a vision for improving the accessibility of health care and shared decision-making. Patients and healthcare professionals have begun sharing notes, laying the foundation for improved quality and transparent healthcare service. At this point, OpenNotes already been established in 2010. Beth Israel Deaconess Medical Center in Boston, Geisinger Health System in rural Pennsylvania, and Harborview Medical Center in Seattle launched an exploratory study. One hundred and five primary care physicians invited twenty thousand patients to read their health notes through a secure online portal. The study looked at the impact of shared notes on patients and physicians (opennotes.org).

OpenNotes is not software, but rather it is a call to action to provide transparency within the health care field. To ensure patients do not miss important information, OpenNotes allows patients review the details of their visit and feel more in control of their own health. For professionals, OpenNotes could enhance communication between patients, families, and physicians, resulting in more significant and more trusting relationships.

However, OpenNotes also comes with several disadvantages. When patients read their notes, they will not understand the medications. or they may see inaccurate documents on the report and subsequently doubt their physicians. One of the primary rules of OpenNotes is that every patient has the right to ask healthcare providers to change their personal medical records. This rule, however, ultimately adds to the management burden already borne by suppliers. If the providers reject or do not adequately respond to the patient's request, it can lead to a poor conversation and a negative relationship between the physicians and the patients. After improvement, both the patient's request and the provider's feedback become a part of the patient's medical record, and the healthcare providers must respond in writing within 60 days (hopkinsmedicine.org). It is important to note that open and honest

communication can help to reduce litigation and resolve medical errors. Another benefit of its implementation is that OpenNotes has also become a powerful tool for enhancing patient engagement. In addition, OpenNotes can share up-to-date and accurate information with family members, specialists, and others involved in the management of chronic diseases. Meanwhile, OpenNotes improves patients' understanding of why and how to take medications, which helps to ensure they stay on their current course of treatment and ultimately improves patient outcomes.

5.2 MyChart

Today, more than 8 million patients in the U.S can access their clinician's notes through the OpenNotes feature in MyChart (hopkinsmedicine.org). MyChart is a software system of NYC Health + Hospitals, powered by Epic, which supports electronic (24/7) access to patients' medical records and video visits from home (figure 2). The features of MyChart include the following: 1) All the health information in one place, meaning that patients could connect their accounts from organizations that use Epic or another EHR that can share patients' health information; 2) It allows the sharing of medical records safely and securely, meaning that records between healthcare providers are automatically updated via MyChart secure network, Care Everywhere, so that physicians can view other medical conversation records. If the provider does not have a patient's medical record, the patient can temporarily provide a share code at MyChart that allows the physician temporary access to the patient's medical records; 3) Quickly scheduling appointments and finding care means making patients make appointments, finding the nearest urgent, and completing pre-visit tasks before visiting; 4) The ability to connect with a doctor no matter where the patient is located; 5) Parents take care of children and other family members (mychart.com).

Some physicians worry that when notes appear with some specialized medical terminology, such as "morbid obesity," this will have a negative effect on the patients'

psychology (hopkinsmedicine.org). However, Howard Levy, OpenNotes' chief physician champion, stated that "If the clinician judges that sharing would cause more harm than good, it is appropriate to withhold certain notes or specific encounter information. Epic allows clinicians to do that" (opennotes.org). In addition, Levy adds, "most of us in health care are in it to help our patients be healthier and take better care of themselves. OpenNotes can provide insight into our thinking and written reminders about what we want them to do, making them likelier to follow our medical advice" (opennotes.org). Physician and patients could through OpenNotes to make more efficiency treatment.

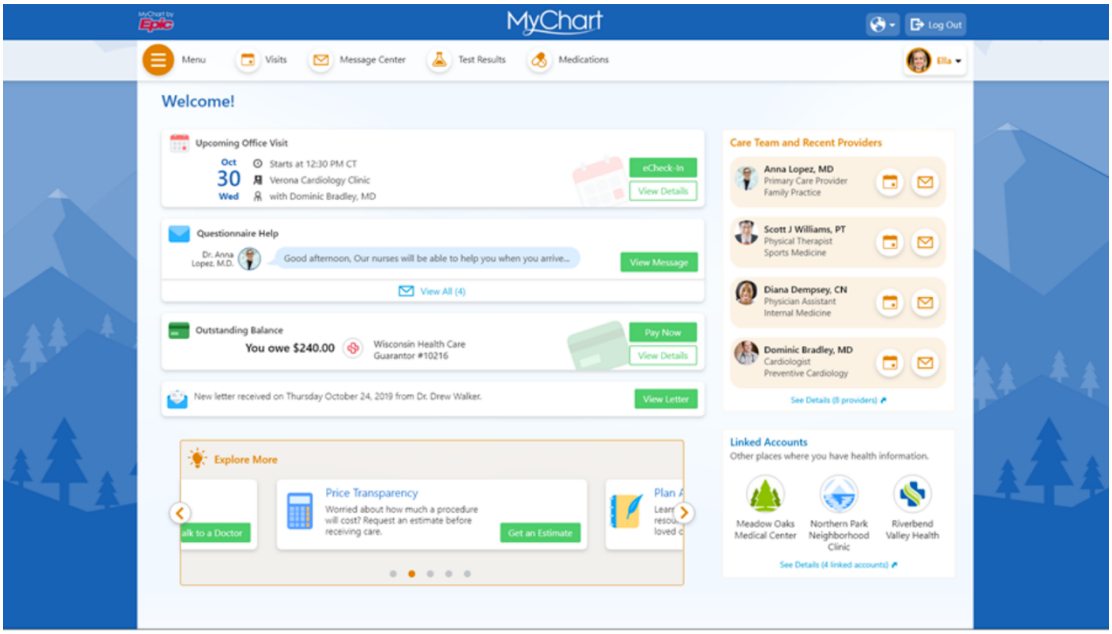


Figure 2.1. Screenshot of MyChart website

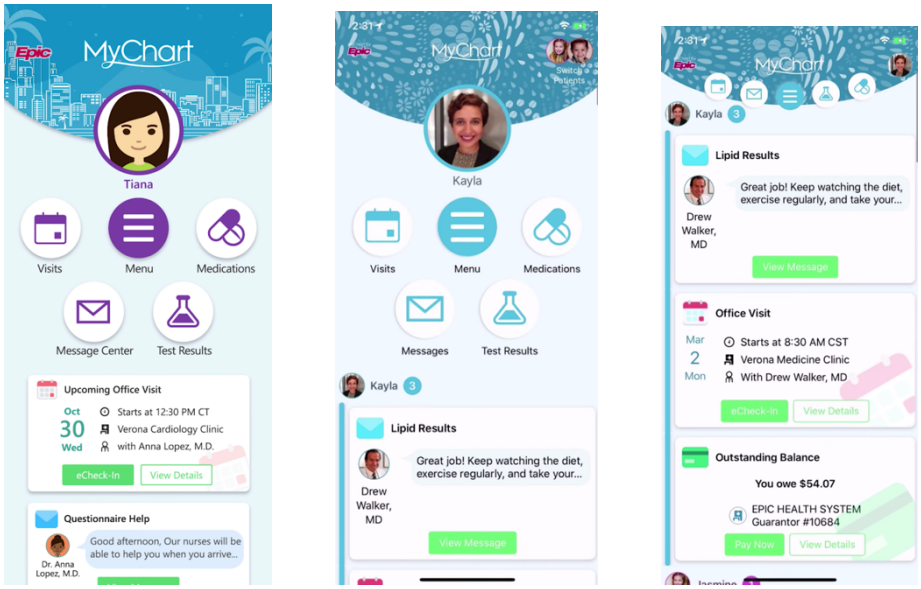


Figure 2.2. Screen shot of My Chart Mobile Application

5.3 DingXiang Internet Hospital

Dingxiang Internet hospital was launched in 2012 and provides health information science, online consultation, drug purchase, health management, and other services (figure 3). This application mainly solves the user's knowledge blind spot in health and the pain points of slow, offline medical treatment and uneven distribution of high-quality medical resources. The patients range in age from around 26-35 years old and are concerned with personal or family health. The physicians who use the application are mainly from hospitals across the country, and they are eager to improve their popularity under the premise of having a certain income. The other users include healthcare companies and hospitals that want to find business partnership opportunities for branding.

Dingxiang Internet Hospital already established authority, professional, and reliable branding. Many health professional platforms and physicians support the health applications; Dingxiang is one of them. The application provides abundant health knowledge, high-quality content, an excellent user experience, and earns users' trust based on product design. However, the product has not yet formed an online and offline integrated medical and health information network, and it does not connect with offline hospitals and pharmacies. It is

impossible to achieve a comprehensive diagnosis only by relying on the online service so that the physicians do not dare to make a diagnosis easily.

Figure 3. Screenshot of Dingxiang Internet Hospital in AppStore

5.4 Alibaba Health

Alibaba Health was launched in 2015 by Alibaba Group, which mainly provides professional answers and treatment options services for users, including consultations and expert consultations. The application's functions are divided into graphic consultation, telephone consultation, video consultation, doctor appointments, medication purchases, medical knowledge sharing, and health management (figure 4). The process could be open to the public for graphic and telephone consultation. In addition, users can add more descriptions about themselves after sending the requirement of graphic consolation. It also educates users on how to write down the description or information about themselves. This feature can encourage patients to describe their condition in as much detail as possible. It is important to note that some physicians, however, do not open video consultation or appointment services for the users.

The limitation of this application is that it is only open in Beijing, Henan, and Guangdong, China. After searching, some doctors who do not match the users' requirements

have appeared at times, indicating that the application cannot recommend other services or other doctors automatically in the same health department. It is also evident that some physicians charge a lower consultation fee and do not provide much physician's information, which may be initially tempting for users, but after entering the follow-up service, it is also presents a safety hazard for users.

According to their demands, new users can choose a doctor, and the consultation method. When the average new user is converted into an old user, patients have a long-term cooperation state with the doctors they trust.

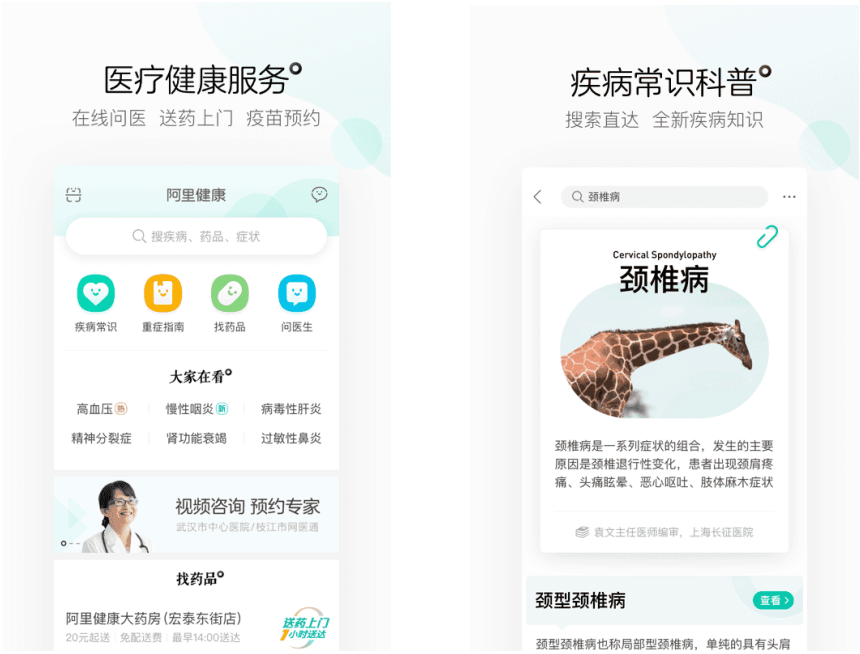


Figure 4.1. Screenshot of Alibaba Health in AppStore

Figure 4.2. Screenshot of Alibaba Health in AppStore

5.5 Quick Ask Doctor

Quick Ask Doctor is an application launched in 2011 with a hospital professional qualification license and an online medical worker in a real-name authentication system that provides 24/7 continuous, one-to-one consultation and online drug purchase service (figure 5). The user group mainly includes people aged 30 years or younger who prefer to stay at home and do not want to go outside for a long time. It allows users to find the disease information they need quickly to achieve its purpose of rapid consultation, like its name "Quick Ask Doctor."

Compared to other Chinese health applications, Quick Ask Doctor can record users' health data, build their own health documents file, and check health exam orders and exam results. Even though the physician can reply to messages quickly and there is no fee for the consultation, users can only ask a physician twice to describe the problem, there is no appointment service for users, and there is no way to understand the treatment of the disease fully.

To conclude, Quick Ask Doctor helps patients maintain close contact throughout the medical process. The doctor profile has detailed information that allows patients to understand the doctor's overall diagnosis data and make an independent and informed choice.

Figure 5.1. Screenshot of Quick Ask Doctor in AppStore

Figure 5.2. Screenshot of Quick Ask Doctor in AppStore

6. Research Design of Chinese Patient-Physician Relationship

This research aims to understand the role that communication plays in the patient-physician relationship, primarily within the context of Chinese patients who are outpatients in a hospital. Accordingly, the goal is to discover how patients choose their physician or if there are some problems that patients worry more about when they want to see a physician, such as trust issues. The questionnaire used in this research aims to explore how the patients communicate with the physicians, what methods and techniques patients prefer to use to know physicians and medical care, and how the patients trust all kinds of physicians.

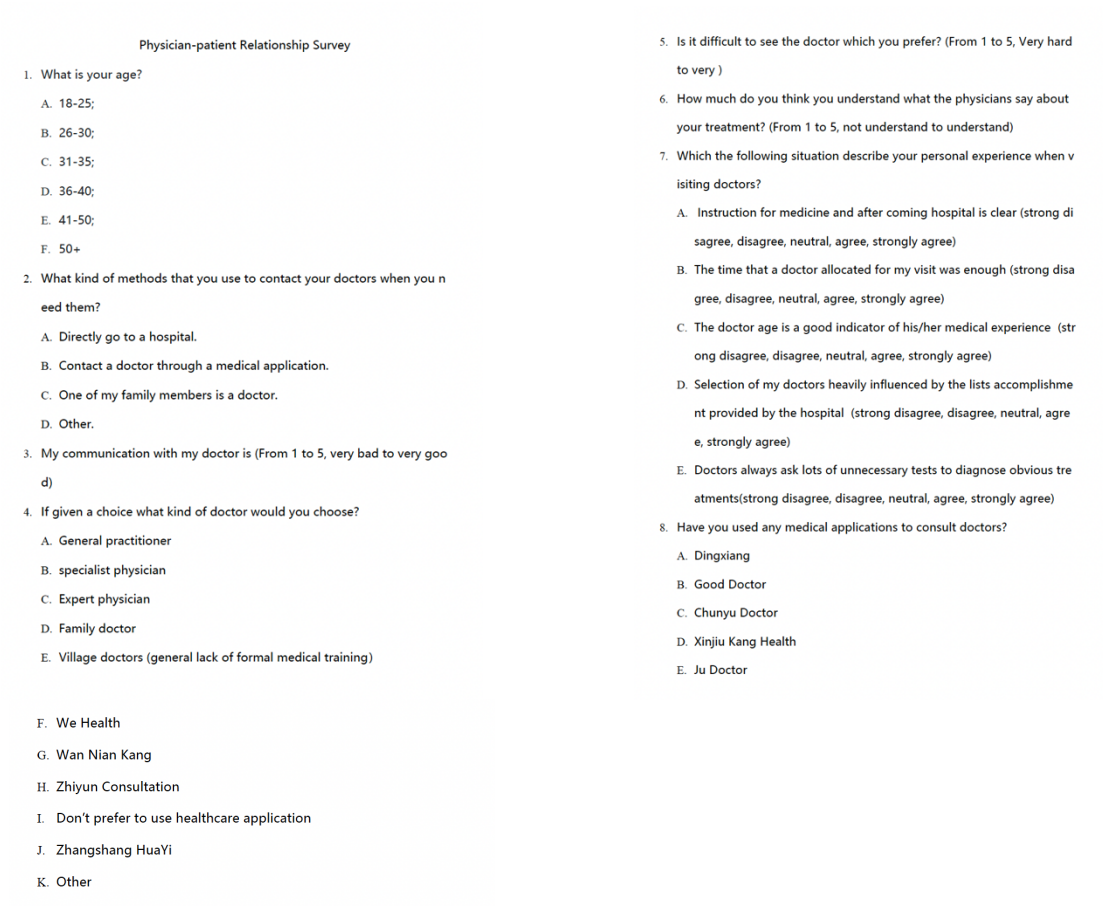
The questionnaire is presented in a Likert Scale five-point format, and some of them are click questions. We chose the number of outpatients in one hospital and received a sample size of 311 from a 20% response rate. The total questionnaire does not ask people about trust (figure 6); in fact, the word "trust" is not mentioned within it. Instead, it allows people to unconsciously represent their trust in the physician while answering the questions. However, inevitably some people will avoid presenting a negative attitude, and people would choose "normal" in the questionnaire. The responses are primarily from patients aged between 26 to 60 years old.

Even though the Chinese government has implemented an "Internet + medical care" policy to reduce the problems of seeing the doctors and saving time in the treatment process, 63.67% of people in my response still prefer to go to the hospital whenever they feel not good directly. Only 29.9% of people choose to use online medical care applications, 36,98% of people feel that they have good communication with doctors, and 31.51 % of people think the communication process is "normal". However, a 2013 survey conducted by the *China Youth Newspaper* found that approximately 86.5% of patients doubt or complain about the physicians and feel unsatisfactory (孙震，中青在线). Moreover, in China, physicians have their titles, such as general practitioner, specialist physician, and expert physician. This study indicated that half of the 84.24% would choose a specialist or expert physician. Generally, it

is understood that people want the best and more professional treatment for the disease. Nevertheless, these are great medical sources, and physicians have no way to be well assigned to all people.

The research also demonstrates the extent to which the patient understands their treatment. In sum, 31.19% of people believed that they understood a little bit and only 18.33% believe they are understood very well. Additionally, during their course of treatment, over 70 % of people choose their physician based on physician information provided by the hospital and recommended by friends or family. Meanwhile, the physician's title also dramatically impacts patients' choices. When a patient sees a doctor in China, the doctor would ask the patient to do several lab exams after understanding the patient's symptoms. In total, 57% of patients considered requiring several unnecessary exams is unprofessional or only to earn money.

There are over 10 million outpatients in China who see a physician in a hospital every day. 56% of people in my response think that they do not have enough time to converse with a physician. Even though some hospitals have designed their application to solve this problem, reducing the hospital's waiting time, people would go through the same process in the hospital that generally involves these steps: 1) see a doctor; 2) report their symptoms; 3) pay the exam fee; 4) go to the lab to complete all exams; 4) go back to the doctor's office; 5) the doctor prescribes treatment based on the result of the exam; 6) pay the medical fee; 7) go home. This lengthy process demonstrates that there is a lack of understanding and communication from the doctor, especially concerning the time, effort, and cost of multiple examinations. This results in patient doubt and necessitates more detailed explanations from doctors. Moreover, patients with an extensive treatment plan home need more time to understand the treatment plan.



Physician-patient Relationship Survey

1. What is your age?
   - A. 18-25;
   - B. 26-30;
   - C. 31-35;
   - D. 36-40;
   - E. 41-50;
   - F. 50+
2. What kind of methods that you use to contact your doctors when you need them?
   - A. Directly go to a hospital.
   - B. Contact a doctor through a medical application.
   - C. One of my family members is a doctor.
   - D. Other.
3. My communication with my doctor is (From 1 to 5, very bad to very good)
4. If given a choice what kind of doctor would you choose?
   - A. General practitioner
   - B. specialist physician
   - C. Expert physician
   - D. Family doctor
   - E. Village doctors (general lack of formal medical training)
5. Is it difficult to see the doctor which you prefer? (From 1 to 5, Very hard to very)
6. How much do you think you understand what the physicians say about your treatment? (From 1 to 5, not understand to understand)
7. Which the following situation describe your personal experience when visiting doctors?
   - A. Instruction for medicine and after coming hospital is clear (strong disagree, disagree, neutral, agree, strongly agree)
   - B. The time that a doctor allocated for my visit was enough (strong disagree, disagree, neutral, agree, strongly agree)
   - C. The doctor age is a good indicator of his/her medical experience (strong disagree, disagree, neutral, agree, strongly agree)
   - D. Selection of my doctors heavily influenced by the lists accomplishment provided by the hospital (strong disagree, disagree, neutral, agree, strongly agree)
   - E. Doctors always ask lots of unnecessary tests to diagnose obvious tretments(strong disagree, disagree, neutral, agree, strongly agree)
8. Have you used any medical applications to consult doctors?
   - A. Dingxiang
   - B. Good Doctor
   - C. Chunyu Doctor
   - D. Xinjiu Kang Health
   - E. Ju Doctor
   - F. We Health
   - G. Wan Nian Kang
   - H. Zhiyun Consultation
   - I. Don't prefer to use healthcare application
   - J. Zhangshang HuaYi
   - K. Other

Figure 6. Patient-physician Relationship Survey

7. Design Artifact

The Design is mainly for Chinese users who prefer to directly see a doctor in a hospital instead of seeking medical care through the internet. The users could base on their location to find the physician and the health providers where they want to go. Users choose the doctor and establish a trusting relationship with the physician. This interactive system effectively integrated Misztal's trust theory to improve Chinese patients' trust in physicians. The main features of this interactive system are communicating with doctors, building tight long-term connections, and collaborating. These features are combined with different theory methods.

7.1 Establishing a Long-Term Ongoing Connection Between Patients and Physicians

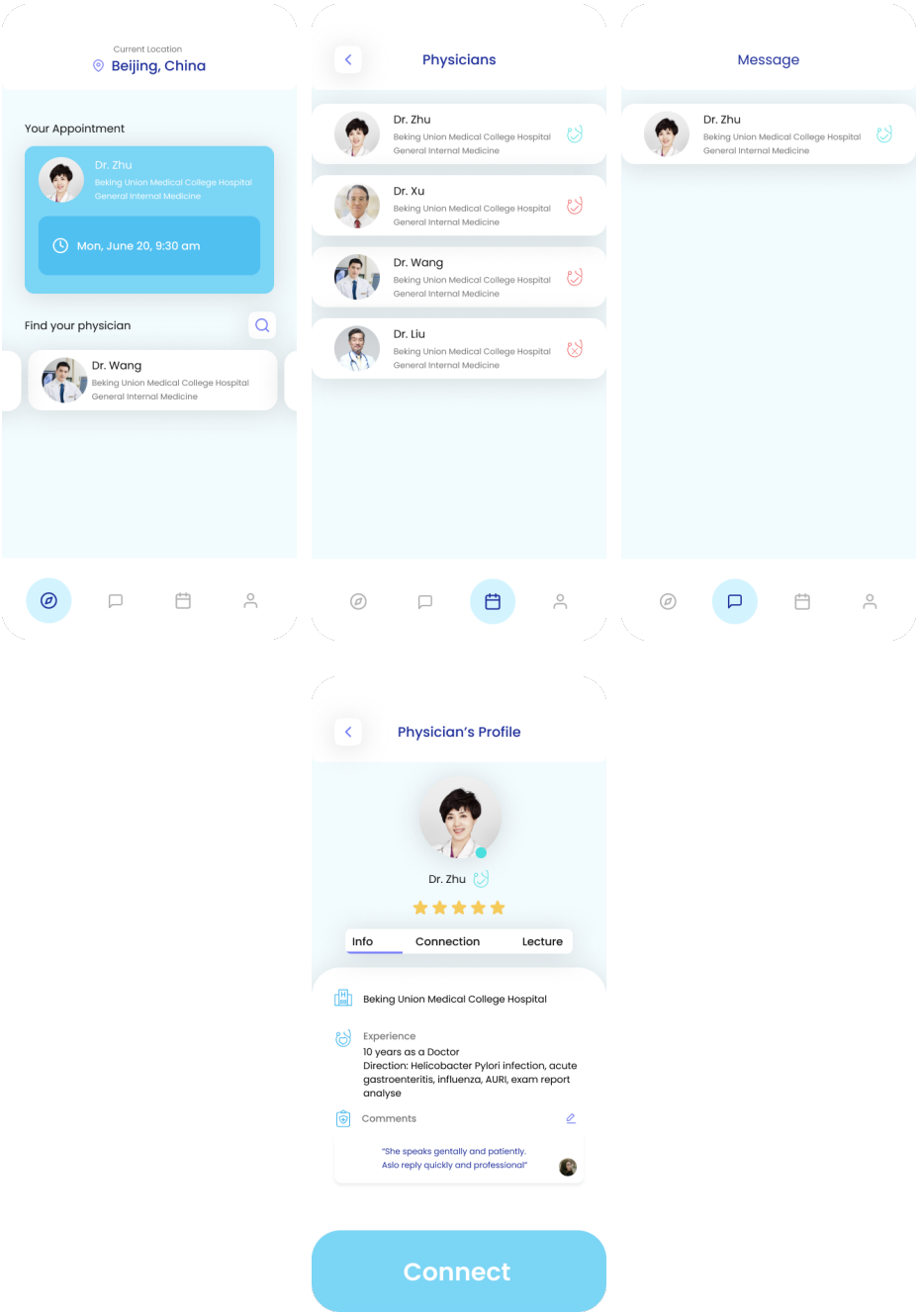


Figure 7. Interface of Choosing a physician

The design allows users to have repetitive behavior to communicate with their physician and subsequently form a connection with the physician based on "trust as habits" from Mistal's theory. Based on reading the physician's information, the user chooses the physician and communicates with his or her doctor (figure 7). After one or two communications, the user chooses the same doctor, which would form a habit. For example, when the user has a health problem, he or she would ask this doctor and trust this doctor. The

user would like to trust in a physician because her or she has developed a long-term connection with the physician.

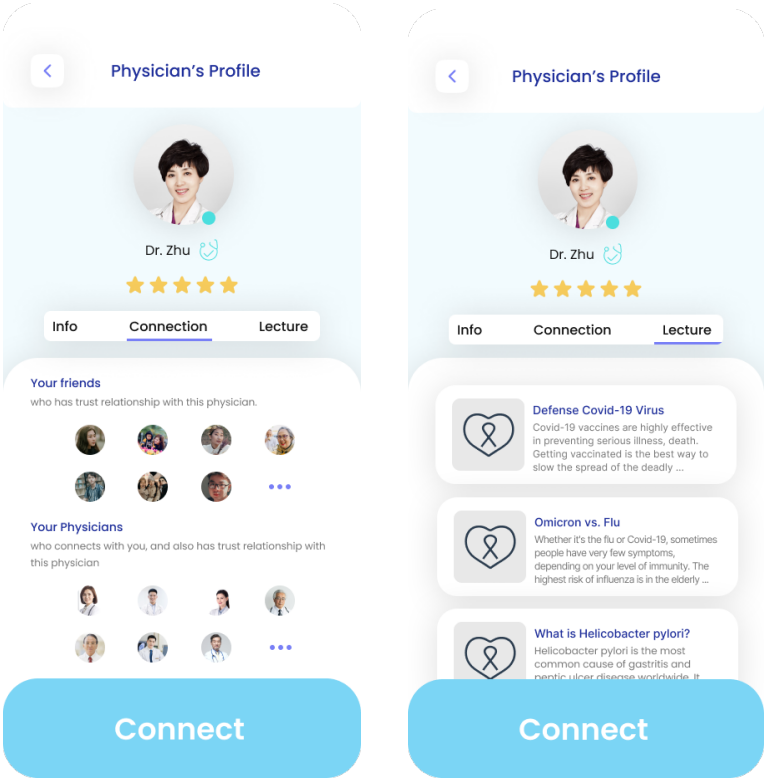


Figure 8. Interface of Physician Profile

The lingering problem, however, is determining how to help people establish trust in the physician. The design is divided three sections to represent the doctor's information. Users can review the physician's workplace, working experience, and comments from friends or families (figure 8). Meanwhile, it displays the familiar connections who also have a close relationship with this physician, such as friends, family members, or even the physicians who had close relationships with their own. This feature connects to the "trust as passion" aspect of Misztal's trust theory. Since people usually tend to trust their family, friends, and fellows, the interactive system shows the user is trusting relationship with the society related to the physician so that the user could produce trusting behavior toward the physician and make a choice. In addition, the physicians will share their medical knowledge to educate users or patients to explore the medical knowledge that they need in life.

7.2Communication with Physicians

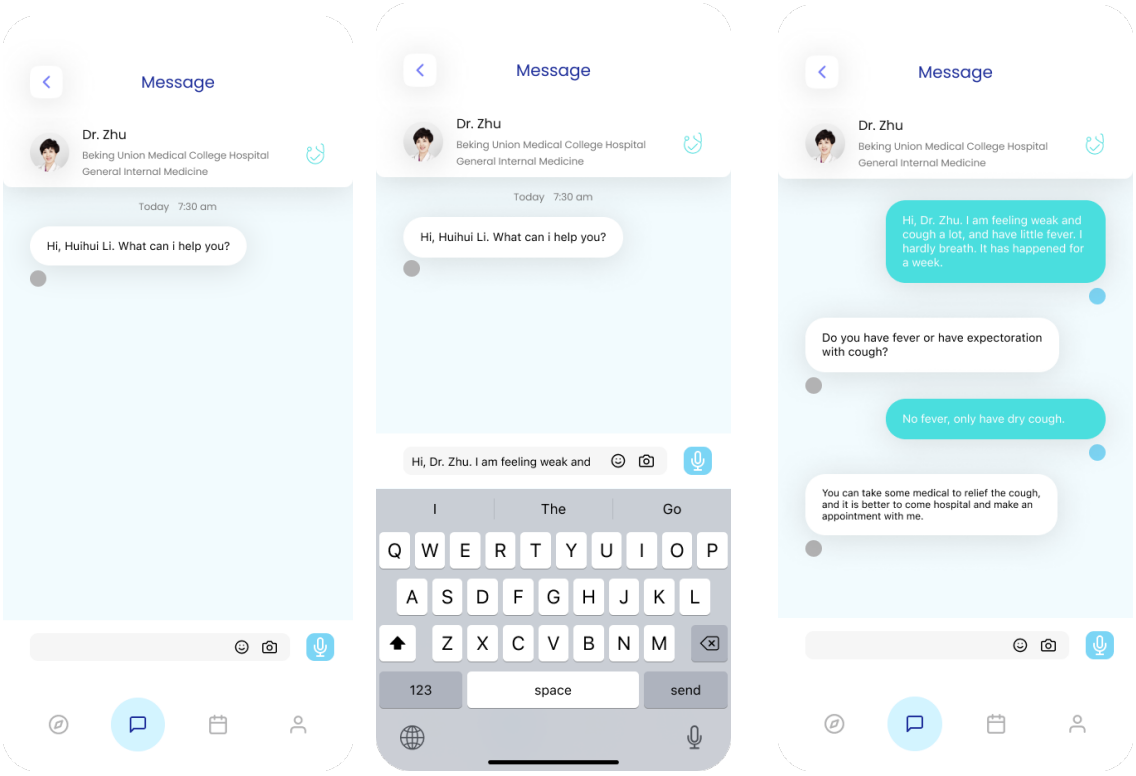


Figure 9. Interface of Message

On the message page, users can have a short conversation with the physician before deciding to go to the hospital. During this conversation, the physician could ask some general questions about the patient's health problems before determining what their next step should be (figure 9). If the doctor believes the patient needs to go to the hospital and have an in-person meeting with him or her, the doctor will instruct the patient how to do it before seeing them.

This conversation feature allows patients to do pre-consultation and get to know the physician before going to the hospital. It also allows patients to keep the familiar feeling, then go to the hospital for a face-to-face consultation with the physician. Also, this feature will allow patients to have more time and energy to complete lab health tests and better understand the hospital's process for health exams.

7.3 Effective Collaboration

According to Misztal's trust theory, "trust as policy," in a relationship, promoting trust and solidarity needs policies. An individual needs a kind of identity who has responsibility for the relationship. Through this interactive system, we allow users to collaborate throughout the course of treatment.

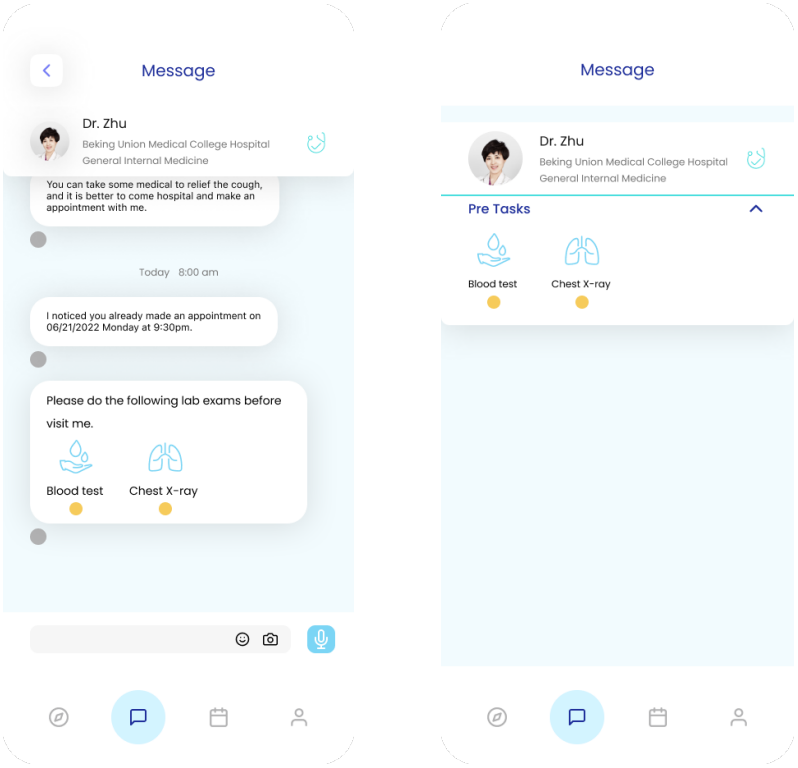


Figure 10. Interface of Preparing list

Communication is also similar to a kind of collaboration. Except for pre-consultation with a physician about the health problems, in this interactive system, the physician will offer pre-requirements, such as requiring patients to do a health exam and make an appointment for preparing in-person consultation (figure 10). The pre-requirement allows patients to understand what they will do during the treatment process rather than merely obey the doctor's advice. The patients also could play a more interactive role in the relationship with knowledge, skill, information, and time.

8. Validation

To assess the validity of the trust for social orders in medical care, we defined hypotheses and conducted controlled experiments using our design section.

8.1 Experiment Design

8.1.1 Variables and Hypotheses

The independent variable we manipulate is three different types of trust from Misztal's trust theory. Through a set of design elements and interaction mechanisms, we created an interactive flow used to guide people to contact their physicians, become familiar with the physicians, and collaborate with the physicians to improve patient's trust in physicians.

The dependent variable in our experiment is the Chinese patients' trust in physicians, as measured by Anderson and Dedrick's "Trust in physician Scale" (Anderson and Dedrick 1095). This assessment was validated in a series of experiments and consisted of an 11-item questionnaire.

To evaluate the extent to which Chinese patients trust physicians, we have defined our alternative hypothesis and the null hypothesis:

H_0: Interactive systems made with three different types of trust cannot higher the Chinese patients' trust in physicians. (1=the score of the experiment group; 2= the score of the control group)

$$H_0: |_1 = |_2$$

H_a: Interactive systems made with three different types of trust can higher the Chinese patients' trust in physicians.

$$H_2: \eta_1 > \eta_2$$

8.1.2 Subjects and Procedure

20 subjects who volunteered to participate in the experiment were randomly divided into a control group and an experimental group. Each group contained 10 subjects. We

transfer the interactive system language to Chinese to test accurately Chinese users. The two groups were tested with different systems, and the experiment group they were tested fully designed interactive system. The whole instrument uses 1-5 points from “strongly disagree” to “strongly agree.” Then, the users would use Maze.com and a survey by “Trust in Physician Scale” (Anderson and Dedrick 1095) to do the test and complete the process.

Sample 1 (Control Group)

For the control group, we designed the interactive system without connecting with doctors, and communicating and collaborating with doctors. The users utilized the system to choose one of the physicians on the physician list. Those physicians are in the same location that the user inputs. They are based on a physician’s information, such as workplace, work experience, and some comments from other patients to book an appointment with the physician. Users would not talk with a physician in the system and would directly go to the hospital for consultation with the physician. As a result, 10 users did not feel that the physician put their needs first. It is a normal process of seeing a doctor in China, booking an appointment, and waiting for a consultation with the physician in the hospital.

We used a significance level of .05 for testing, so a p-value < .05 is needed to reject the null hypothesis.

Simple 2 (Experiment Group)

For the experiment group, the users used the fully designed interactive system to test their trust in physicians. Based on Misztal’s theory integrated in the system, the users can see the familiar people who also connected with the physician and communicate with the physician to engage in the treatment processing or decision. As a result, the users think the physician is more considerate of their needs and would demonstrate less judgment about their medical care. The highlight of the testing is the communication part. Users feel more satisfied during the process of seeing a physician. They can independently complete health exams and

have more time to understand how the exams work and do more preparation before going to the hospital.

8.2 Experiment Design

After both the control group and the experiment group have completed the prototype task and finished the questionnaire, we recorded and analyzed their trust scale scores. Table 1 shows the scores for each question in the questionnaire and the average of the scores for each group.

Table 1

Score of Each Subject

	Control Group	Experiment Group
P1	35	40
P2	29	36
P3	31	41
P4	38	35
P5	33	42
P6	30	33
P7	35	37
P8	34	38
P9	31	39
P10	35	41
Mdn	34	39

To test that the three different trusts can improve Chinese patients' trust in physicians, the experiment conducted a two-tailed u-test on the scores of both groups. Table 2 shows the results.

Table 2

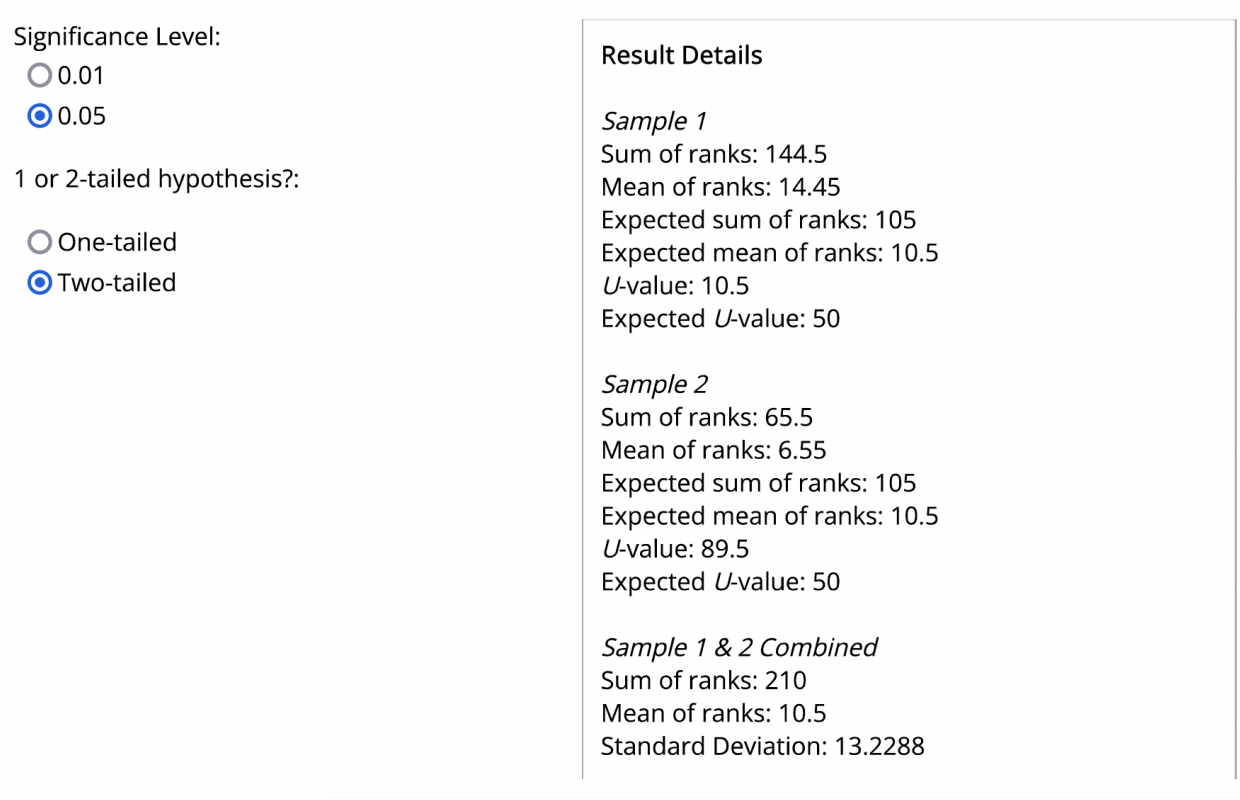
u-test Results

	n	Mean	u	z	p(two-tailed)
Control Group	10	6.55	89.5	2.94812	.00318
Experiment Group	10	14.45	10.5		

The U-value is 10.5. The critical value of U at $p < .05$ is 23. Therefore, the result is significant at $p < .05$. The Z-Score is 2.94812. The p-value is .00318. The result is significant at $p < .05$.

Trust in Physician Scale scores of the experiment group (*Mdn* = 39) were higher than those of the control group (*Mdn* = 34). A Mann-Whitney test indicated that this difference was statistically significant, U ($N_{control}$ = 10, $N_{experiment}$ = 10,) = 10.5, z = 2.94812, $p < .00318$.

Therefore, at a significant level of .05, we reject the null hypothesis and accept the alternative hypothesis.



The *U*-value is 10.5. The critical value of *U* at $p < .05$ is 23. Therefore, the result is significant at $p < .05$.

The *z*-score is 2.94812. The *p*-value is .00318. The result is significant at $p < .05$.

Conclusion

This experiment provides data on the patients' trust in the physician before and after using the designed interactive system and extends the potential possibility of improving patients' trust. Although there are a variety of interactive systems for Chinese medical care, we are aware of no other current design solution that addresses the trust problem between patients and physicians. This suggests that, at least within the sample we studied, the patient may express more trust in physicians when using the interactive system. A systematic test of this notion is still needed for the next step.

However, the limitations of the application should be noted. The patients in the study expressed that there was a lack of expression for patients' medical needs. Since the conversation with the physician is scripted, people have no chance to communicate real

situations in their lives unavailable through the application's script. Additionally, users cannot quickly search for the specific health information they want to know. Users also still need to be educated on how to describe their health conditions to the physicians to make conversations more effective. Moreover, regarding the section of the application based on bonds of familiarity, there was some concern amongst users regarding privacy. Their information may be too transparent for a media platform; the users might feel unsafe. With these limitations in mind, Misztal's trust theory and the "Trust in Physician Scale" could be used in collaboration with other studies to better prioritize patients' medical care needs and improve patient-physician trust.

List of Tables in Appendix

Appendix 1 Experiment Questionnaire

Table 1

Assessment of Trust in patient-physician relationship

Respondents evaluated this statement on a scale labeled five-point Likert format, ranging from “strongly agree” to “strongly disagree.”

Trust in Physician Scale (Anderson and Dedrick)[13]

1. I doubt that my doctor really cares about me as a person.
2. My doctor is usually considerate of my needs and puts them first.
3. I trust my doctor so much that I always try to follow his/her advice.
4. If my doctor tells me something is so, then it must be true.
5. I sometimes distrust my doctor's opinion and would like a second one.
6. I trust my doctor's judgment about my medical care.
7. I feel my doctor does not do everything he/she should for my medical care.
8. I trust my doctor to put my medical needs above all other considerations when treating my medical problems.
9. My doctor is a real expert in taking care of medical problems like mine.
10. I trust my doctor to tell me if a mistake was made about my treatment.
11. I sometimes worry that my doctor may not keep the information we discuss totally private.

Lynda A. Anderson and Robert F. Dedrick’s “Trust in Physician Scale” (Anderson and Dedrick 1095.)

Appendix 2 Experiment Data

Experimen Group	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9	Question 10	Question 11	Sum
Subject 01	2	5	5	4	3	4	2	2	4	5	4	40
Subject 02	3	4	3	4	3	4	2	2	4	4	3	36
Subject 03	2	4	4	4	3	4	4	4	5	4	3	41
Subject 04	3	4	3	3	3	4	3	3	3	3	3	35
Subject 05	2	4	5	4	2	5	2	3	5	5	5	42
Subject 06	3	2	3	3	2	3	2	3	4	3	5	33
Subject 07	2	4	4	4	3	4	2	3	4	4	3	37
Subject 08	3	4	3	3	4	4	3	4	4	3	3	38
Subject 09	3	4	4	4	2	3	4	4	4	3	4	39
Subject 10	2	4	4	4	3	4	4	4	4	5	3	41
											SUM	382
											Mdn	39
Control Group												
Subject 11	4	3	3	3	3	4	3	3	4	3	2	35
Subject 12	5	1	3	3	4	3	3	2	2	2	1	29
Subject 13	3	3	3	1	4	3	4	3	2	4	1	31
Subject 14	5	3	3	3	3	3	4	3	4	4	3	38
Subject 15	4	2	4	3	2	4	4	1	3	4	2	33
Subject 16	1	5	1	2	4	3	4	3	4	2	1	30
Subject 17	3	2	4	3	3	4	3	3	4	4	2	35
Subject 18	3	2	3	3	4	4	4	2	4	3	2	34
Subject 19	4	2	4	3	3	3	2	2	3	3	2	31
Subject 20	4	2	4	3	4	3	4	3	4	2	2	35
											SUM	331
											Mdn	34

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