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Prioritisation of Factors Influencing Outpatient Satisfaction in Chinese Public Hospitals: A Dominance Analysis

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Video abstract

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Objective: To investigate the current status of outpatient satisfaction with their healthcare experience and its influencing factors, providing a basis for improving medical service quality.

Methods: Utilizing data from a 2021–2024 national survey by Doctor-Patient Experience Research Base, National Health Commission of the people's Republic of China across 20 hospitals (n=49,371 outpatients), this study analyzed the impact of hospital characteristics, patient demographics, and care process factors (registration time, consultation time, payment time, waiting time, perceived value of consultation) on satisfaction. Chi-square tests and Logistic regression identified significant factors; the innovative application of dominance analysis was then used to assess their relative importance contribution and establish a clear priority for intervention.

Results: Hospital characteristics, care process factors, and most patient demographics showed significant associations with satisfaction ($p<0.05$). Logistic regression identified consultation time, perceived value of consultation, payment time, registration time, and waiting time as significant predictors of satisfaction ($p<0.001$). The dominance analysis revealed a distinct hierarchy of influence: consultation time had the highest relative contribution to satisfaction, followed by perceived value of consultation, payment time, registration time, and waiting time.

Conclusion: This study analyses the key sequences for enhancing patient satisfaction and healthcare experience, providing healthcare managers with precise actionable guidance.

Keywords: patient satisfaction, influencing factors, relative importance, dominance analysis

Introduction

Patient satisfaction reflects patients' overall experience and evaluation of the entire medical service process and is one of the key indicators for measuring the quality of medical institution services.[1,2] Its importance is increasingly prominent in the development of healthcare. In 2010, the World Health Organization (WHO) stated that the quality of a health system largely depends on meeting patient expectations and their satisfaction with treatment, emphasizing the need to place patients at the center when designing and implementing health systems.[3] In recent years, the global trend towards "patient-centered" medical services has gradually strengthened, with patient satisfaction and patient experience becoming an increasing focus of research.[4] In 2018, patient satisfaction was incorporated by WHO as one of the indicators for

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measuring service safety and quality in the healthcare industry, reflecting a globally established consensus on its importance.[5] In North America and Europe, large-scale surveys and standardized frameworks—such as the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) have been widely used to systematically evaluate patient experience and satisfaction.[6,7] More recently, Spain's MAPEX program (Model for the Advanced Pharmaceutical Care in Outpatient Settings) has emerged as an international benchmark for outpatient pharmaceutical services, demonstrating how standardized care models can improve patient outcomes and enhance healthcare system efficiency.[8,9] In Asia, China has implemented the "Healthy China 2030" strategy, which explicitly introduced the "Comprehensive Medical Quality Improvement Action Plan" and identified enhancing patient satisfaction as one of its key objectives.[10]

As the frontline window of the hospital service system,[11] outpatient services hold a crucial position in hospital management and the provision of medical care.[12] In terms of patient volume, outpatients constitute the vast majority of hospital service recipients, and the number of outpatient visits in China has shown a continuous upward trend in recent years.[13] Being the most extensive and frequent point of contact between hospitals and patients, the quality of outpatient services directly influences patients' overall perception and evaluation of the hospital. Therefore, enhancing outpatient satisfaction has become a key factor in optimizing the hospital's service image and strengthening patients' sense of benefit from healthcare.

The prerequisite for improving patient satisfaction is identifying its main influencing factors and their relative impact. Existing research has extensively investigated this, primarily focusing on the following categories: (1) exploring the influence of patient personal factors such as age, income, and education level on satisfaction;[14] (2) examining the relationship between the medical service process and patient satisfaction, including factors like the healthcare environment, physician skill, and medical costs;[15,16] (3) focusing on patient satisfaction with specific medical services or procedures, such as anesthesia, rehabilitation services, or radiotherapy.[17] However, most existing studies have relied on traditional regression-based modeling approaches, which, while effective in identifying significant predictors, often fail to capture the complex, nonlinear relationships and relative importance among influencing factors. To address these limitations, this study employed a dominance analytical framework to examine outpatient satisfaction as the dependent variable, focusing on three key dimensions—hospital characteristics, patient demographics, and the treatment process. The combination of interpretative modeling with variable importance analysis provided deeper insights.

Information and Methodology

Study Population

This study was based on the Patient Healthcare Experience Evaluation System survey conducted from 2021 to 2024 by the Patient-Physician Experience Research Base of the Medical Management Service Guidance Center, National Health Commission. A multi-stage stratified sampling method was employed. First, nine representative provinces/municipalities were selected nationwide across eastern, western, southern and central regions (Beijing, Shaanxi, Chongqing, Jiangsu, Sichuan, Guangdong, Hubei, Hebei, and Zhejiang). Subsequently, 20 public hospitals of varying tiers were selected from these regions (including 12 Grade III, Class A hospitals, 3 Grade III, Class B hospitals, and 5 Grade II, Class A hospitals). This approach aimed to establish a representative sample framework in terms of both regional distribution and hospital tier.

The survey participants comprised outpatients attending the aforementioned hospitals or their accompanying family members. Patients were defined as individuals aged 18 years or older who were conscious and able to complete the questionnaire independently or with the assistance of the investigator. Questionnaires were completed by accompanying family members only if the patient was under 18 years old or unable to complete it independently (eg, due to severe mental disorders, coma, or dementia).

Inclusion criteria: ❶ Outpatients who have completed their current visit; ❷ Age ≥18 years. Exclusion criteria: ❶ Critically ill/emergency patients or those unable to respond independently; ❷ Patients with psychiatric disorders; ❸ Emotionally unstable patients.

Data Collection and Quality Control

The structure of the patient healthcare experience measurement scale adopted in this study includes: a questionnaire title, informed consent form, screening section, socio-demographic information, the formal evaluation questionnaire (covering content related to the quality of care and service levels in medical, nursing, and ancillary diagnostic departments, as well as specific factor indicators such as the care environment and logistical support), and overall evaluation metrics (overall healthcare experience, level of agreement, loyalty).

Reliability and validity analyses were conducted on the indicator system for the outpatient satisfaction survey. Factor analysis was employed to assess the structural validity of the questionnaire. The results showed that the common factors cumulatively accounted for 68.00% of the total variance, and each indicator demonstrated sufficiently strong factor loadings (≥0.4) on its corresponding factor, indicating good structural validity of the indicator system. Furthermore, reliability was assessed using Cronbach's α coefficient and split-half reliability. The results revealed an overall Cronbach's α coefficient of 0.952 for the indicator system, with Cronbach's α coefficients for individual levels ranging from 0.859 to 0.946. The overall split-half reliability was 0.982, with split-half reliabilities for individual levels ranging from 0.905 to 0.976. Both results indicate excellent internal consistency of the questionnaire.

In each sample hospital, third-party assessors who had undergone standardized training employed convenience sampling within outpatient areas, inviting eligible patients or their relatives to participate in the survey through face-to-face approaches. The field data collection process prioritized ensuring the quality of data from included participants. Consequently, the number of individuals who "did not meet inclusion criteria" or "met criteria but refused participation" was not systematically recorded, rendering it impossible to calculate the traditional response rate. Following a detailed explanation of the study objectives and the obtaining of informed consent, participants independently completed an anonymous questionnaire using a dedicated mobile device. All respondents must complete all questions before submission. Results were uploaded to a cloud server, with no human interference throughout the process. Following data cleansing and the exclusion of invalid questionnaires, a final valid sample of 49,371 cases was obtained, representing a data validity rate of 96.15%.

Statistical Analyses

Data Processing

Dominance Analysis (DA) is a method used to compare the relative importance of explanatory variables in multiple regression models. It systematically evaluates each variable's contribution to the model's goodness-of-fit to determine its importance in explaining the outcome variable. Compared to multivariate regression analysis, dominance analysis considers all possible submodels. This effectively addresses issues of multicollinearity among independent variables, avoids potential bias arising from relying solely on regression coefficients, and enhances the accuracy of the research.

Outcome Variable: Patient satisfaction was measured using a Likert scale with 5 levels, ranging from "very dissatisfied" (assigned a value of 1) to "very satisfied" (assigned a value of 5). Higher scores indicated higher patient satisfaction. For this analysis, it was transformed into a binary variable: scores of 1, 2, and 3 were combined as 0 (Dissatisfied), while scores of 4 and 5 were combined as 1 (Satisfied). To assess the robustness of this dichotomization, we additionally fitted a proportional-odds logistic regression model using the original 5-level ordinal outcome; the detailed results are provided in Table S1.

Explanatory Variables: Based on existing research,[18] common factors influencing satisfaction include patient characteristics, hospital service quality, hospital medical quality, and healthcare-related factors. Patient satisfaction is a multidimensional and subjective concept, and multiple studies indicate it is influenced by patient personal characteristics. Existing research also confirms the significant impact of medical costs on satisfaction, where lower costs tend to increase satisfaction among patients and their families. Excessive waiting times during the care process often lead to complaints and negatively impact satisfaction. Conversely, consultation times shorter than expectations can result in negative evaluations, although high-quality communication can help mitigate this dissatisfaction.

Specific explanatory variables were defined or categorized as follows: Number of hospital beds and Average daily outpatient volume were converted into categorical variables by dividing the sample into four groups based on the median and upper/lower quartiles. Age was categorized as: "18 years and below", "19–39 years", "40–59 years", and "60 years

and above". Place of long-term residence was categorized as: "Within this province" and "Outside this province". Payment type was categorized as: "Employee Medical Insurance", "Resident Medical Insurance", "Maternity/Work Injury/Commercial Insurance/Public Expense", "Out-of-Province Medical Insurance", "Self-pay", and "Other". Occupation was categorized as: "Enterprise/Institution Staff & Civil Servants", "Workers/Farmers", "Self-employed /Private Business Owners", "Students/Unemployed", "Retired", and "Other". Annual household income was categorized as: "Below 30,000CNY", "30,000–100,000CNY", "100,000–200,000CNY", and "Above 200,000CNY". Reason for choosing the hospital was categorized as: "Hospital Reputation", "Many Specialists", "High Technical Level", and "Other". Registration method was categorized as: "Hospital Counter", "Hospital Self-service Kiosk", "Phone Appointment", "Online Appointment", and "Other". Registration time, Waiting time (pre-consultation), and Payment time were categorized as: "Within 20 minutes" and "Over 20 minutes". Consultation time was categorized as: "Within 10 minutes" and "Over 10 minutes". Perceived value of consultation was categorized as: "Matches expectations or is inexpensive" and "Too expensive to accept". Additionally, the classifications for Patient gender and Whether a return visit remained unchanged.

Statistical Methods

Descriptive statistics were used to characterise the data for the sample and key study variables, chi-square analysis, one-way logistic regression, multivariate logistic regression analyses were used to identify significant influences on patient satisfaction, and, finally, dominance analyses were used to determine the relative importance of each influence on patient satisfaction. All statistical calculations were performed using R software (version 4.2.2) and $p<0.05$ was considered statistically significant. To reduce potential overfitting associated with stepwise selection, we applied predefined entry ($p<0.05$) and exit ($p>0.10$) criteria and performed a 10-fold cross-validation to assess the robustness and stability of the model estimates.

Before conducting the multivariable logistic regression, we examined potential multicollinearity among process-time variables (registration waiting time, payment waiting time, consultation waiting time, and service duration) by calculating variance inflation factors (VIFs). All variables had VIF values below 2, which were well under the commonly accepted threshold of 5, indicating no significant multicollinearity. The inclusion of these variables did not affect parameter estimates or model stability. To account for the clustering of patients within hospitals, hospital-level fixed effects were included in the multivariable logistic regression model.

The dominance analysis was based on the following steps: firstly, all possible sub-models were constructed, for a regression model with k independent variables, all possible sub-models were constructed (2^k sub-models in total), each containing a different combination of independent variables. The goodness of fit of each submodel was then calculated, and the incremental contribution of each variable, ie, the difference in goodness of fit when that variable was in the model and when it was not, was then determined. For example, the incremental contribution of the variable X_i can be expressed as $\Delta R^2 = R^2_{\text{with Xi}} - R^2_{\text{without Xi}}$. Finally, the dominance relationships were determined, including full dominance, conditional dominance, and overall dominance.[19]

The incremental contribution of a variable was defined as the change in R^2 when it was added to a regression model. In logistic regression, several R^2-like indices were proposed as measures of model goodness-of-fit; however, based on four criteria, only four were recognized as R^2 analogs. These indices were included in the dominance analysis package (version 2.1.1): McFadden's R^2 (ΔRm^2), Cox and Snell (r2.cs), Nagelkerke (r2.n), and Estrella (r2.e). McFadden's R^2 (ΔRm^2) was selected in this study because it was one of the most widely used pseudo-R^2 measures for logistic regression models, providing an interpretable measure of model fit that was robust and comparable across different models, especially when working with categorical outcome variables.[20]

In addition, this study assessed the stability of the results using bootstrap analysis, where the bootstrap process provided a measure of confidence (ie, reproducibility) that indicated the chance of reproducing the results of the original sample out of 1000 bootstrap samples. We used a 95% or higher reproducibility cutoff, similar to a 95% confidence interval, to obtain reliability results for one independent variable over another. In Table 1, the D_{ij} column indicated whether one variable usually dominated the other in the current sample, with three typical outcomes: 1 (X_i dominated X_j), 0.5 (no dominant relationship could be established between X_i and X_j), and 0 (X_j dominated X_i. the Rep column indicated the reproducibility of the results,

Table 1 Bootstrap Results for Dominance Analysis: Pairwise Comparisons (Dij Values) with Mean, Standard Error, Probabilities, and Reproducibility

i	j	D_{ij}	mD_{ij}	$SE.D_{ij}$	P_{ij}	P_{ji}	Pno_{ij}	Rep
General dominance								
Number of Beds	Daily Outpatient Volume	1.00	0.88	0.33	0.88	0.12	0.00	0.88
Number of Beds	Reason for Choosing Hospital	1.00	0.82	0.39	0.82	0.18	0.00	0.82
Number of Beds	Perceived Value	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Number of Beds	Registration Method	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Number of Beds	Registration Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Number of Beds	Fee Payment Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Number of Beds	Waiting Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Number of Beds	Consultation Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Daily Outpatient Volume	Reason for Choosing Hospital	1.00	0.45	0.50	0.45	0.55	0.00	0.45
Daily Outpatient Volume	Perceived Value	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Daily Outpatient Volume	Registration Method	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Daily Outpatient Volume	Registration Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Daily Outpatient Volume	Fee Payment Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Daily Outpatient Volume	Waiting Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Daily Outpatient Volume	Consultation Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Reason for Choosing Hospital	Perceived Value	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Reason for Choosing Hospital	Registration Method	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Reason for Choosing Hospital	Registration Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Reason for Choosing Hospital	Fee Payment Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Reason for Choosing Hospital	Waiting Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Reason for Choosing Hospital	Consultation Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Perceived Value	Registration Method	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Perceived Value	Registration Time	1.00	0.86	0.35	0.86	0.14	0.00	0.86
Perceived Value	Fee Payment Time	1.00	0.78	0.42	0.78	0.22	0.00	0.78
Perceived Value	Waiting Time	1.00	0.98	0.14	0.98	0.02	0.00	0.98
Perceived Value	Consultation Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Registration Method	Registration Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Registration Method	Fee Payment Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Registration Method	Waiting Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Registration Method	Consultation Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Registration Time	Fee Payment Time	0.00	0.36	0.48	0.36	0.64	0.00	0.64
Registration Time	Waiting Time	1.00	0.90	0.30	0.90	0.10	0.00	0.90
Registration Time	Consultation Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Fee Payment Time	Waiting Time	1.00	0.91	0.29	0.91	0.09	0.00	0.91
Fee Payment Time	Consultation Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Waiting Time	Consultation Time	0.00	0.00	0.00	0.00	1.00	0.00	1.00

Notes: The Dij column shows whether one variable dominates another, with outcomes: 1: Xi dominates Xj, 0.5: No dominance relationship, 0: Xj dominates Xi. The Rep column indicates the reproducibility of these relationships across 1000 bootstrap samples. A higher reproducibility score indicates more reliable results. A 95% or higher reproducibility cutoff is used to assess dominance stability.

ie, how often the dominant relationship observed in the original sample was reproduced in the bootstrap samples. Thus, when sample $D_{ij} = 1$, a higher reproducibility score indicated more reliable evidence that X_i was superior to X_j.

Results

Data Characteristics of the Study Variables

The distribution of the number of hospital beds and daily outpatient volume was relatively uniform. Patient annual household income was concentrated below 100,000 CNY (79.0%). Among reasons for choosing the hospital, "hospital reputation" (24.3%) was the most common, followed by "abundance of specialists" and "advanced technology". Primary

registration methods were "online appointment" (49.5%) and "hospital counter" (32.4%), with "hospital self-service kiosk" and "telephone appointment" being less frequent. The proportion of return visits was similar to first visits. Furthermore, patients with registration time, fee payment time, and waiting time within 20 minutes constituted higher proportions than those exceeding 20 minutes (79.6%, 90.4%, and 73.6% respectively). Patients with consultation time ≤10 minutes represented a higher proportion (70.2%) than those >10 minutes. Patients perceiving the consultation value as meeting expectations or cheap (96.7%) far outnumbered those considering it very expensive/unacceptable.

Overall patient satisfaction was 82.16%. Satisfaction rates across bed number quartiles were 86.9%, 83.9%, 84.3%, and 79.0%. Satisfaction across daily outpatient volume quartiles was 85.5%, 86.9%, 81.8%, and 80.5%. Satisfaction was significantly higher among "students/unemployed" (84.5%) and "retired" (84.1%) occupations compared to "enterprise/institution staff/civil servant", "worker/farmer", and "freelancer/self-employed" (p=0.002). Satisfaction by annual household income was: <30,000 CNY (83.5%), 30,000–100,000 CNY (84.5%), 100,000–-200,000 CNY (82.5%), and >200,000 CNY (81.4%). Satisfaction by reason for choosing hospital was: "hospital reputation" (82.7%), "abundance of specialists" (85.1%), and "advanced technology" (86.6%). Higher satisfaction rates were observed with "hospital counter" (85.3%) and "hospital self-service kiosk" (85.5%) registration. Return visit patients (84.1%) had slightly higher satisfaction than first visits (83.2%) (p=0.015). Patients with registration time ≤20 minutes (87.7%), fee payment time ≤20 minutes (86.3%), and waiting time ≤20 minutes (88.0%) had significantly higher satisfaction than those exceeding 20 minutes (67.8%, 58.9%, and 71.4% respectively). Patients with consultation time ≤10 minutes had lower satisfaction (79.3%) than those >10 minutes (93.8%). Satisfaction was substantially higher among patients perceiving value as meeting expectations or cheap (85.0%) versus very expensive/unacceptable (44.2%). See Table 2 for details.

No statistically significant associations were found between patient satisfaction and age (p=0.062), place of residence (p=0.061), or payment type (p=0.933). All other examined variables demonstrated statistically significant relationships with satisfaction.

Table 2 Descriptive Statistics of Study Variables and Patient Satisfaction (n=49,371)

Variable	Category	Proportion (n, %)	Satisfied (%)	Dissatisfied (%)	P-value
Gender	Male	19717 (39.9%)	83.8%	16.2%	<0.001
	Female	29654 (60.1%)	83.6%	16.4%	
Age (years)	≤18	6419 (13.0%)	84.3%	15.7%	0.620
	19-39	22,415 (45.4%)	84.2%	15.8%	
	40-59	12,280 (24.9%)	82.5%	17.5%	
	≥60	8257 (16.7%)	83.5%	16.5%	
Place of Residence	Local Province	43993 (89.1%)	83.8%	16.2%	0.061
	Other Province	5378 (10.9%)	82.7%	17.3%	
Occupation	Enterprise/Institution Staff/Civil Servant	12434 (25.2%)	82.9%	17.1%	0.002
	Worker/Farmer	11296 (22.9%)	83.6%	16.4%	
	Freelancer/Self-employed	5259 (10.7%)	82.6%	17.4%	
	Student/Unemployed	9674 (19.6%)	84.5%	15.5%	
	Retired	3965 (8.0%)	84.1%	15.9%	
	Other	6743 (13.7%)	84.4%	15.6%	
Annual Household Income (CNY)	<30,000	18,366 (37.2%)	83.5%	16.5%	<0.001
	30,000–100,000	20,655 (41.8%)	84.5%	15.5%	
	100,000–200,000	7130 (14.4%)	82.5%	17.5%	
	>200,000	3220 (6.5%)	81.4%	18.6%	

(*Continued*)

Table 2 (Continued).

Variable	Category	Proportion (n, %)	Satisfied (%)	Dissatisfied (%)	P-value
Number of Beds	Min - Lower Quartile	13725 (27.8%)	86.9%	13.1%	<0.001
	Lower Quartile - Median	11720 (23.7%)	83.9%	16.1%	
	Median - Upper Quartile	11936 (24.2%)	84.3%	15.7%	
	Upper Quartile - Max	11990 (24.3%)	79.0%	21.0%	
Daily Outpatient Volume	Min - Lower Quartile	14702 (29.8%)	85.5%	14.5%	<0.001
	Lower Quartile - Median	10209 (20.7%)	86.9%	13.1%	
	Median - Upper Quartile	12148 (24.6%)	81.8%	18.2%	
	Upper Quartile - Max	12312 (24.9%)	80.5%	19.5%	
Payment Type	Employee Medical Insurance	15070 (30.5%)	83.7%	16.3%	0.933
	Resident Medical Insurance	23956 (48.5%)	83.7%	16.3%	
	Maternity/Work injury/Commercial insurance/ Public-funded	977 (2.0%)	83.4%	16.6%	
	Non-local Medical Insurance	1061 (2.1%)	83.6%	16.4%	
	Self-pay	7304 (14.8%)	83.2%	16.8%	
	Other	1003 (2.0%)	84.2%	15.8%	
Reason for Choosing Hospital	Hospital Reputation	11981 (24.3%)	82.7%	17.3%	<0.001
	Abundance of Specialists	5022 (10.2%)	85.1%	14.9%	
	Advanced Technology	4956 (10.0%)	86.6%	13.4%	
	Other Reasons	27412 (55.5%)	83.2%	16.8%	
Registration Method	Hospital Counter	15970 (32.4%)	85.3%	14.7%	<0.001
	Hospital Self-service Kiosk	7424 (15.0%)	85.5%	14.5%	
	Telephone Appointment	746 (1.5%)	82.4%	17.6%	
	Online Appointment	24435 (49.5%)	82.2%	17.8%	
	Other	796 (1.6%)	78.8%	21.2%	
Return Visit	No (First visit)	25269 (51.2%)	83.2%	16.8%	0.015
	Yes	24102 (48.8%)	84.1%	15.9%	
Registration Time	≤20 minutes	39304 (79.6%)	87.7%	12.3%	<0.001
	>20 minutes	10067 (20.4%)	67.8%	32.2%	
Fee Payment Time	≤20 minutes	44650 (90.4%)	86.3%	13.7%	
	>20 minutes	4721 (9.6%)	58.9%	41.1%	
Waiting Time	≤20 minutes	36314 (73.6%)	88.0%	12.0%	<0.001
	>20 minutes	13057 (26.5%)	71.4%	28.6%	
Consultation Time	≤10 minutes	34649 (70.2%)	79.3%	20.7%	<0.001
	>10 minutes	14722 (29.8%)	93.8%	6.2%	
Perceived Value of Consultation	Met expectations or Cheap	47748 (96.7%)	85.0%	15.0%	<0.001
	Very expensive/Unacceptable	1623 (3.3%)	44.2%	55.8%	

Correlation Between Satisfaction and Study Variables

Stepwise regression was employed for variable selection, with the final logistic regression model incorporating the number of beds, daily outpatient volume, occupation, annual household income, reason for choosing the hospital, registration method, return visit status, registration time, fee payment time, waiting time, consultation time, and perceived value of consultation. Results demonstrated that patients with registration times exceeding 20 minutes had 0.56 times the odds of reporting satisfaction compared to those within 20 minutes (OR = 0.56, 95% CI = 0.52–0.60). Patients with fee payment times > 20 minutes had 0.45 times the odds of satisfaction versus those ≤ 20 minutes (OR = 0.45, 95% CI = 0.41–0.48). Those with waiting times > 20 minutes had 0.58 times the odds of satisfaction compared to those ≤ 20 minutes (OR = 0.58, 95% CI = 0.55–0.61). Patients with consultation times > 10 minutes had 3.15 times higher

odds of satisfaction than those ≤ 10 minutes (OR = 3.15, 95% CI = 2.93–3.40). Patients perceiving the consultation cost as very expensive or unacceptable had 0.19 times the odds of satisfaction compared to those perceiving it as meeting expectations or cheap (OR = 0.19, 95% CI = 0.17–0.22). Detailed results are presented in Table 3.

Table 3 Logistic Regression Analysis of Factors Associated with Patient Satisfaction

Variable	Category	Unadjusted OR (95% CI, P value)	Adjusted OR (95% CI, P value)
Occupation	Enterprise/Institution Staff/Civil Servant		
	Worker/Farmer	1.05 (0.98–1.13, p=0.134)	1.05 (0.97–1.14, p=0.243)
	Freelancer/Self-employed	0.98 (0.90–1.07, p=0.613)	1.03 (0.93–1.13, p=0.604)
	Student/Unemployed	1.13 (1.05–1.22, p=0.001)	1.14 (1.05–1.23, p=0.002)
	Retired	1.10 (0.99–1.21, p=0.065)	1.06 (0.95–1.18, p=0.305)
	Other	1.12 (1.03–1.21, p=0.007)	1.08 (0.98–1.18, p=0.109)
Annual Household Income (CNY)	<30,000		
	30,000–100,000	1.08 (1.02–1.14, p=0.008)	1.09 (1.02–1.16, p=0.008)
	100,000–200,000	0.93 (0.86–1.00, p=0.049)	1.00 (0.91–1.08, p=0.925)
	>200,000	0.86 (0.78–0.95, p=0.003)	0.99 (0.89–1.11, p=0.866)
Number of Beds	Min - Lower Quartile		
	Lower Quartile - Median	0.79 (0.73–0.84, p<0.001)	0.72 (0.57–0.90, p=0.005)
	Median - Upper Quartile	0.81 (0.76–0.87, p<0.001)	1.86 (1.34–2.58, p<0.001)
	Upper Quartile - Max	0.57 (0.53–0.61, p<0.001)	2.82 (1.95–4.05, p<0.001)
Daily Outpatient Volume	Min - Lower Quartile		
	Lower Quartile - Median	1.13 (1.05–1.21, p=0.002)	0.95 (0.78–1.17, p=0.638)
	Median - Upper Quartile	0.76 (0.72–0.81, p<0.001)	0.32 (0.24–0.43, p<0.001)
	Upper Quartile - Max	0.70 (0.66–0.74, p<0.001)	0.28 (0.20–0.38, p<0.001)
Reason for Choosing Hospital	Hospital Reputation		
	Abundance of Specialists	1.19 (1.09–1.31, p<0.001)	1.28 (1.16–1.42, p<0.001)
	Advanced Technology	1.36 (1.23–1.49, p<0.001)	1.31 (1.18–1.45, p<0.001)
	Other Reasons	1.04 (0.98–1.10, p=0.193)	0.97 (0.91–1.03, p=0.343)
Registration Method	Hospital Counter		
	Hospital Self-service Kiosk	1.01 (0.94–1.10, p=0.736)	1.06 (0.97–1.16, p=0.211)
	Telephone Appointment	0.81 (0.67–0.99, p=0.033)	1.08 (0.88–1.35, p=0.462)
	Online Appointment	0.80 (0.76–0.84, p<0.001)	1.04 (0.97–1.12, p=0.260)
	Other	0.64 (0.54–0.76, p<0.001)	0.84 (0.69–1.03, p=0.089)
Return Visit	No (First visit)		
	Yes	1.06 (1.01–1.11, p=0.014)	1.08 (1.03–1.14, p=0.003)
Registration Time	≤20 minutes		
	>20 minutes	0.30 (0.28–0.31, p<0.001)	0.56 (0.52–0.60, p<0.001)
Fee Payment Time	≤20 minutes		
	>20 minutes	0.23 (0.21–0.24, p<0.001)	0.45 (0.41–0.48, p<0.001)
Waiting Time	≤20 minutes		
	>20 minutes	0.34 (0.32–0.36, p<0.001)	0.58 (0.54–0.61, p<0.001)
Consultation Time	≤10 minutes		
	>10 minutes	3.92 (3.65–4.21, p<0.001)	3.15 (2.93–3.40, p<0.001)
Perceived Value of Consultation	Met expectations or Cheap		
	Very expensive/Unacceptable	0.14 (0.13–0.16, p<0.001)	0.19 (0.17–0.22, p<0.001)

Note: Adjusted ORs were estimated from a multivariable logistic regression model controlling for hospital fixed effects.

Relative Importance of Factors Influencing Patient Satisfaction

The dominance analysis showed that consultation time, perceived value of consultation and payment time explained 24.8%, 19.2% and 17.6% of the overall variance in satisfaction, respectively, and the three together explained 61.6% of the overall variance (Figure 1), indicating the three most important influences on patient satisfaction, followed by registration time (16.8%) and waiting time (15.2%), etc, and registration mode was the lowest ranked variable in the Dominance Analysis, explaining 0.8% of the overall variance.

Dominance analysis revealed that consultation time, perceived value of consultation, and fee payment time accounted for 24.8%, 19.2%, and 17.6% of the total variance in satisfaction respectively, collectively explaining 61.6% of the overall variance (Table 1). These three factors constituted the most influential determinants of patient satisfaction. Registration time (16.8%) and waiting time (15.2%) represented secondary contributors, while registration method ranked as the least influential variable in the dominance analysis, explaining only 0.8% of the total variance.

The columns in the table represent the average incremental contribution of each variable when added to submodels of corresponding sizes. The final row displays the proportion of each variable's explained variance relative to the total variance explained by the full model. The numerical values in the table indicate the averageΔR_m^2 for each variable when added to regression submodels containing varying combinations of other predictors.

Discussion

The research systematically evaluated the key factors influencing outpatient satisfaction and their relative importance by applying dominance analysis to cross-sectional survey data collected from 20 public hospitals nationwide. The results revealed that consultation time, perceived value of consultation, payment time, registration time, and waiting time were the five most significant factors. Consultation time demonstrated the greatest relative contribution, explaining 24.8% of the variance. The finding suggests that the amount of time and attention provided during consultations is a primary concern for outpatients, aligning with the academic consensus that active listening, clear explanations, and professional guidance from physicians directly enhance satisfaction.[21–24] Conversely, high patient volumes and compressed schedules inevitably reduce communication time, adversely affecting the patient experience.[25] Perceived value of consultation

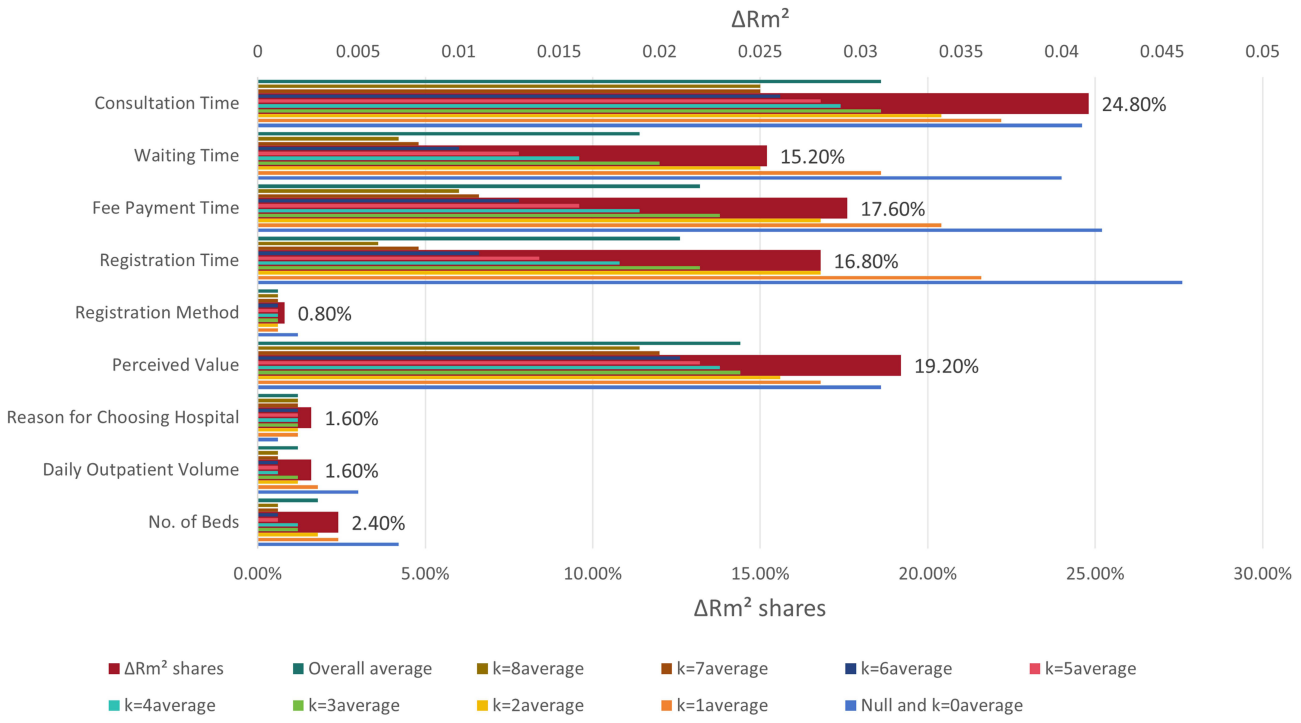

Figure 1 Dominance Matrix of Relative Importance of Study Factors on Patient Satisfaction.
Notes: McFadden's R^2 (ΔRm^2) represents the variance in the outcome explained by the model corresponding to that row.

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contributed 19.2% to the model, corroborating the established role of value perception in healthcare service evaluation. The literature posits that patient satisfaction increases when perceived service quality matches or exceeds associated costs.[26–28] Notably, 96.7% of respondents reported that medical costs were consistent with or lower than anticipated—a perception likely influenced by regulated pricing in China's public hospitals and broad insurance coverage. The three time-related factors—payment, registration, and waiting time—were of nearly equal importance and together accounted for 49.6% of the variance. International research consistently shows that longer waiting times are associated with lower patient satisfaction.[29–33] Building on this foundation, we deconstruct the general concept of "waiting time" into three distinct components: payment processing, registration, and consultation waiting. This differentiation enables a more granular analysis, contrasting with the prevailing view of waiting time as a singular construct.

The primary contribution of this study is its exploration of the relative importance of factors influencing outpatient satisfaction. However, several limitations should be noted. First, as all samples were drawn from public hospitals, the findings should be generalized to private systems with caution. Second, dichotomizing patient satisfaction into "satisfied" and "dissatisfied" may obscure more nuanced, continuous variations. Third, the time-related variables (registration, payment, waiting, and consultation times) were collected as predefined categorical items in the questionnaire. These cut-points were established by the expert panel of the National Health Commission's Doctor-Patient Experience Research Base based on service benchmarks and pilot survey data. As continuous time data were not collected, further sensitivity analyses using alternative thresholds or continuous modeling could not be performed, which may limit the granularity of the findings. Fourth, despite controlling for multiple covariates, unmeasured confounders—such as hospital management systems and regional healthcare policies—could still influence the results. Finally, the study's sample is susceptible to selection bias owing to the use of convenience sampling, a lack of process data, and inadequate coverage of specific subgroups.

Based on these findings and considering the study's limitations, the following comprehensive recommendations are proposed for hospital administrators. To enhance consultation effectiveness, it is essential to protect critical consultation time by optimizing appointment systems, regulating patient flow density, and implementing patient-centered communication training. In terms of cost perception, hospitals should maintain pricing transparency and reasonable fee structures, while reducing operational costs through streamlined workflows. Due to the exclusive use of public hospital samples, private institutions should carefully evaluate the transferability of this recommendation before application. Regarding process optimization, efforts should focus on improving the waiting experience in non-clinical areas and actively promoting online registration and self-service payment options. Priority improvements should target the payment stage, while also upgrading the waiting environment according to each hospital's specific circumstances. By drawing on the standardized, modular framework of Spain's MAPEX Project, hospitals can incorporate waiting times at each stage into their process re-engineering, achieving simultaneous enhancement in service efficiency and patient satisfaction.[6] It must be emphasized that the nature of cross-sectional data precludes causal inference between the identified factors and patient satisfaction. Given these constraints, healthcare institutions are encouraged to adopt an incremental approach when implementing improvements, using small-scale pilot trials and continuous evaluation to validate.

Conclusion

This study applied dominance analysis to quantify the relative importance of five key factors influencing outpatient satisfaction: consultation time (24.8%), perceived value of consultation (19.2%), payment time (17.6%), registration time (16.8%), and waiting time (15.2%).

Based on these findings, improvement efforts should prioritize safeguarding consultation time, enhancing its perceived value, and systematically optimizing the non-clinical waiting experience. These measures support the "Healthy China 2030" strategy's core aim of "continuously improving the healthcare experience", furnishing a scientific foundation for advancing healthcare service quality. The dominance analysis methodology also demonstrated significant potential for application in other settings—such as inpatient and primary care, thereby providing a robust method to support healthcare management decision-making. It is important to note that this study's sample was primarily drawn from public hospitals, and satisfaction was measured dichotomously. Potential limitations also included

unmeasured confounders and survey bias. Future research would benefit from expanded sample sources, more refined satisfaction scales, and advanced statistical models to strengthen the robustness and generalizability of the findings.

Ethics Approval and Consent to Participate

The protocol for this study was approved by Ethics Committee of Chinese People's Liberation Army General Hospital (Approval Number: S2025-235-01). The patient satisfaction survey was anonymous. We obtained written informed consent from each respondent before their participation in the survey. This study was conducted in accordance with the Declaration of Helsinki.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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