

Customer Perceptions of Health Examination Service Quality: An Empirical Investigation in South Korea

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Abstract—With an increasing trend of extended life expectancy and consequential aging society, the demand for health examination is ever heightened. The purpose of this study is to identify the dimensions of health examination service quality and their influence on customer satisfaction and behavioral intention. We utilized a modified SERVPERF model, in which service quality consists of six factors of tangibles, reliability, responsiveness, assurance, empathy, and privacy. Using the structural equation model analysis, we found that six factors of SERVPERF are consolidated into five. Privacy loses its significance, responsiveness and assurance stay valid, and tangibles factor is split into two. Overall, reliability, empathy, and tangibles 1 are found to be the relatively influential to consumer satisfaction.

Index Terms—Health examination, health screening, service quality, servperf.

I. INTRODUCTION

Health examination service, also referred as health screening, is a multi-phase postural examination that includes chest X-ray examination, blood test, urine test, dental screening and Cancer Screening. It is an outpatient service and has a distinct feature that it provides examination without medical treatment. Reference [1] defined periodic health examination as "a group of tasks designed either to determine the risk of subsequent disease or to identify disease in its early symptomless state".

The importance of periodic health examination had been stressed for more than a century. In 1861, Dr. Horace Dobell, a physician in England, proposed; "There should be instituted, as a custom, a system of periodical examination, to which all persons should submit themselves, and to which they should submit their children" [2]. In 1900, Dr. Gould, an ophthalmologist, also mentioned that "a series of systematized periodic examinations of patients apparently well would often reveal beginning diseases, prevent future illnesses, and increase the vital values of life, everyone can prevail upon certain patients, students, or members of his family, to undergo the necessary tests" [3].

During 1920s, although the National Health Council and the American Medical Association declared in favor of the periodic health examinations for healthy persons, the efficiency and the efficacy of the health examination had been actively debated by professionals until 1970s. After clinical evidences and the promotion of Canadian Task Force

and U.S. Preventive Services Task Force, the health examination began to be actively supported by the insurance companies, governments, and each individual [4].

In recent years, extended life expectancy results in aging society, as illustrated in Fig. 1 and Fig. 2, which heightens the necessity of the periodic health examination. Consequently, healthcare cost represents the only expenditure item that increases steadily with age as shown in Fig. 3. The healthcare expenditure represents 9.2% of the world GDP, 17.4% of the US GDP, and 11.4% of Switzerland GDP with a compound annual growth rate of about 4% in 2000 [5]. In developed countries, the expenditure on cancer and chronic diseases such as hypertension, diabetes, dyslipidemia, and cerebrovascular constitutes a large portion of the total health expenditure [6]. Therefore, an early detection of these diseases saves medical costs and enhances national health level.

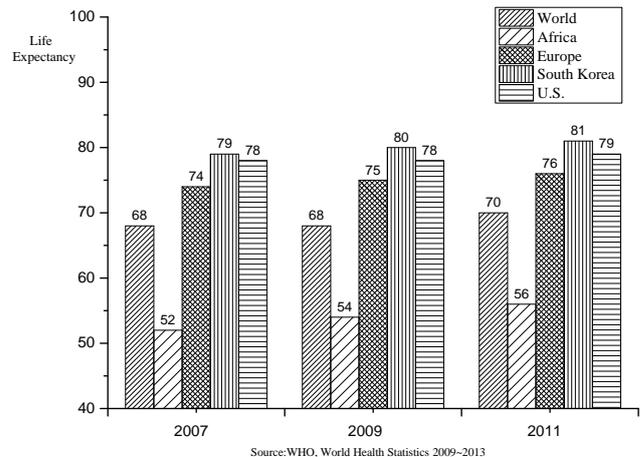


Fig. 1. Trend of global life expectancy.

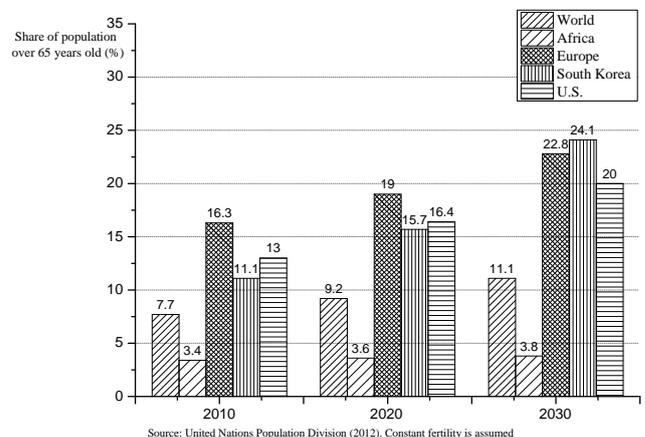


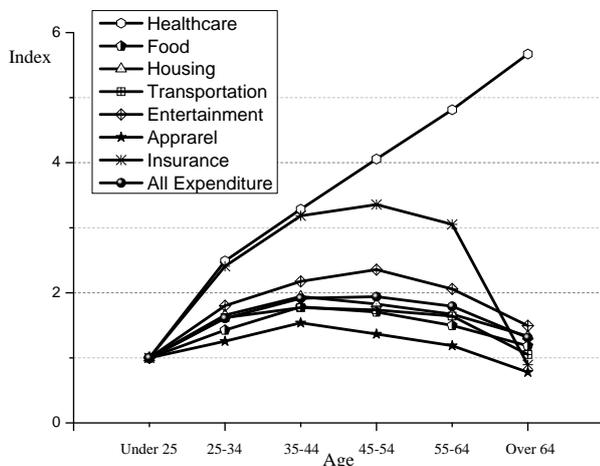
Fig. 2. Proportion of population over 65 years old.

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Global expenditure on health is estimated to be 6.98

trillion USD [7]. However, due to the fact that the expenditure on health examinations is not reported clearly, the global market size of health examination is not attainable. Nevertheless, a few countries provide health examination service through national health screening programs and issue the national report. For instance, the United States runs a program supporting health examinations for age under 21 or over 65 by Medicaid and Medicare. As a result, consumers of other age groups pay their examination fees on their own or through a third party which makes it difficult to estimate the total volume of health examination service. In contrast, the market sizes of the UK and South Korea are attainable. The market size of the UK is 21,496,050 GBP (USD 34,737,657) and that of South Korea is 813,308,256,000 KRW (USD 765,106,543) in 2011 [8], [9]. The national health screening program of South Korea covered about 20% of population, or eleven million customers during 2011.



Source: U.S. Department of Labor Bureau of Labor Statistics (2011). Expenditure data have been normalized to set expenditure of "under 25" as 1.0

Fig. 3. Health care and other expenditures with age increase

Korea is one of the fastest aging countries in the world. The Korea Institute for Health and Social Affairs recently estimated that average life expectancy will be 87.4 years by 2050. Moreover, Korean Statistical Information Service reported that the ratio between the age group over 65 and under 15 has risen from 20% in 1990 to 83.3% in 2013. Table I indicates that the expenditure and the number of examinees of Korean health examination service have increased constantly. It also implies that health screening clinics and centers are more in competition as shown in the growth rate of clinics and centers outweighs the examinee numbers and market.

TABLE I: STATISTICS OF HEALTH EXAMINATION IN KOREA

		2008	2009	2010	2011
Number of Examinee	First	15,124,755	15,036,607	15,917,939	15,249,528
	Target	9,878,548	9,927,538	10,851,277	11,070,569
	Second	3,893,203	1,558,511	1,130,883	1,112,233
	Target	1,847,391	580,053	439,339	395,053
Cost	Unit: 1,000 KRW	603,982,213	712,078,638	813,308,256	897,766,623
Centers		5,921	6,384	7,514	8,103

Source: National Health Screening Statistical Yearbook (2011), National Health Insurance Service, Korea

In the face of this competition in Korean healthcare

industry, each healthcare institute focuses more on consumer-oriented strategy by considering the benefit and utility for consumers [10]. In addition to fundamental benefits for consumers, personal experience and peer recommendations matter the most in the healthcare industry compared to other industries such as hotels, retails, and airlines [11]. Therefore, implementing the right strategy to satisfy consumers is pivotal in healthcare industries. Improving consumer satisfaction is mostly related to enhancing service quality perceived by consumers and the first step to enhance service quality is the identification of the determinants of service quality [12].

However, consumer satisfaction and quality dimensions of health examination service have not been actively researched. Existing researches on health examination takes the perspective of public health or medical science. Representative topics include effectiveness of health examination in the local community [13], [14] and the factors affecting examination rate [18]. Although there are some researches on service quality or consumer satisfaction of health examination, they are either exploratory [15], [16] or incomplete [17], [18] due to the ignorance of reliability and validity factors. Since different service areas of hospitals are considered separately [19], specific research efforts on the health examination service quality is needed.

II. LITERATURE REVIEW

Historically, the definition of healthcare quality is mostly based on the resulting condition of health. This quality has been defined as “the ability to achieve desirable objectives using legitimate means” and the desirable objective means “an achievable state of health” [20]. Institute of Medicine defines it as “the extent to which health services provided to individuals and patient populations improve desired health outcomes”. The Joint Commission on Accreditation of Healthcare Organizations defines it as “the degree to which patient care services increase the probability of desired outcomes and reduce the probability of undesired outcomes given the current state of knowledge” [21]. In sum, healthcare quality has been defined in terms of technical delivery of care by physician’s viewpoint. However, recent literatures on healthcare quality question the validity of using the technical quality and instead, emphasize the importance of the patient’s perceived quality and satisfaction [22], [23].

Service quality consists of technical quality and functional quality. The former involves what the customer is actually receiving from the service and the latter involves the manner in which the service is delivered [24]. In healthcare service, functional quality is gaining more importance than technical quality [25], [26]. This is due to the fact that consumers can evaluate subjective quality more easily than technical quality. In general, most patients do not know whether the service was performed properly or even necessary [23], [27]. Healthcare service is also characterized by significant time lag between provider’s provision of service and patient’s perception of technical quality [23]. Hence, functional quality is usually the primary determinant of patients’ quality perceptions. With these considerations, the focus of the health service quality shifts from professionals’ view of

technical quality to consumers' view of subjective quality [28].

SERVQUAL methodology has become primary tool for measuring "functional service quality" in service industries including health care services [22], [29]-[31]. SERVQUAL is based on the expectancy disconfirmation model [32], which states that evaluation of service quality by comparing the gap between prior expectations of what the service should provide and perception of service received [33]-[35]. SERVQUAL has been extensively employed in healthcare service research including acute care [36], physicians' service [37], nursing service [38], [39], cancer center [22], and maternity hospitals [40] in numerous countries as shown in Table II. Many literatures have pointed out the need for measuring quality expectations in SERVQUAL. SERVQUAL measures the expectation of consumers after the service. Hence, the expectation may be biased by the memory of actual services received [41]. In this regard, using SERVQUAL to measure prior expectation and perception can lead to inaccuracy [29], [42], [43]. Additionally, in the context of the healthcare service, many patients are not sure about what to expect from the healthcare service [44].

TABLE II: RESEARCH OF HEALTHCARE SERVICE QUALITY (T: TANGIBLES, R: RELIABILITY, R: RESPONSIVENESS, A: ASSURANCE, E: EMPATHY)

Research	Service Context	Perceived by	Dimensions				
			T	R	R	A	E
Jun and Zsidisin (1998)	US hospitals	Patients, physicians, administrators	○	○	○		
O'Connor (2000)	US hospitals	Physicians, administrators, employees	○	○	○	○	○
Lee et al. (2000)	US hospitals	Physicians	○	○	○	○	○
Reidenbach and Sandifer-Smallwood (1990)	US hospitals (emergency rooms)	Patients					
Carman(1990)	US dental clinics	Patients	○	○			
Babakus and Mangold (1999)	US hospitals, Hong Kong's hospitals	Patients					
Dean (1999)	Australia, medical/health care	Patients	○	●	●	○	○
Anderson and Zwelling (1996), Chaniotakis and Lymperopoulos(2009)	US Cancer center, Greek maternity hospitals, respectively	Patients	○	○	○	○	○
Moon et al. (1998), Han et al. (2007), Kim et al. (2011)	Korean public health center or hospitals	Patients	○	○	○	○	○
Lim and Tang (2000)	Singapore, general and special clinics	Patients	○	○	○	○	○
Andaleeb (2001)	Bangladesh hospitals	Patients			○	○	
Ramsaran-Fowdar(2008)	Mauritian hospitals, General Physicians	Patients	○	○	○	●	●
Choe et al. (2012)	Korean hospitals	Patients	○				○
Choi et al. (2004)	Korean hospitals	Outpatients	○				
Pakdil and Harwood (2005)	US, Anesthesia service	Inpatients					
Kara et al. (2005)	Turkish hospitals	Inpatients	○	○	○	○	○
Kim and Park (2006)	Korean hospitals	Inpatients	○	○	●	○	●
Zineldin (2006)	Egyptian and Jordanian hospitals	Inpatients					

two ● dimensions converged to a single dimension

* Indicates the factors from PZB (1985), bold indicates factor added by author

Ref. [42] Investigated conceptualization and measurement of service quality and the relationships among service quality, consumer satisfaction and purchase intentions. They strongly advised that performance determines service quality in lieu of the gap between performance and expectation. SERVPERF, an alternative methodology to SERVQUAL, appears to have a good fit and more construct-valid explication of service quality [42], [45]. SERVPERF is also actively employed in the context of healthcare services [45]-[47].

In terms of technical quality, healthcare service quality

consists of dimensions such as efficacy, effectiveness, efficiency, legitimacy, optimality, acceptability, and equity [48]. Similarly, WHO suggested dimensions such as effectiveness, efficiency, accessibility, acceptable/patient centered, equitable, and safety. In contrast, many recent literatures focus on functional quality measured by SERVQUAL, SERVPERF, or their variants. SERVQUAL introduces five dimensions of tangibles, reliability, responsiveness, assurance, and empathy [34], which is also shared by SERVPERF. The description of each of these five dimensions is shown in the following [33]. The relevant researches on quality dimensions of healthcare service are shown in Table II.

The different functions or service areas within hospitals should be considered and measured separately [19], [36], [46]. In that respect, researches regarding health examination service and its quality dimensions are necessary [49]. However, many of current researches are either exploratory or flawed in some ways. In Table III, some researchers introduce dimensions without focus group interview or corresponding literature study [50] and others have problems in terms of reliability and validity investigation [17], [18].

TABLE III: RESEARCH ON HEALTH EXAMINATION SERVICE QUALITY

Author	Dimensions	Remark
Kim and Ryu (2001)	Examination, Excellent facilities, Expenses	reliability and validity were not investigated
Lee and Jung (2006)	User environment, Process, Result consultation	reliability and validity were not investigated
NHIC (2007)	Communication, Attitude, Privacy, Environment, Exam result	reliability and validity did not met the academic standard
Cha (2011)	Tangibles, Reliability, Responsiveness, Assurance, Empathy	reliability and validity were not investigated

Privacy or confidentiality during transactions emerged as a critical attribute during the focus group interview in the context of banking and securities brokerage services, belonging to the security dimension [33]. In healthcare service, patients' perception of privacy attribute strongly affects satisfaction [51]. The importance of privacy attribute has been pointed out in various contexts such as primary care [52], and emergency room [51], [53]. Privacy also appears as a tangibles factor in other healthcare literature [36], [54], [55].

In health examination service research, privacy sometimes is considered as a dimension or an item belonging to other dimensions. For instance, [17] concedes that privacy dimension consists of two items of disclosure of body during examination process and respect of privacy. [18] maintains that two privacy items in health examination belongs to different dimensions, respectively. The item of privacy respect belongs to tangibles and the respect of secret belongs to assurance. However, the former research is seriously unsatisfying in terms of the academic standard of reliability and validity and the latter one is implemented without investigation of reliability and validity. Therefore, further research on the privacy dimensions or items is required.

We assume health examination service consists of six quality dimensions from previous literature study, adding privacy dimension to five dimensions of SERVQUAL/SERVPERF. We hypothesize that each dimension has positive effect on consumer satisfaction.

H1: Tangibles has a positive effect on the satisfaction level

of the health examination service.

H2: Reliability has a positive effect on the satisfaction level of the health examination service.

H3: Responsiveness has a positive effect on the satisfaction level of the health examination service.

H4: Assurance has a positive effect on the satisfaction level of the health examination service.

H5: Empathy has a positive effect on the satisfaction level of the health examination service.

H6: Privacy has a positive effect on the satisfaction level of the health examination service.

Ref. [32] defined consumer satisfaction as “the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer’s prior feelings about the consumption experience.” Patient satisfaction, the consumer satisfaction in healthcare context, is an indicator of quality of health care from the patient’s perspective [56]. As a valid indicator of healthcare outcome, high patient satisfaction should result in revisiting [23], [57] and recommending to others [19], [23]. In that respect, impact on these behavioral intentions has been actively researched in health care industries [19], [23], [57].

H7: Patient satisfaction affects behavior intentions positively (revisit and recommend).

III. RESEARCH DESIGN AND METHODOLOGY

H1: Tangibles has a positive effect on satisfaction of using health examination.

H2: Reliability has a positive effect on satisfaction of using health examination.

H3: Responsiveness has a positive effect on satisfaction of using health examination.

H4: Assurance has a positive effect on satisfaction of using health examination.

H5: Empathy has a positive effect on satisfaction of using health examination.

H6: Privacy has a positive effect on satisfaction of using health examination.

H7: Patient satisfaction positively affects behavior intentions.

We use structural equation model (SEM) for identifying the hypothesis. The use of SEMs is more precise in specification of hypotheses and provides construct validity in broader and deeper ways than traditional analyses [58].

Since an appropriate adaptation of the instrument is desirable for investigating a specific service [34], [36], we have tried to reflect specific consideration of the health examination service environment. Our questionnaire is based on SERVQUAL [34] and other researches in the domain of healthcare service. We have incorporated results from pilot studies and consulting by professionals in family medicine and business into the compilation of suitable measurement items for the survey. As a result, we extracted 32 items from literature study and made adjustment for the health examination service context. We utilized results of [29], [36], and [55] as major references. Since the health examination service provider of our choice offers service with no charge, items regarding cost ([22], [29], [36], [54], [59]) have been removed. Also, since consumers of health examination

service are treated as outpatients, the items pertinent to inpatients have been excluded. These include discharge process [19], [36] and meal ([19], [36], [55]). The finalized items and their references are depicted in Table V (See Fig. 4).

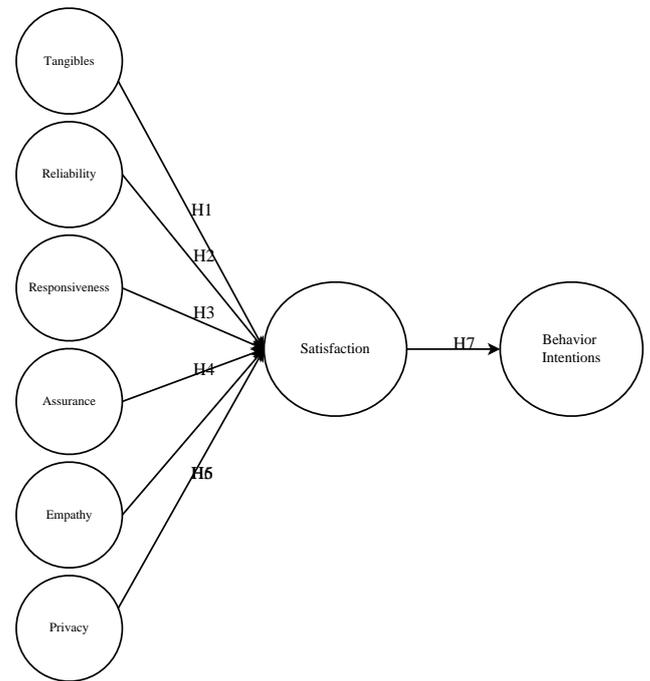


Fig. 4. Main model.

TABLE IV: ITEMS AND DIMENSIONS

	TAN1	TAN2	TAN3	TAN4	TAN5	TAN6	TAN7	REL1	REL2	REL3	REL4	REL5	REL6	REL7	PRV1	PRV2	PRV3	PRV4
Parasuraman et al., 1988																		
Carman, 1990																		TAN
Reidenbach and Sandifer-Smallwood, 1990																		
Babakus and Mangold, 1992																		
McAlexander, 1994																		
Anderson and Zwilling, 1996																		
Lam, 1997																		
Burden, 1998																		
Dean, 1999																		
Lee et al., 2000											RES							ASU
Lim and Tang, 2000																		TAN
Olsen and Sabin, 2003																		
Deshfey-Longhi et al., 2004																		
Karro et al., 2005																		
Kara et al., 2005																		TAN
Kim and Park, 2006																		
Han et al., 2007																		
Chaniotakis and Lympereopoulos, 2009																		
Lin and Lin, 2011																		
Choi et al., 2012																		
Lee et al., 2007**																		
Cha, 2011**																		ASU TAN

TABLE V: ITEMS AND DIMENSIONS – CONT'D

	RES1	RES2	RES3	RES4	RES5	RES6	ASU1	ASU2	ASU3	ASU4	ASU5	EMP1	EMP2	EMP3	EMP4
Parasuraman et al., 1988															
Carman, 1990												RES			
Reidenbach and Sandifer-Smallwood, 1990															
Babakus and Mangold, 1992															
McAlexander, 1994															
Anderson and Zwilling, 1996															
Lam, 1997															
Dean, 1999															
Lee et al., 2000										RES					RES
Lim and Tang, 2000															
Kara et al., 2005											RES				
Kim and Park, 2006							ASU			EMP					
Han et al., 2007															
Chaniotakis and Lympereopoulos, 2009															
Cha, 2011**											EMP				
Choi et al., 2012										EMP	TAN	EMP			

*O indicates measurement item in corresponding dimension. Otherwise dimensions is described.

**REL6 appears in Parasuraman et al. (1985)

**Health examination service

Review of measurement items was based on the pre-test and responses from professionals. Pre-test of an instrument is an integral part of the survey construction [60], which gives feedbacks to the researcher and introduces potential

problems with the survey [61]. For this reason, pre-test is actively used in quality studies of healthcare service ([22], [29], [40]). The survey questionnaires were distributed to five outpatients, who had recently experienced health examination service for invaluable feedback. Some survey items were changed or removed as participants found them confusing or impossible to answer. For instance, ASU4 was deleted since consumers may not contact doctors to ask questions. EMP6 also was removed because some respondents claimed that answering both EMP1 and EMP6 are redundant.

TABLE VI: DEMOGRAPHICS (N=136)

	Freequency	Percent (%)
Gender (3 missings)		
Male	65	48.9
Female	68	51.1
Age (4 missings)		
Under 30	28	21.2
30-39	40	30.3
40-49	37	28.0
50-59	23	17.4
Over 59	4	3.0
Marriage (3 missings)		
Yes	93	30.1
No	40	69.9
Education (3 missings)		
Middle school	1	0.8
High school	31	23.3
Bachelor's Degree	93	69.9
Graduate Degree	8	6.0
Physical Cor(3 missings)		
Bad	1	0.8
Average	58	43.6
Good	73	54.9
Other	1	0.8
Chronic Dis(3 missings)		
Yes	8	6.0
No	125	94.0
Knowledge (3 missings)		
Bad	19	14.3
Average	101	75.9
Good	13	9.8
Experience (3 missings)		
Yes	60	45.1
No	73	54.9
Place (3 missings)		
A	85	63.9
B	48	36.1

After the pre-test, we collected feedbacks from two professionals in family medicine and one in business administration. PRV4 was deleted since the response will not be achievable. We collected the survey right after the consumers received the service but collecting responses for PRV4 took additional 10 days and further contact was impossible due to the privacy act. REL6 was changed slightly due to confusion. Lastly, two instruments of behavior intentions and survey design of color were changed for easier identification.

Contrary to seven-point Likert scale, we employed

five-point Likert scale, (1 = strongly disagree, 5=strongly agree), since seven-point Likert scale can be confusing under certain circumstances ([29]). In addition, negatively worded items were not used because of response quality problem ([29], [36]).

The data for the study were obtained from a paper-based survey questionnaire. The survey had been collected for two weeks from two healthcare centers in Seoul. 201 consumers were asked to complete the survey and the response rate was 62.4% to result in the total of 136 valid responses that were free of missing items or skewed responses. There was no significant pattern or trend regarding missing items.

IV. DATA ANALYSIS, INTERPRETATION AND RESULTS

Demographic statistics are displayed in Table V. Physical condition is a subjective condition that the patient feels. Knowledge indicates the self evaluation of one's knowledge of health. Experience means whether consumer has experience of health examination service at the same healthcare center. Place A or B indicates the specific location of the health care center. Table VI indicates that the sample mainly consists of consumers with high level of academic degrees.

TABLE VII: EXPLORATORY FACTOR ANALYSIS

Items in each dimension	Factor Loadings					Reliability Index	
	Tangibles 1	Tangibles 2	Reliability	Responsive Assurance	Empathy	Item-to-total correlation	Cronbach's α
Tangibles 1							0.818
TAN1	0.846					0.692	
TAN2	0.828					0.692	
Tangibles 2							0.803
TAN3		0.573		0.496		0.614	
TAN4		0.812				0.650	
TAN5		0.718		0.417		0.723	
Reliability							0.834
REL2			0.707	0.362	0.338	0.735	
REL3			0.657		0.368	0.663	
REL6			0.535	0.422		0.698	
Res./Assu.							0.961
RES2		0.308	0.358	0.673		0.857	
RES3				0.804	0.364	0.875	
RES4				0.802	0.341	0.899	
RES5				0.735		0.811	
ASU1			0.383	0.676	0.370	0.894	
ASU2		0.348	0.461	0.600	0.316	0.864	
ASU3				0.744		0.835	
Empathy							0.926
EMP1				0.345	0.760	0.826	
EMP2			0.310		0.794	0.840	
EMP3					0.851	0.903	
EMP4					0.799	0.760	
PRV2				0.449	0.719	0.740	

80 percent of variance explained

The factor analysis, which is useful in establishing reliability and validity in empirical research methods [60], was utilized to investigate reliability and validity. For purification process, we followed the sequence of [34] and [23]. The exploratory factor analysis was carried with principal component analysis and Varimax rotation. During the process, the instruments and factors were rearranged. First, we found out that tangibles factor was divided into two. One factor consists of TAN1 and TAN2 and the other does TAN3, TAN4, and TAN5. Responsiveness and assurance

emerged as one dimension and privacy items are absorbed into empathy. Items TAN7, ASU4, and PRV1 were deleted by step 1. Then, TAN6, REL1, REL5, REAL7, RES1, RES6, EMP5, and PRV3 were deleted by step 4. Deleted items are poorly correlated or associated with more than a single factor considerably.

TABLE VIII: CONFIRMATORY FACTOR ANALYSIS

Items in dimension	Loadings	AVE*>.5	AVE**>.5	CR >.6
Tangibles 1		0.824	0.695	0.903
TAN1	up-to-date equipment	0.797		
TAN2	facilities visually appealing	0.869		
Tangibles 2		0.797	0.922	0.600
TAN3	employees well dressed and neat	0.764		
TAN4	convenient and comfortable facilities	0.736		
TAN5	clean and comfortable environment	0.821		
Reliability		0.800	0.633	0.923
REL2	sympathetic and reassuring	0.814		
REL3	dependable center	0.749		
REL6	performs right at the first time	0.822		
Res./Assu.		0.902	0.780	0.985
RES2	prompt service from employees	0.852		
RES3	willing to help customers	0.894		
RES4	respond customer requests promptly	0.914		
RES5	proper waiting time	0.828		
ASU1	can trust employees	0.911		
ASU2	feel safe in your interaction	0.894		
ASU3	polite employees	0.886		
Empathy		0.809	0.733	0.955
EMP1	gives individual attention	0.854		
EMP2	know what your needs are	0.903		
EMP3	has your best interests at heart	0.944		
EMP4	convenient operating hours	0.797		
PRV2	keep customer's secret	0.771		

*Fornell and Larcker (1981), **Hair *et al.* (2006).

TABLE IX: DISCRIMINANT VALIDITY

Correlations	AVE*	AVE**	ϕ	ϕ^2	Validity
Tangibles1 ↔ Tangibles2	0.824, 0.797	0.695, 0.922	0.678	0.460	○
Tangibles1 ↔ Reliability	0.824, 0.800	0.695, 0.633	0.623	0.388	○
Tangibles1 ↔ Responsiveness/Assurance	0.824, 0.902	0.695, 0.780	0.618	0.382	○
Tangibles1 ↔ Empathy	0.824, 0.809	0.695, 0.733	0.493	0.243	○
Tangibles2 ↔ Reliability	0.797, 0.800	0.922, 0.633	0.776	0.602	○
Tangibles2 ↔ Responsiveness/Assurance	0.797, 0.902	0.922, 0.780	0.856	0.733	○
Tangibles2 ↔ Empathy	0.797, 0.809	0.922, 0.733	0.599	0.359	○
Reliability ↔ Responsiveness/Assurance	0.800, 0.902	0.633, 0.780	0.874	0.764	△
Reliability ↔ Empathy	0.800, 0.809	0.633, 0.733	0.774	0.599	○
Responsiveness/Assurance ↔ Empathy	0.902, 0.809	0.780, 0.733	0.751	0.564	○

*Fornell and Larcker (1981), **Hair *et al.* (2006).

Individual item reliability, the composite reliability for latent variables, and the average variance extracted (AVE) were analyzed. The reliability test result satisfies as it meet the each standard of item-to-total correlations (AVE >0.3) [62], Cronbach's alpha ($\alpha >0.7$), Average Variance Extracted (AVE>0.5), and Composite Reliability (CR>0.6) [58] as reported in Table VII and Table VIII.

Several types of validity such as construct validity, convergent validity and discriminant validity can serve as criteria for assessing scale [35]. To assess the validity of the measures, factor analysis results were employed. Although the exploratory factor analysis indicates that TAN3 (0.573) and REL6 (0.535) have somewhat low factor loadings, the confirmatory analysis supports all the items satisfy the

critical level of .7. In practice, factor loadings as low as .50 still can satisfy the overall SEM model, thus researcher should focus on hypotheses and goodness-of-fit [58]. The value of AVE, 0.633~0.922, and the one of CR, 0.600~0.955, in Table VIX imply that this model has convergent validity. Lastly, discriminant validity was also confirmed. Table X shows that the correlation between one scale and another is not as high as each scale's coefficient by comparing AVE and ϕ^2 .

Modified measurement model is followed by the previous analysis and finally has five dimensions of tangibles 1, tangibles 2, reliability, responsiveness/assurance, and empathy. The overall fit of measurement model and main model are good as shown in Table X. Although χ^2 test of each model is significant, the sensitivity of χ^2 test has potential problems in sample size. As the sample size increases, the chances of rejecting a model also increase [63].

TABLE X: GOODNESS-OF-FIT INDICES

	χ^2	DF	χ^2/DF	RMSEA	IFI	TLI	CFI
Measurement M	323.769	160	2.024	0.074	0.936	0.923	0.935
Main Model	618.583	446	1.387	0.054	0.941	0.928	0.94

*DF stands for degree of freedom

H1-1. Tangibles 1 has a positive effect on the satisfaction level of the health examination service.

Accepted ($P=0.017$)

H1-2. Tangibles 2 has a positive effect on the satisfaction level of the health examination service.

Rejected

H2. Reliability has a positive effect on the satisfaction level of the health examination service.

Accepted ($P<0.001$)

H3/H4. Responsiveness/assurance has a positive effect on the satisfaction level of the health examination service.

Rejected

H5. Empathy has a positive effect on the satisfaction level of the health examination service.

Accepted ($P<0.001$)

H6. Privacy has a positive effect on the satisfaction level of the health examination service.

Not available

H7: Satisfaction level positively affects behavior intention.

Accepted ($P<0.001$)

The noticeable result is that the tangibles dimension is divided into two dimensions. This result coincides with previous research of Parasuraman *et al.*, [35]. They found that the four items under tangibles consistently break into two factors, with Q1 and Q2 (equipment and physical facilities) forming one factor, and Q3 and Q4 (employees and communication materials) forming another factor. We have similar results that TAN1 and TAN2 (equipment and physical facilities) comprise Tangibles 1 and TAN3, TAN4, and TAN5 (employees and communication materials) comprise Tangibles 2. In addition, only tangibles 1 related to equipment and physical facilities were found to be significant factor in influencing consumer satisfaction in health examination service.

Another result is that responsiveness and assurance dimensions P converged as one dimension. The exploratory

factor analysis shows considerable overlap between two factors and the confirmatory factor analysis supports that treating these two dimensions as one satisfies the reliability and the validity. As Parasuraman *et al.*, [35] indicated, assurance of willing to assist customers can be related to the perception of responsiveness. Other healthcare service researches using SERVQUAL or its variant also report considerably high correlations between reliability and responsiveness [64], assurance and empathy [65], and responsiveness and empathy [66] as shown in Table II. Our study introduces another context of convergence between two factors in which responsiveness and assurance show significant correlationm (See Fig. 5).

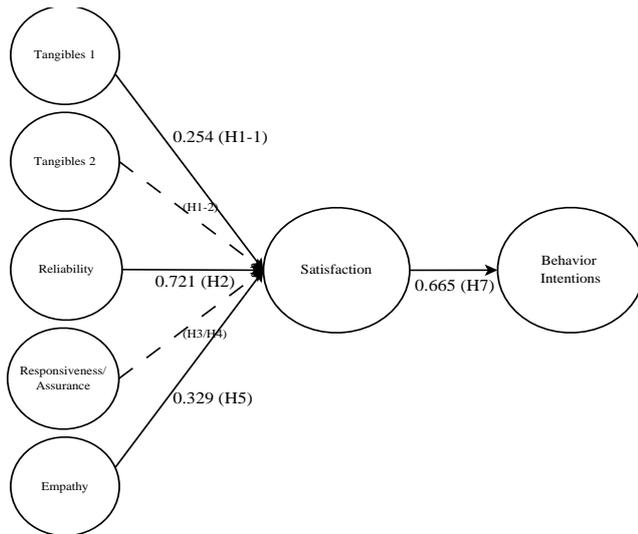


Fig. 5. Main model (modified).

In search of new dimension pertaining to the specific service category of healthcare examination ([36], [49]), we introduces privacy as the sixth dimension with four measurement items. However, PRV4 was deleted from the feedback of professionals, PRV1 was rejected due to lack of contribution to improving the total-item-correlation, and PRV3 was trimmed due to the high cross-loadings with other dimensions of responsiveness/assurance (0.533) and empathy (0.603). As a result, a single item, PRV2, cannot construct the dimension. This cast doubt on the research of NHIC ([17]), in which it was conceded that privacy in health examination service emerges as an important one from the focus group interview. However, due to unsatisfactory reliability and the validity results, we claim that privacy may not construct a dimension in health examinations service.

The relative importance of each dimension on customer satisfaction in health examination service is readily observable. Though responsiveness/assurance and tangibles 2 are not significant, reliability (0.721), empathy (0.329), and tangibles 1(0.254) are found to be significant. This result implies that reliability is the most important dimension, followed by empathy and tangibles 1. Also, the impact of satisfaction on revisit (0.610) turns out to be slightly more significant than that on recommendation (0.541).

V. CONCLUSION

The purpose of this research is to identify the quality

dimensions of health examination service and their impacts on consumer satisfaction and behavior intentions. Although previous researches have dealt with various healthcare service contexts, the health examination service has been received much attention.

Several interesting findings emerged from this study. First, we found that privacy does not construct the dimension. This contradicts the former research in health examination service [17] and supports the view of other healthcare service research that privacy is employed as measurement item. Second, responsiveness and assurance dimensions are merged as one, which supports the result by [35], [67]. Third, tangibles dimension is split into two, supporting [35]. Tangibles 1, equipment and physical facilities, affect consumer satisfaction and tangibles 2, employees and communication materials, does not. This result is in line with that from [35] and revisits the previous result of [36] that dress (TAN3) is not an important item in the hospital setting. Lastly, the relative importance of reliability and empathy dimensions implies that health examination centers have to focus on these two dimensions to effectively improve consumer satisfaction.

It has been suggested that very few indicators per factor may produce unstable solutions and thus, some researchers claim to use at least three indicators per factor [58]. Therefore, one of the limitations of this research is that both tangible 1 and behavior intention have only two indicators. Another limitation is that our sample contains similar characteristics. We tried to investigate the impact of chronic disease on consumer satisfaction by group analysis, but only 8 consumers had chronic diseases.

Since the sample covers two health examination centers in Seoul, South Korea, further research on more diverse samples with various culture and location is desirable. We investigated the impact of physical condition, medical knowledge and other elements on consumer satisfaction by group analysis, but there is no significant difference. We assumed that this result derives from the rather homogeneous nature of the sample.

During the purification process, items such as ASU5, the explanation item, had significant cross loadings. As depicted in Table IV, it appears to be in different dimensions such as responsiveness or empathy in healthcare service. In this respect, we need further research to determine whether the explanation compose a new dimension or belongs to previous SERVQUAL dimension.

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