

Exploring the dual effects of perceived waiting on healthcare service satisfaction among outpatients

Exploring the dual effects of perceived waiting

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Abstract

Purpose – The purpose of this paper is to explore healthcare waiting time and the negative and positive effects (i.e. the dual effects) it has on outpatient satisfaction.

Design/methodology/approach – Self-administered surveys with 334 outpatients and follow-up interviews with 20 outpatients in three large hospitals in Taiwan were conducted to collect data.

Findings – Quantitative surveys demonstrated that perceived waiting time correlated with satisfaction negatively first but then positively. Satisfaction also correlated with doctor reputation and patient sociability. Follow-up qualitative interviews further revealed that, for some patients, waiting contributed positively to patient evaluations through signaling better healthcare quality and facilitating social interaction.

Originality/value – This research demonstrated the possibility that waiting might have positive effects on healthcare satisfaction. It also identified variables that could produce greater positive perceptions during hospital waiting and underlying mechanisms that could explain how the positive effects work. This research may potentially help hospitals with a better understanding of how they can improve patients' waiting experiences and increase satisfaction.

Keywords Social interaction, Satisfaction, Waiting, Healthcare service, Quality signal

Paper type Research paper

Introduction

Waiting, particularly for healthcare services, can sometimes be extensive and is a major cause of patients' dissatisfaction with healthcare services (Mowen *et al.*, 1993; Taylor and Bengner, 2004; Thompson and Yarnold, 1995). In addition, waiting is associated with many undesirable consequences among patients, such as reduced physician visit frequency (Tak *et al.*, 2014), reduced desire for preventive medical checkup (Maulana and Pradana, 2018); fewer recommendations and repeat visits (Hill and Joonas, 2005) and increased cognitive distraction and poorer recall of important information (Portnoy, 2010).

Waiting has been an important research topic for a long time in healthcare service literature. Related research could be classified into four main streams. The first examines the unfavorable influences of actual or perceived waiting time on patients' evaluations (e.g. satisfaction and perceived service quality), patients' behaviors (e.g. repeat visits, visit frequency and preventive medical checkup) or medical outcomes (e.g. mortality) (e.g. Anderson *et al.*, 2007; Becker and Douglass, 2008; Casaletto and Gatt, 2004; Guttman *et al.*, 2011; Hill and Joonas, 2005; Maulana and Pradana, 2018). The second category analyzes how patients' individual



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differences, attributes of healthcare service or situational factors (such as gender, age, reimbursement policy and time of visit) affect actual or perceived waiting time (e.g. Becker and Douglass, 2008; Chen *et al.*, 2010; Guo *et al.*, 2019; Pell *et al.*, 2000). The third investigates how time-filling mechanisms such as television, magazine distractions and information delivery can alter patient perceptions of waiting time (e.g. Becker and Douglass, 2008; Dansky and Miles, 1997; Thompson *et al.*, 1996). Finally, a field of study has been devoted to information dispatch technologies and service process design tools (e.g. appointment systems and lean systems) that could improve accuracy in predicting waiting time or reduce actual waiting time (e.g. Chen *et al.*, 2010; Costa and Godinho Filho, 2016; Gonçalves *et al.*, 2018; Henrique *et al.*, 2016; Kaandorp and Koole, 2007).

Most of the previous research views waiting as a negative part of the healthcare system. Therefore, researchers are continually finding ways to diminish actual and perceived waiting time and reduce consequential adverse effects. The rationale behind this “negative perspective” might be that people see time as a resource, and therefore, waiting as a waste of resource. Consequently, waiting has also been found to increase negative emotions such as anger, anxiety, impatience and agitation (Au and Tse, 2019; Hui and Tse, 1996; Taylor, 1994; Zakay, 1989).

However, real-world observations reveal that some patients gain emotional tranquility when waiting alone or chatting with others. Also, some other patients choose longer waiting in order to see a more reputable doctor, as they believe that hospitals and doctors with more patients are more trustworthy. Thus, this research would like to inquire: is waiting only a waste of time and does it produce only negative effects? Is it possible the time spent on waiting contributes to favorable consultation experiences?

The retail literature on waiting, queuing and crowding proposes that sometimes a moderate crowd may be a sign of service or product quality and bring positive emotion and shopping fun. Waiting, queuing and crowding have sometimes been found to increase consumers’ purchases and experience satisfaction (Koo and Fishbach, 2010; Kremer and Debo, 2012; Mehta, 2013; Pan and Siemens, 2011). However, there is little research regarding how waiting can positively affect healthcare satisfaction. If waiting contributes not only negatively but also positively to satisfaction, it could bring new insights for healthcare management teams. Shortening waiting time may not be the only choice; management teams might consider doing something to benefit from waiting. Therefore, the prime objective of this research is to explore both the negative and the positive impacts (i.e. the dual effects) of waiting time on healthcare satisfaction.

If waiting can really make a positive contribution to healthcare satisfaction, then it should be determined under what circumstances these positive effects might emerge. Healthcare management could then utilize the research findings to improve services. Thus, the second objective of this research is to identify the boundary conditions for the positive effects of waiting. The relevant literature points out that service attributes (e.g. brand, general outpatient vs emergency service and first consultation vs ongoing visit) and individual differences (e.g. gender, education, personality traits and sociability) may affect a person’s acceptable waiting time, perceived waiting time and tolerance for crowding (Aiello *et al.*, 1983; Maister, 1985; Miller and Nardini, 1977; Miller *et al.*, 1981). Following this notion, this research expects that certain attributes of healthcare service and personal characteristics of patients might influence patients’ negative and positive perceptions of waiting time.

Based on the real-world observations mentioned above, this research suggests that the time used in waiting for healthcare services might result in beneficial impacts through mechanisms such as signaling a better healthcare quality (Chatterjee, 2013; Giebelhausen *et al.*, 2011) or providing opportunities for patients to socially interact with others (Berger and Calabrese, 1975; Duhachek, 2005). Accordingly, it is believed that the positive effects of

healthcare waiting might be more likely to emerge when a patient is waiting for a reputable doctor (so the patient may see the time spent on waiting as a reflection of the doctor reputation), or when a patient has a high level of sociability (so the patient may be more likely to interact with others while waiting). Thus, this research proposes doctor reputation and patient sociability as potential moderators on the dual effects of healthcare waiting.

Specifically, this study aims to answer two questions:

RQ1. How does waiting affect healthcare satisfaction? Negatively? Positively? Or both?

RQ2. When are the negative/positive effects of waiting more likely to emerge?

By clarifying how waiting negatively and positively affects satisfaction, this research brings a new “positive perspective” into the literature on healthcare waiting in addition to the traditional “negative perspective,” and thus helps align the waiting research in healthcare service with the waiting research in other service businesses. Furthermore, by identifying when the negative/positive effects emerge, this study may potentially assist healthcare managers in avoiding unfavorable impacts and strengthening favorable influences of waiting.

This manuscript was organized as below. First, to explore these research questions, the dual effect hypothesis, proposing an inverted U-shaped relationship between waiting and satisfaction, was built. Second, outpatients and their companions in the waiting areas of large hospitals were taken as samples for self-reported surveys. The surveys were further assisted with qualitative analysis on open-ended questions and in-depth interviews to gain a deeper insight into the patients’ perspective. The results of surveys and interviews were then presented in sequence. At the end, conclusions, discussion and implications were provided.

Theoretical background and hypotheses

The primary argument of this research is that there is an inverted U-shaped relationship (positive first and then negative) between waiting and healthcare satisfaction. For this relationship to be established, two pre-requisites are necessary: first, the relationship between waiting and satisfaction is non-monotonic; that is, they both are negatively and positively related, and there is a turning point in the relation curve of the two. Second, the relationship between waiting and satisfaction is positive first and then negative; that is, longer waiting leads to greater satisfaction before the turning point and lesser satisfaction after that. For developing this primary argument, a negative relationship, a positive relationship and an inverted U-shaped relationship between waiting and satisfaction were discussed step by step below. After the hypotheses of the main effect were established, the moderating effects of doctor reputation and patient sociability were further discussed. Please see Figure 1 for the research framework.

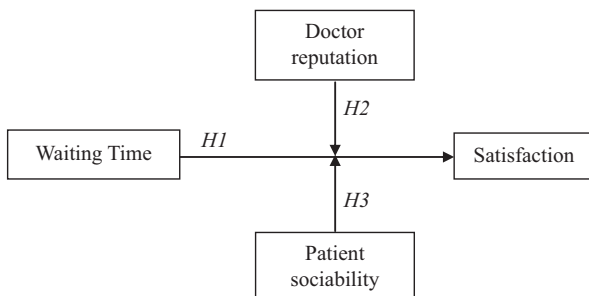


Figure 1. Research framework

A negative relationship between waiting and satisfaction: resource allocation and costs of waiting

Most studies on perceived waiting time were based on the resource allocation model proposed by Zakay (1989). In this model, people develop a perception of time by using the cognitive timer in their brain. It is not the objective absolute waiting time, but people's subjective perception of waiting time that counts (Boudreaux and O'Hea, 2004; Thompson and Yarnold, 1995). In addition, waiting has a negative effect because people consider time an economic resource, and waiting is thus considered a waste of resource. Waiting requires investments of economic costs (time is money) and mental costs (waiting causes negative psychological responses) (Koo and Fishbach, 2010). Therefore, waiting brings many negative feelings, such as anger, anxiety, impatience and agitation (Au and Tse, 2019; Hui and Tse, 1996; Taylor, 1994). Furthermore, waiting was identified as a major contributor to the disutility of service experience (Chang and Huang, 2016). In service and retailing industries, the negative relationship between waiting and evaluations of a product or shop has already been confirmed by extensive empirical studies (Benjarongrat and Neal, 2017; Chatterjee, 2013; Clemes *et al.*, 2018; Giebelhausen *et al.*, 2011).

Davis and Heineke (1994) found that waiting under physical discomfort is felt even longer than comfortable waiting. Waiting for healthcare is just the case under physical discomfort, making it even more unbearable (Taylor and Bengner, 2004). Since waiting has always been a major issue in healthcare management, plenty of the literature proved once and again the longer the waiting, the poorer the patients' evaluations of healthcare quality, the more dissatisfied they are and the more negative emotions and actions they show (Anderson *et al.*, 2007; Dansky and Miles, 1997; Hill and Joonas, 2005; Papanicolas *et al.*, 2013). Accordingly, a negative relationship between waiting and healthcare satisfaction is inferred; that is, the longer the waiting time, the higher the economic and mental costs patients need to invest, and hence the lower the satisfaction:

- H1a.* There is a negative segment in the relationship between perceived waiting time and healthcare satisfaction, in which the longer the waiting time, the less satisfied are the patients.

A positive relationship between waiting and satisfaction: quality signal and social interaction

Information economists (Bergen *et al.*, 1992; Rao and Monroe, 1996) believe that trade participants possess different amounts of information. When one party lacks the information the other party possesses, he/she will make transaction decisions based on information provided by other groups, resulting in the so-called information asymmetry. When considering buying a product with uncertain quality before use, consumers need to make a preliminary estimate of its possible quality based on some quality signals (Nelson, 1970). The number of purchasers is usually seen as a quality signal; consumers tend to think commodities that attract many purchasers must have good quality. This argument has widely been supported in the literature relating to crowding and queuing. For example, Koo and Fishbach (2010) found that when the value of a service or product is indistinct and not fully comprehensible to consumers, consumers will infer its value from the length of the queue. Kremer and Debo's (2012) empirical study also showed when the quality of a commodity is uncertain, consumers will infer the quality from the length of the queue, and thus causing a higher probability of consumers joining the queue as the queue lengthens.

Recent studies on waiting also found waiting may symbolize the quality of a service or product; therefore, waiting may contribute positively to the evaluations of a shop, product or service. For example, Buell and Norton's (2011) study showed waiting has a positive impact on service value when consumers can feel the longer waiting time represents the service

provider's greater effort. Giebelhausen *et al.* (2011) found that waiting does serve as a quality signal when the quality of a product can hardly be objectively measured, and hence enhances the purchase intention and satisfaction. Chatterjee (2013) conducted a meta-analysis on empirical studies on waiting, which revealed that waiting may make a positive contribution to the perceived service quality under certain circumstances.

Healthcare service is generally classified as a "credence product" (Zeithaml, 1981), for which the quality can hardly be evaluated even after use since most consumers lack the expertise. It thus fulfills the above mentioned condition that "waiting does serve as a quality signal when the quality can hardly be objectively measured" (Giebelhausen *et al.*, 2011; Koo and Fishbach, 2010; Kremer and Debo, 2012). Therefore, patients are likely to infer healthcare quality from waiting time, believing doctors with more people waiting to see are more reliable. Furthermore, patients may think longer waiting time probably means the doctor is attending to patients more meticulously, which represents better healthcare quality. This phenomenon accords with the situation described above that "waiting has a positive impact on the service value when consumers can feel the longer waiting time represents the service provider's greater effort" (Buell and Norton, 2011), and so the service quality is inferred from the waiting time. Consequently, it is believed that in the case of healthcare service, patients probably consider waiting as a signal of healthcare quality, which in turn improves their satisfaction.

On the other hand, waiting may contribute to satisfaction by facilitating social interaction. Being physically or mentally ill is very torturing. Many medical studies showed that social support might exert a tremendous positive power when a disease is being treated. Both formal and informal social support may offer comfort to patients and their family, alleviate their anxiety, increase adherence to treatment and improve the prognosis of diseases (DiMatteo, 2004; Uchino *et al.*, 1996). This is why patients need companions at the time of medical consultation, or some patients may join patient groups. Such social interaction and support may not directly relieve their medical problems, but having a companion or someone to share their feelings with may create enormous pacifying effects. In the process of waiting, patients may get social support not only from the companion of their own family but also from chatting with other patients and their family, in whom they may find "sympathy" and the feeling that "I am not alone."

Miller *et al.* (2008) stated that negative service incidents (services that consumers wish to avoid, like medical services) themselves constitute high pressure on consumers, but waiting makes time for them to find coping strategies against the pressure. During this waiting time, consumers may cope with the stressful consumption incidents through three types of strategy – proactive action, passive avoidance and seeking social support (Duhachek, 2005). In the situation of healthcare service, the waiting time provides an opportunity for patients to acquire social support via interaction with others, and thus buffers the pressure created by the negative service (Uchino *et al.*, 1996).

Concluding the above discussion, this research suggests that the longer the waiting time, the higher quality the patients will infer for the healthcare service they are about to receive, and the more likely they will have social interaction with others and thereby get social support. Therefore, the hypothesis is proposed:

- H1b.* There is a positive segment in the relationship between perceived waiting time and healthcare satisfaction, in which the longer the waiting time, the more satisfied are the patients.

An inverted U-shaped model

According to the above discussion, waiting involves economic and mental costs, and so has negative impacts on satisfaction; on the other hand, waiting may exert positive effects on

satisfaction by signaling better service quality or increasing chances of social interaction. It should then be determined when the positive effects can override the negative effects and when the negative effects prevail over the positive effects.

A few recent retail studies supported an inverted U-shaped (i.e. positive first and then negative) relationship between waiting and service evaluations. For example, both the studies of Mehta *et al.* (2013) and Pan and Siemens (2011) on crowding found an inverted U-shaped relationship between crowding and consumers' evaluations; that is, there exists an optimal level of crowding, over or under which is inappropriate. The empirical studies of Chuo and Heywood (2014) and Lu *et al.* (2013) on queuing revealed an inverted U-shaped relationship between queue length and purchase quantity, perceived quality and queuing behavior. When the perceived waiting time is shorter than consumers' acceptable waiting time, the positive benefits of waiting are likely to emerge; but when perceived wait time exceeded what was perceived to be acceptable, the negative effects will significantly surpass the positive effects.

Based on the above mentioned literature, it is proposed that within a relatively short waiting time, which does not exceed patients' tolerance (i.e. the turning point in the inverted U-shaped curve), the positive effects of waiting surpass the negative effects, and hence waiting and healthcare satisfaction show a positive relationship. However, when waiting time exceeds patients' tolerance, patients grow more impatient toward waiting and the physical and mental discomfort caused by waiting becomes obvious, resulting in the negative effects surpassing the positive effects; waiting and satisfaction then show a negative relationship. Therefore:

H1c. Perceived waiting time and healthcare satisfaction show an inverted U-shaped relationship composing a positive segment first and then a negative segment. That is, longer waiting increases satisfaction before the tolerance level (the turning point), while longer waiting reduces satisfaction after that level.

Moderating effects of doctor reputation

H1b proposes waiting may contribute favorably to healthcare satisfaction by signaling better quality of healthcare service or by increasing social interaction. This research further argues "doctor reputation" may affect the probability and strength of patients' inference of service quality from waiting time, while "patient sociability" may influence the probability and strength of patients' engagement in social interaction. Therefore, it is assumed that doctor reputation and patient sociability have moderating effects on the relationship between waiting and satisfaction.

Giebelhausen *et al.* (2011), Koo and Fishbach (2010) and Kremer and Debo (2012) all pointed out that consumers tend to see waiting time as a quality signal when the quality of a product is uncertain, ambiguous or not readily measurable. Healthcare service is generally considered a "credence product," of which the immeasurability or uncertainty of the service quality is relatively high (Zeithaml, 1981). Therefore, patients are likely to count on waiting time as a signal of healthcare quality, believing that the doctor whom more people wait for is more trustworthy. It is further proposed that when a doctor is more reputable, patients will deem the healthcare service they are about to receive more valuable and worth waiting. As a result, their tolerance level for waiting time will increase (i.e. the turning point in the inverted U-shaped relationship between waiting and satisfaction will appear later), and the positive effect of waiting on satisfaction will strengthen (i.e. the gradient in the positive segment of the inverted U-shaped relationship will be greater).

This "prominent doctor effect" can often be seen when patients are gladly queuing up and waiting for hours to consult with well-known department heads or hospital superintendents. A similar phenomenon was found in studies on famous brands. Research found that when a

product's quality had not yet been established, consumers tended to believe that products of more famous brands have more excellent quality and, therefore, consumers would be more willing to spend time queuing up for them. Accordingly, the following hypothesis is proposed:

- H2.* Doctor reputation moderates the inverted U-shaped relationship between perceived waiting time and satisfaction. When a doctor is more reputable, the turning point in the inverted U-shaped relationship appears later, and the gradient of the positive segment is greater.

Moderating effects of patient sociability

Sociability is a personality trait. A highly sociable person is defined as someone who can easily get into conversations with strangers and who loves and needs to have frequent interaction with others (Schmit *et al.*, 2000). Therefore, this study infers that highly sociable persons easily get involved in social interaction with others when waiting, and hence are more likely to take advantage of social support in response to the pressure of receiving healthcare service, and so a more significant positive relationship between waiting and satisfaction will result. In other words, the gradient in the positive segment of the inverted U-shaped relationship between waiting and satisfaction before the turning point will be greater.

Also, Miller *et al.* (1981) and Miller and Nardini (1977) showed that highly sociable persons have a greater tolerance for crowding. Applying this to the case of healthcare waiting, this research suggests that more sociable persons are more likely to engage in social interaction with others during waiting, which makes waiting less distressing and increases tolerance for waiting. Therefore, the turning point in the inverted U-shaped relationship will appear later, and the positive effect of waiting on satisfaction will strengthen. Thus:

- H3.* Patient sociability moderates the inverted U-shaped relationship between perceived waiting time and satisfaction. When a patient is more sociable, the turning point in the inverted U-shaped relationship appears later, and the gradient of the positive segment is greater.

Methodology

With the purpose to collect extensive quantitative data to test the hypotheses, self-reported surveys measuring perceived waiting time, satisfaction, doctor reputation and patient sociability were conducted among outpatients and their companions. Open-ended questions were also designed in the surveys to probe into patients' experience of social interaction while waiting and the reasons why they feel satisfied/dissatisfied. After that, follow-up interviews were conducted to further find out whether and why patients consider waiting a signal of healthcare quality or a chance for social interaction.

Sample

Patients and their companions were identified in general outpatient and emergency service waiting areas at one large medical center and two regional hospitals in Taiwan. The age range was set at anyone over 20 years old, which ensured that the subjects had the appropriate cognitive ability and sufficient experience to be able to provide reliable responses. Because the length and experience of waiting differs between patients of different medical departments, on different dates and at different consultation times (Chen *et al.*, 2010; Guttman *et al.*, 2011), this research used a stratified quota sample consisting of patients waiting at different medical departments and different consultation times. A total of 359 questionnaires were collected. Incomplete surveys were discarded, leaving 334 valid responses. Respondents' background and demographic data can be found in Table I.

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	<i>n</i>	Percentage (%)
<i>Sex</i>		
Male	107	32.0
Female	227	68.0
<i>Age</i>		
20–24	42	12.6
25–30	41	12.3
31–40	88	26.3
41–50	58	17.4
51–60	65	19.4
61–70	28	8.4
71 or above	12	3.6
<i>Education</i>		
Illiterate	1	0.3
Elementary school or below	11	3.3
Junior high school	16	4.8
Senior high/vocational school	100	29.9
University/5-year college	181	54.2
Master's degree	23	6.9
PhD or above	2	0.6
<i>Identity</i>		
Patient	221	66.2
Companion	113	33.8
<i>Level of hospital</i>		
Medical center	242	72.5
Regional hospital	92	27.5
<i>First or ongoing consultation</i>		
First consultation	72	21.6
Ongoing consultation	262	78.4
<i>Type of service</i>		
Outpatient	312	93.4
Emergency	22	6.6
<i>Medical department</i>		
Internal medicine ^a	85	25.4
Surgery ^b	52	15.5
Pediatrics	3	0.9
Gynecology/obstetrics	34	10.2
Traditional Chinese medicine	21	6.3
Dentistry	24	7.2
Dermatology	41	12.3
Orthopedics	31	9.3
ENT	19	5.7
Ophthalmology	24	7.2
Total	334	100

Table I.
Sample backgrounds
and demographics

Notes: ^aIncludes general internal medicine, internal medicine – neurology, internal medicine – cardiology, internal chest medicine, internal medicine – hepatology and gastroenterology, metabolism, infectious diseases; ^bincludes general surgery, neurosurgery, plastic surgery, surgery – hepatology and gastroenterology, traumatology

Measurement

All measurements were adopted from the existing literature and presented in Chinese after the back-translation process (Brislin, 1970). First, the items were translated from English into Chinese. Three Taiwanese professors who won their PhD in America and then have

taught in America for several years were invited to see whether the meaning of each item in the Chinese version is similar to that in the English version. Minor amendments were made according to their opinions. Then a Taiwanese professor who teaches English in Taiwan was asked to translate the Chinese questionnaire back into English. The back-translated English items were then compared with the original English items by three native Americans who work or study in Taiwan in terms of the similarity of the meaning of each item. A small-scale pretest with 20 college students was conducted to ensure the wording, accuracy, readability and find out the time needed for completing the questionnaire.

The main independent variable was “perceived waiting time.” According to the preliminary understandings of the range of general outpatient waiting time and taking Seawright and Sampson’s (2007) suggestion to avoid typical response bias, the following measurement was adopted:

How long do you think you have waited until now? Please circle the most suitable numbers.

Hour: 0 1 2 3 4 5

Minute: 0 5 10 15 20 25 30 35 40 45 50 55.

The main dependent variable, “satisfaction with healthcare service,” was measured at two different points of time: “satisfaction after waiting and before consultation” (“post-waiting satisfaction” hereafter) and “post-consultation satisfaction.” Satisfaction levels at these two time points were analyzed and compared in an expectation to distinguish between the two and clarify the effect of waiting. Satisfaction was measured by using a five-item, ten-point Likert scale (1 = totally disagree, 10 = totally agree) which were modified from Hui and Tse’s (1996) study. The five items were: “Up to this point, I feel good about the overall consultation experience today.” “I like the overall consultation experience today.” “The overall consultation experience today makes me feel good.” “The time spent on the consultation today is acceptable to me.” “Based on the overall consultation experience today, I will recommend this hospital to friends.” A factor analysis revealed that the five items load on the same factor and explain 77.2 percent and 77.8 percent of the total variance of post-waiting satisfaction and post-consultation satisfaction, respectively, which indicated that this scale is unidimensional. The scores on these five items were then averaged to form a single index of satisfaction. Cronbach’s α for post-waiting satisfaction and post-consultation satisfaction were 0.90 and 0.92, respectively, which ensured the reliability of this scale.

Regarding the moderating variables, “patient sociability” was measured by using the five sociability-related items in the personality traits scale developed by Schmit *et al.* (2000), which were presented in a ten-point Likert scale (1 = totally disagree, 10 = totally agree). The five items were: “I find it easy to talk with strangers.” “I think I am a friendly person.” “I like social occasion with intensive interpersonal interaction.” “I enjoy others’ companion.” “In daily life, I need to have frequent interaction with others.” This scale appeared to be unidimensional (a factor analysis revealed that the five items load on the same factor and explain 61.9 percent of the total variance) and reliable ($\alpha = 0.75$). Similarly, the scores on these five items were then averaged to form a single index of sociability. For “doctor reputation,” one question asking “Do you think the doctor you are seeing today is well-known?” (1 = not at all well-known, 10 = very well-known) was used to measure the subjective perception of patients.

Three demographic factors of patients (age, sex and education) and three attributes of healthcare service (first or ongoing consultation, medical center or regional hospital and emergency or outpatient service) were also included as control variables. The questionnaire was divided into two parts: the first part was completed when the respondent was initially waiting to see the doctor. Respondents were asked to circle what they felt was their perceived wait time and indicated their level of post-wait satisfaction. They were also asked

with whom they had interacted during the wait and what factors had made them feel satisfied or dissatisfied (open-ended questions). Then, they were asked to complete the sociability scale and to state whether the visit had been a first time or ongoing consultation. Age, sex, education and identity (patient/companion) were also recorded. Interviewers recorded the hospital level (medical center/regional hospital), medical department and type of service (emergency/outpatient service). Respondents were required to complete the second part of the questionnaire immediately after they had finished the consultation. It included the measurements of post-consultation satisfaction, doctor reputation and an open-ended question to determine the reasons why they had felt satisfied or dissatisfied.

Process

The research plan and questionnaire were reviewed and approved by the Institutional Review Board of the sample hospitals. Respondents were voluntary and were given a gift worth \$1.50 for their appreciated participation.

Respondents were expected to complete the questionnaire as close to their actual consultation time as possible. Also, there should be sufficient time for respondents to finish the first part of the questionnaire. Therefore, the target sample would be the third patient in line after the currently consulting patient (e.g. if No. 15 patient was consulting and No. 18 patient would be the target respondent).

Trained interviewers arrived at the waiting areas of the assigned medical department at the scheduled time according to the stratified quota sampling plan. The interviewers explained the purpose of the study to the selected sample (purpose of the study was modified to avoid hinting the respondents and affecting their answers) and acquired the respondents' consent before administering the survey. The respondents had to complete the first part of the questionnaire just before seeing the doctor and the second part immediately after they finished consulting the doctor. It takes about 10 min to complete the whole questionnaire (not including the consultation time).

Research results

Descriptive statistics and correlation analysis

Waiting time was converted into minutes and the six control variables were included as dummy variables. These included, level of hospital: low (regional hospital) = 0 and high (medical center) = 1; first/ongoing consultation: first = 0, ongoing = 1; emergency/outpatient service: outpatient = 0, emergency = 1; sex: male = 0, female = 1; age: youth or elder (below 30 or above 61) = 0, middle and prime aged (31-60) = 1; education: low (senior high and vocational school or below) = 0, high (college or above) = 1. Table II illustrated the means, standard deviations and correlation coefficients of major variables.

Table II illustrated that waiting time was negatively correlated with post-waiting satisfaction ($\gamma = -0.283, p = 0.000$) and post-consultation satisfaction ($\gamma = -0.237, p = 0.000$). However, the degree of correlation between waiting and post-waiting satisfaction was higher. Table II also revealed that both post-waiting satisfaction and post-consultation satisfaction were significantly correlated with sociability and doctor reputation; thus, partial correlation analyses were further conducted to realize the net effects of waiting time by controlling the effects of sociability and doctor reputation. The results showed a similar pattern: the degree of correlation between waiting and post-waiting satisfaction ($\gamma = -0.293, p = 0.000$) was higher than that between waiting and post-consultation satisfaction ($\gamma = -0.265, p = 0.000$). Besides, post-consultation satisfaction might be more subject to the influence of other factors apart from waiting (see Qualitative analysis). Therefore, post-waiting satisfaction continues to be the major dependent variable in the following analyses of the effects of waiting time.

	Mean	SD	1	2	3	4	5
1. Waiting time	44.57	51.57					
2. Waiting time square	4,637.65	12,708.39	0.915**				
3. Post-waiting satisfaction	4.99	1.14	-0.283**	-0.132*			
4. Post-consultation satisfaction	5.43	1.08	-0.237**	-0.135*	0.650**		
5. Patient sociability	4.94	0.82	-0.062	-0.0021	0.198**	0.207**	
6. Doctor reputation	5.27	1.32	0.032	0.033	0.238**	0.379**	0.111*
7. Level of hospital (1 = high)	0.72	0.45					
8. First/ongoing consultation (1 = ongoing)	0.78	0.41					
9. Emergency/outpatient service (1 = emergency)	0.07	0.25					
10. Sex (1 = female)	0.68	0.47					
11. Age (1 = middle and prime aged)	0.63	0.48					
12. Education (1 = high)	0.62	0.49					

Notes: Two-tailed. * $p < 0.05$; ** $p < 0.01$

Table II.
Mean, standard deviation and correlation coefficient

Since post-waiting satisfaction was significantly negatively correlated with waiting time and also significantly negatively correlated with waiting time square ($\gamma = -0.132, p < 0.05$), it meant the relationship between waiting and satisfaction was a quadratic function that opened downward. It preliminary supported *H1* (an inverted U-shaped dual relationship between waiting time and satisfaction). In addition, post-waiting satisfaction was positively correlated with doctor reputation ($\gamma = 0.238, p = 0.000$) and patient sociability ($\gamma = 0.198, p = 0.000$), meaning the more reputable the doctor and the more sociable the patient, the higher was the level of satisfaction.

Hypotheses testing

Since a dual relationship between waiting and satisfaction was inferred in this research's primary hypothesis, representing a quadratic function, this research first referenced to Bielen and Demoulin (2007) for curve estimation of waiting time on satisfaction and for comparing the explanatory power of linear function and quadratic function models. Results of the analysis were presented in Table III and Figure 2, showing the quadratic function ($R^2 = 0.179, p = 0.000$) had greater explanatory power than the linear function ($R^2 = 0.080, p = 0.000$). Therefore, the level of satisfaction was better expressed as a quadratic function of waiting time.

Second, to test the quadratic relationship and the interaction between independent variables and moderating variables, suggestions of Aiken and West (1991) and Frazier *et al* (2004), were followed for hypotheses testing through hierarchical regression analysis. Besides, reference was made to the study of Mehta *et al*. (2013) for the steps of testing the inverted U-shaped relationship between waiting time and post-waiting satisfaction. Six models were adopted in the hierarchical regression analysis, with post-waiting satisfaction as the dependent variable and different independent variables included step by step. First/ongoing consultation, age, sex, education, level of hospital and emergency/outpatient service were included in Model A as control variables, while major independent variables, waiting time and

Dependent variable	Method	R^2	df	F	p	b_0	b_1	b_3
Post-waiting satisfaction	Linear	0.080	332	28.89	0.000	5.2677	-0.0063	
Post-waiting satisfaction	U-shaped (quadratic)	0.179	331	36.15	0.000	5.6469	-0.0221	7.0E-05

Table III.
Curve estimation for waiting time on post-waiting satisfaction

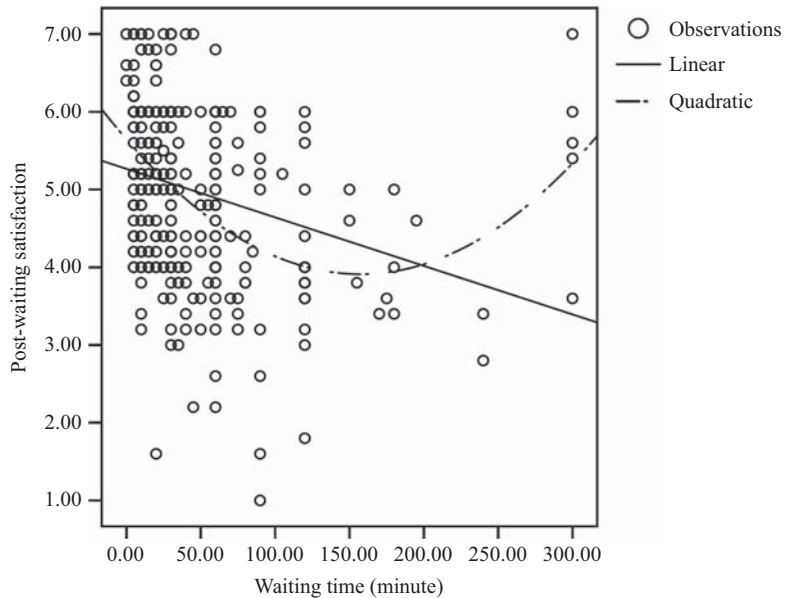


Figure 2.
Distribution for
waiting time and post-
waiting satisfaction

waiting time square, were added in Model B and Model C in sequence. Moderating variables (doctor reputation and patient sociability) were added in Model D. Linear interactions (waiting time \times moderating variables) and quadratic interactions (waiting time square \times moderating variables) were further added in Model E and Model F, respectively. Since doctor reputation and patient sociability were believed to moderate the “quadratic curve” of waiting and satisfaction, the method of Mehta *et al.* (2013) was referenced to confirm the existence of a moderating effect by means of the coefficient of waiting time square \times moderating variables and the explanatory power of the models. Results of the analysis were shown in Table IV.

Table IV illustrated that the ΔF from Model A to Model B ($\Delta F = 26.758, p = 0.000$), from Model B to Model C ($\Delta F = 40.137, p = 0.000$) and from Model C to Model D ($\Delta F = 13.849, p = 0.000$) remained significant, meaning Model D explained the variance of post-waiting satisfaction best among the four models. However, the ΔF (0.985) did not reach significance from Model D to Model E, meaning Model E cannot explain the variance of post-waiting satisfaction better than Model D. Accordingly, the explanatory power of Model D was the best ($F = 12.130, p = 0.000, R^2 = 0.273$). Model D revealed that post-waiting satisfaction was mainly influenced by waiting time ($\beta = -0.949, p = 0.000$), waiting time square ($\beta = 0.740, p = 0.000$), doctor reputation ($\beta = 0.208, p = 0.000$) and patient sociability ($\beta = 0.131, p = 0.008$), which meant shorter waiting, higher doctor reputation and higher patient sociability led to higher satisfaction during waiting. All the attributes of healthcare service and patient demographics included did not significantly affect post-waiting satisfaction.

Since the β of waiting time square in Model D was positive, the relationship between waiting time and satisfaction showed a negative first and then positive upright U-shaped curve, which supported *H1a* (there is a negative relationship between waiting and satisfaction) and *H1b* (there is a positive relationship between waiting and satisfaction), but did not confirm *H1c* (there is a positive first and then negative inverted U-shaped relationship between waiting and satisfaction). Moreover, the fact that the ΔF did not reach significance from Model D to Model E also meant the interaction between waiting time and moderating variables as well as the interaction between waiting time square and

	Model A		Model B		Model C		Model D		Model E		Model F	
	<i>b</i>	β	<i>b</i>	β	<i>b</i>	β	<i>b</i>	β	<i>b</i>	β	<i>b</i>	β
Constant	4.698***		5.142***		5.564***		3.671***		3.864***		3.696***	
First/ongoing consultation (1 = ongoing)	0.282	0.102	0.155	0.056	0.218	0.079	0.171	0.062	0.151	0.055	0.143	0.052
Age (1 = middle and prime aged)	0.054	0.023	0.015	0.007	0.006	0.003	0.006	0.003	-0.004	-0.022	-0.017	-0.007
Sex (1 = female)	0.309*	0.127*	0.288*	0.118*	0.216	0.088	0.188	0.077	0.187	0.077	0.206*	0.084*
Education (1 = high)	-0.165	-0.070	-0.227	-0.097	-0.213	-0.091	-0.152	-0.065	-0.145	-0.062	-0.149	-0.064
Level of hospital (1 = high)	-0.125	-0.049	-0.095	-0.037	-0.144	-0.056	-0.107	-0.042	-0.108	-0.042	-0.094	-0.037
Emergency/outpatient service (1 = emergency)	0.268	0.058	0.046	0.010	-0.089	-0.019	0.106	0.023	0.141	0.031	0.120	0.026
Waiting time			-0.006***	-0.278***	-0.022	-0.998	-0.021***	-0.949***	-0.024*	-1.091*	-0.018	-0.804
Waiting time square					7.045E-05***	0.786***	6.635E-05***	0.740***	6.696E-05***	0.747***	3.820E-05	0.426
Doctor reputation							0.180***	0.208***	0.215***	0.248***	0.188*	0.217*
Patient sociability							0.182***	0.131**	0.113	0.081	0.172	0.123
Waiting time × doctor reputation									-0.001	-0.188	0.000	0.120
Waiting time × patient sociability									0.001	0.321	-0.001	-0.279
Waiting time square × doctor reputation											-5.718E-06	-0.357
Waiting time square × patient sociability											1.226E-05	0.683
<i>F</i>	2.294*		5.944***		10.842***		12.130***		10.271***		8.860***	
ΔF	2.294*		26.758***		40.137***		13.849***		9.985		0.559	
<i>R</i> ²	0.040		0.113		0.221		0.273		0.277		0.280	
ΔR^2	0.040		0.073		0.097		0.062		0.004		0.003	

Notes: **p* < 0.05; ***p* < 0.01; ****p* < 0.001

Table IV. Results of hierarchical regression analysis (dependent variable: post-waiting satisfaction)

moderating variables were insignificant. Therefore, *H2* and *H3* (the moderating effects of doctor reputation and patient sociability) were not supported.

Considering merely the relationship between satisfaction and waiting time, the formula was “post-waiting satisfaction = 0.00007 waiting time square - 0.0221 waiting time + 5.6469” (i.e. the quadratic function in Table III), with the minimum satisfaction value of 3.90 at the turning point of waiting time = 157.86 min (about 2.6 h). The quadratic curve in Figure 2 showed that longer waiting time led to lower satisfaction, but the decline in satisfaction gradually slowed down. Satisfaction reached the minimum level when waiting time equaled 2.6 h, and then the relationship turned positive. The right side of the curve representing the positive segment was relatively flat, and observations on the right side were few.

Qualitative analysis

Analysis of open-ended questions in surveys. Although the correlation analysis showed that post-waiting satisfaction and post-consultation satisfaction were correlated, further qualitative analysis of the open-ended questions revealed the antecedents for the two differed greatly. Patients' answers about the reasons why they were satisfied or dissatisfied at the two time points were analyzed. For “post-waiting satisfaction,” a total of 31 respondents gave an answer, of which 20 indicated satisfaction/dissatisfaction due to waiting; as for “post-consultation satisfaction,” a total of 13 patients responded, but only 1 indicated it was related to waiting, while others indicated it was related to the service attitude of doctors or nursing staff. For example, one patient who had indicated low post-waiting satisfaction because of excessively long waiting turned out to have enhanced post-consultation satisfaction due to the doctor's clear explanation during the consultation (post-waiting = 3.4 and post-consultation = 4.2). Another respondent indicated remarkably increased satisfaction after consultation because the doctor had been very friendly and polite during the consultation (post-waiting = 3.8 and post-consultation = 7.0). It might be concluded that factors influencing post-waiting satisfaction were mostly related to waiting, whereas factors affecting post-consultation satisfaction were predominantly related to the attitude of medical staff.

The regression analysis found that on the right side of the waiting-satisfaction curve (Figure 2), there were a few observations showing extremely long waiting time leading to an extremely high level of satisfaction. However, since these respondents did not provide reasons why they had felt satisfied or dissatisfied, the direct cause of such phenomenon was unknown. Indirect investigation on these patients' characteristics and whom they interacted with during waiting revealed that they tended to be more sociable (sociability mean = 5.2, higher than the sample mean of 4.9), and had interacted with many service staff or volunteers during waiting. Thus, social interaction might be one of the causes leading to high post-waiting satisfaction, and social interaction might not necessarily occur in the early stage of waiting; it might occur in the later stage or at any point of time during waiting.

The analysis of whom respondents interacted with during waiting found that most patients interacted with their own companions, and some interacted with medical care staff or volunteers; only six respondents had interacted with other patients or their companions. Further analysis found that respondents who had interacted with others had higher levels of sociability, with a mean of 5.3 (higher than the sample mean of 4.9). 83 percent of them were female (68 percent of the entire sample) and 66.7 percent had lower education levels (38.3 percent of the entire sample). This illustrated that females with lower levels of education tended to socialize more during waiting.

Analysis of interviews. To further understand patients' experience and thoughts about how waiting associated with social interaction and service quality signal, and also to clarify the reason why the surveys failed to reveal a strong positive effect of waiting, a

convenient sample consisting of 20 respondents (10 females and 10 males, average age around 40) were interviewed in the aforementioned hospitals. These follow-up interviews aimed mainly at understanding whether and why respondents would interact with others when waiting, as well as whether and why long waiting time would be considered a signal of better healthcare quality.

As to the question if patients interact with others while waiting, results found 14 respondents expressed they would not chat with others when waiting, mainly because “a hospital is a place that requires quietness,” “they do not know each other,” “they are afraid of cross infection,” or “they do not want to disturb others since everyone is in a bad mood.” Another four respondents said they would not take the initiative to talk with others but would respond if others approach them first, because “responding to others represents common courtesy,” or “chatting may relieve tension.” The other two respondents said they would chat with others because “seeing the doctor makes them feel bad,” and “sharing their feeling with someone else may help them relax.” It could be seen that interacting with others when waiting might bring a positive effect of easing up emotions, but concerns about the social norms and cross infection made interacting with others difficult when waiting for medical consultation.

As to the question if waiting signals healthcare quality, ten respondents believed that doctors requiring longer waiting might pay more attention to patients or have better skills; six of them said they would wait longer for these reasons, while the other four said waiting made them dissatisfied even though they agreed it might mean better healthcare quality. The other ten respondents disagreed that doctors requiring longer waiting offered better healthcare quality; instead, they attributed it to doctors in large hospitals being generally slow in action (maybe due to the need to collect research data) or often kept by other matters (e.g. surgical operation). In sum, about half of the patients saw outpatient waiting as a signal of better healthcare quality, but most patients were still reluctant to wait despite this.

The follow-up interviews provided insights that shed light on something not readily revealed by the surveys. It revealed that waiting may indeed have positive effects on some patients through social interaction or signaling better service quality. It also pointed out the obstacles to these favorable effects, which may prompt managers of healthcare service to find ways to overcome these obstacles and thus help patients benefit from waiting.

Findings, discussion and conclusion

Findings and discussion

Post-waiting satisfaction vs post-consultation satisfaction. To clarify the impact of waiting on different types of healthcare satisfaction, this research compared post-waiting satisfaction with post-consultation satisfaction. First, the correlation analysis indicated that waiting time was more related to post-waiting satisfaction than to post-consultation satisfaction, meaning post-consultation satisfaction was more likely influenced by factors other than waiting. Furthermore, qualitative analysis revealed that factors affecting respondents' post-waiting satisfaction were related to waiting, while factors affecting post-consultation satisfaction were related mostly to the service attitude of healthcare staff. These findings corresponded to previous research, which found the most significant factors that affected overall satisfaction (i.e. post-consultation satisfaction) and perceived value of healthcare services were quality of interactions with doctors and medical staff (Anderson *et al.*, 2007; Anh and Thuy, 2017; Raposo *et al.*, 2009) and how much time doctors spent with their patients (Boudreaux and O'Hea, 2004).

Effects of quality signal and social interaction. This study hypothesized that outpatient waiting has positive impacts on satisfaction by signaling higher healthcare quality or providing more opportunities for social interaction. Although the regression analysis did

not confirm these hypotheses, qualitative analysis offered some support for it. It revealed that for some patients, waiting time could have a positive impact on satisfaction since there had been opportunities for social interaction. However, many refrained, citing social norms that implied that hospitals should be “a quiet place” where people “should not disturb each other” and that they were afraid they could get infected by other patients’ illnesses.

The qualitative analysis also found that respondents that exhibited higher levels of satisfaction under longer waiting were more sociable and interacted more with service staff and volunteers. Therefore, it might be inferred that social interaction may be one of the reasons leading to these respondents’ relatively high post-waiting satisfaction. This finding echoed previous research which demonstrated that interaction between service staff and patients improved patients’ participation, perceived value, and perceived quality of care (Becker and Douglass, 2008; Hau *et al.*, 2017).

In addition, it was found that the positive effects brought by social interaction may not necessarily emerge in the early stage of waiting; rather, it may occur at any point of time during waiting, even in the later stage. The fact that social interaction hardly appears in the early stage of waiting may be explained by the process of interpersonal interaction (Berger and Calabrese, 1975). Unacquainted people meeting each other in the waiting area of a hospital must take time to observe each other before engaging in trial chatting, and then they may generate meaningful conversations, which lead to the social support effect. The works of Jacobsen *et al.* (2019) and Kreijns *et al.* (2003) also supported that unacquainted people need time to start interacting with each other. If the waiting time was not long enough, the above mentioned “observation → trial → conversation → support” process would not be possible.

On the other hand, even if waiting did signal better healthcare quality, this positive effect would probably not be strong enough to appear in the regression analysis. A reason for this might be the outpatient scheduling systems that were introduced by most medical institutions (Cayirli and Veral, 2003; Kaandorp and Koole, 2007). These systems estimate consultation times for patients, and this would simply require patients to just show up a little before the estimated consultation time. Even for well-known doctors who had many patients, there was an expectation that patients should be given accurate estimates of consultation time. Therefore, waiting time that exceeds the estimated time is still unbearable.

Relationship between waiting and satisfaction. It has been hypothesized that healthcare waiting has positive first and then negative dual effects on satisfaction. This hypothesis was preliminarily supported in the correlation analysis; however, the regression analysis showed an upright U-shaped relationship instead. In the regression analysis, only a feeble positive relationship between healthcare waiting and satisfaction was exhibited. One possible reason for this could have been the impending unpleasant nature of healthcare service. Nowlis *et al.* (2004) pointed out that the generation of the positive effect of waiting depends on the product’s nature. Healthcare services are generally an unpleasant experience and waiting before consultations may generate unpleasant imagination regarding the upcoming consultations (Nowlis *et al.*, 2004). This could potentially increase the negative effects of waiting. Therefore, even though waiting does have positive effects on satisfaction, the unpleasant imagination induced by waiting, plus the negative impact of waiting being considered a waste of time, will add up to a cumulative negative effect far greater than the positive effect. Therefore, this might be the reason why the positive effect of waiting was not significantly shown.

Although the hypotheses were not adequately supported, this study contributes to healthcare waiting literature by offering a new viewpoint on the effect of healthcare waiting. The extant literature predominantly proposed a monotonic negative relationship between healthcare waiting and satisfaction, and so most studies discussed only the linear impact of

waiting on satisfaction (e.g. Anderson *et al.*, 2007; Dansky and Miles, 1997; Papanicolas *et al.*, 2013). However, this research refuted the monotonic negative linear relationship between waiting and satisfaction; instead, it found a quadratic relationship consisting of both negative and mildly positive effects. Besides, this research demonstrated a gradually slowing down decline rate in satisfaction in the negative segment, which was ignored in previous studies.

Two possible causes of these results were further discussed. First, the gradually moderating decline rate in satisfaction might mean that patients are growing numb with the dissatisfaction from waiting. That is, the negative effect of waiting on satisfaction has a “diminishing marginal effect” as suggested by the prospect theory (Kahneman and Tversky, 1979). In the prospect theory, gains or losses are formed relative to the expectation held by each individual (i.e. the reference point). When the result turns out to be better than the reference point, gain is formed, whereas loss is formed on the contrary. Currently, most medical institutions have introduced outpatient scheduling systems, and consultation times are automatically estimated (Cayirli and Veral, 2003; Kaandorp and Koole, 2007). Most patients arrive at the hospital and start waiting around the estimated time. Therefore, the estimated time becomes the patients’ “reference point.” When the actual consultation time turns out to be later than the estimated time, it causes loss and leads to dissatisfaction (one of the respondents in this study explicitly expressed that too great a difference between the estimated and the actual consultation time was the primary reason of low post-waiting satisfaction). Moreover, the psychological effects induced by both gains and losses are marginally diminishing (Kahneman and Tversky, 1979). Consequently, the waiting time has a gradually diminishing negative impact.

Second, this upright U-shaped relationship might actually be the summative result of the negative and positive effects of healthcare waiting. Primarily, waiting is deemed a waste of time, plus the imagination of unpleasant experience for the upcoming healthcare service induced by waiting (Nowlis *et al.*, 2004), causing a strong negative impact on satisfaction. Based on the extant literature, the longer the waiting time, the greater is this negative impact. Further, considering the diminishing marginal effect proposed by the prospect theory (Kahneman and Tversky, 1979), the overall negative effect of waiting can be expressed by the Curve A in Figure 3. On the other side, waiting may generate positive impact via social interaction. According to the formation process of interpersonal relationship (Berger and Calabrese, 1975), social interaction takes time to start (Jacobsen *et al.*, 2019; Krejns *et al.*, 2003) and so this effect emerges only after a certain period of waiting time. It is further proposed in

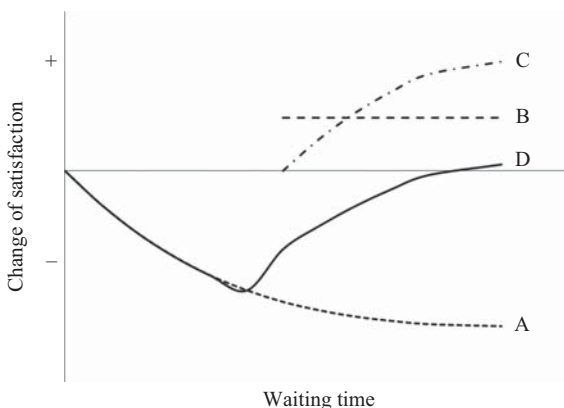


Figure 3.
Proposed dual effects
of waiting for
healthcare service

this study that once the waiting time elapses sufficiently to allow both parties to get ready, social interaction may appear at any point of time during the rest waiting process. Consequently, assuming an equal opportunity for social interaction to occur at each point of time after a period of warming up, it may be represented by a horizontal line (Curve B in Figure 3). Moreover, studies found consumers would infer the quality of a product from the queuing and waiting time or the level of crowding (Koo and Fishbach, 2010; Kremer and Debo, 2012; Mehta, 2013; Pan and Siemens, 2011). Therefore, it is proposed that there is a positive relationship between waiting and healthcare, but considering the similar diminishing marginal effect, this relationship should be represented by a curve slanting upward toward the right with gradually decreasing gradient. However, the cognition that “This is a good doctor with many patients, so I just have to wait” may not emerge in patients’ mind if the waiting time is not long enough. Thus, it is postulated that waiting may signal healthcare quality only after a certain period of waiting, and this effect may be represented by Curve C in Figure 3. By combining the effects of Curves A~C, a summative effect of waiting represented by Curve D is obtained, which is similar to the result of the regression analysis in this study. Therefore, the result of this study might be the manifestation of the summative dual effects of healthcare waiting. However, the positive and negative impacts and their causes were not separately measured in this study, and so the above mentioned arguments have yet to be verified by future research.

Effects of doctor reputation and patient sociability. The correlation analysis and regression analysis showed that post-waiting satisfaction was positively associated with variables such as doctor reputation, patient sociability and sex. It means satisfaction was higher when the doctor was more reputable, the patient was more sociable or was female. The result of qualitative analysis further showed that more sociable female patients with lower level of education were more likely to engage in social interaction. These findings are consistent with the results in the extant literature outside the healthcare area (e.g. Aiello *et al.*, 1983; Miller *et al.*, 1981; Miller and Nardini, 1977).

Nonetheless, the regression analysis found doctor reputation and patient sociability did not have significant moderating effects on the positive segment of the U-shaped curve. This may be due to the fact that most observations collected had scattered on the negative segment of the U-shaped curve and only a few appeared on the positive segment. Therefore, the statistical analysis might have failed to show significant moderating effects of doctor reputation and patient sociability because of the small sample size on the positive segment of the curve.

Theoretical and managerial implications

Theoretical contributions. Although the positive effect of healthcare waiting was not obvious in the regression analysis, the correlation analysis and qualitative analysis provided some support for it. With these findings, this study contributes to the literature on healthcare waiting by introducing the possibility that waiting has a positive effect on satisfaction and by identifying the relevant variables along with the underlying mechanism of how it works. This offers a broader viewpoint for future researchers to consider not only the negative but also the positive influences of waiting. Therefore, it aligns the waiting literature in healthcare service with the waiting literature in nonmedical services.

In addition, for studies attempting to investigate how waiting affects patient evaluations of healthcare service, the proposed “dual effect perspective” might provide insights into how data could be analyzed. The predominant paradigm adopted by extant research assumes a monotonic relationship between waiting time and patient evaluations; thus, most studies examined only the linear effect of waiting time through either correlation, regression, path analysis, structural question modeling or other statistical

analysis techniques (e.g. Anderson *et al.*, 2007; Becker and Douglass, 2008; Dansky and Miles, 1997; Papanicolas *et al.*, 2013). By introducing the dual effect perspective, this research suggests that quadratic or nonlinear effects of waiting time should be taken into account when analyzing the influences of waiting on patient evaluations.

Recommendations to healthcare management. This research could also be insightful for healthcare management. It demonstrated that healthcare waiting can have favorable influences on satisfaction. Therefore, shortening waiting time may not be the only target for waiting management; managers may consider adopting strategies to benefit from waiting.

As the results illustrated, healthcare waiting could have positive impacts by means of social interaction; however, obstacles such as patients regarding hospitals as places that require quietness and they should not disturb others could be factors that prevent social interaction. Observations at the waiting areas of hospitals showed that most hospitals are decorated in white, which exhibits a tranquil feeling. Besides, chairs are mostly arranged in closely packed rows facing the same side, similar to those in a bus station (Becker and Douglass, 2008). This arrangement of chairs increases stress and anxiety and is unfavorable for face-to-face interaction. Maslow and Mintz (1956) found that people tend to have more favorable impressions of others while in more attractive environments. Attractive and comfortable environments are expected to facilitate social interaction. Therefore, for healthcare institutions intending to increase social interaction and thus enhance the positive effects of healthcare waiting, changing the color tone, decoration and chair arrangement in the waiting areas may be the first step. The use of wood and natural colors and materials, home-like and noninstitutional cozy designs and domestic-inspired aesthetics or art may give feelings of warmth, familiarity, and a message that patients are valued more than technology (Becker and Douglass, 2008; Schweitzer *et al.*, 2004); hence patients may be encouraged to interact with each other while waiting.

On the other hand, the results of the interviews showed that for some patients, waiting might signal healthcare quality and hence exert positive effects. But patients generally expect accurate estimates of consultation time even for reputable doctors in spite of the possible positive effects, because outpatient scheduling systems have become very popular nowadays. Observations of the actual operation of the outpatient scheduling systems revealed that most systems failed to take doctors' individual differences (such as examination times) into consideration when estimating consultation times. It means that patients with the same appointment number will have similar estimated consultation times even if they make appointments with different doctors. Thus, for doctors making less speedy examinations, patients' waiting time usually exceeds expectation, leading more likely to dissatisfaction. According to the expectancy disconfirmation theory (Oliver, 1980), reducing the deviation of perceived waiting time from expected waiting time is crucial to customers' satisfaction (Au and Tse, 2019; Thompson and Yarnold, 1995). Therefore, medical care institutions are advised to take into account individual doctors' average examination time when designing outpatient scheduling systems.

Limitations and future research

The limitations of this study mainly concern the nature of sample hospitals and patients. First, this study collected data from outpatients and their companions in waiting areas of three large hospitals in Taiwan; thus the research results should be interpreted with cautions when applied to other types of healthcare institutions or hospitals in other nations. Second, although stratified quota sampling by medical departments and consultation times was made in this research to cover a variety of waiting experiences, the numbers of respondents in certain departments (e.g. pediatrics) were small because of difficulties in collecting responses (e.g. sick little children were often restless or crying while waiting, and

so most parents were unwilling to take the surveys). Therefore, the research results may not sufficiently represent the waiting experiences at these departments. Future research may examine the dual effects of waiting in more diverse medical departments, nations or types of medical institutions.

This study found that factors affecting post-waiting satisfaction were mostly related to waiting, while factors affecting post-consultation satisfaction were mostly related to the service attitude of healthcare staff. For future studies on the effects of healthcare waiting, it is suggested that post-waiting satisfaction should be a more appropriate dependent variable; for studies probing into the impacts of service quality, post-consultation satisfaction should be a more appropriate dependent variable.

It was also found in this research that waiting and healthcare service satisfaction have an upright U-shaped relationship with a flatter right arm. This result might simply reflect the diminishing marginal negative effect of waiting; but it might also represent the summative dual effects of waiting exerted through a few different ways (as illustrated in Figure 3). To further clarify the underlying mechanisms, it is recommended that future research might keep track of the positive and negative responses of individual patients at each time point during the whole waiting process by using feasible methods of measurement (e.g. apparatuses testing signals of physiological responses) and record the reasons why such responses emerge.

Finally, this research suggests that healthcare managers could encourage patients' social interaction by improving the physical surroundings and seating arrangements in the waiting areas. Future studies might also compare different designs or layouts of waiting areas to see how they affect social interaction during the waiting process and hence healthcare service satisfaction.

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