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RESEARCH ARTICLE

Patient-Centred Healthcare Management: Investigating the Relationship Between Service Quality, Patient Trust and Loyalty

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ABSTRACT

Purpose: When strengthening patient-physician relationships in health care, it is important to understand how the patient's care-based experience is directly connected to the quality and sustainability of the relationships. Drawing on the SERVQUAL model and commitment–trust theory, this paper examines the relationships between five dimensions of healthcare service quality and patient trust and loyalty, the mediating role of trust, and differences between public and private hospital settings.

Methods: Cross-sectional survey of 412 adult patients (public and private) in tertiary-care hospitals in Pune, Maharashtra, India. The data were analyzed using partial least squares structural equation modelling (PLS-SEM) comprising 5,000-resample bootstrapping, PLSpredict, importance–performance map analysis (IPMA), measurement invariance of composites (MICOM) and permutation-based multigroup analysis.

Results: All measures were reliable with sufficient validity. Each tangible, reliability, responsiveness, assurance, and empathy had a positive effect on patient trust (R2 = .530), and trust was the strongest predictor of loyalty (beta = .404, p < .001; R2 = .541). Trust was found to be a full mediator of the path of tangibles and reliability to loyalty and a partial mediator of the path between responsiveness and loyalty as well as between assurance and empathy and loyalty. The model was found to have high out-of-sample predictive power. Partial measurement invariance was achieved and results demonstrated that the trust–loyalty relation was stronger in the private than in public hospitals ($\Delta\beta = -.209$, $p = .037$).

Conclusions: Service quality is the key mechanism leading to patient trust and loyalty to the healthcare providers. Hospital management should treat trust as a managed outcome, emphasizing communication and responsiveness to patients, and develop patient-focused solutions based on their understanding of the ownership context.

Keywords: *Healthcare service quality; Patient trust; Patient loyalty; Patient-centred care; SERVQUAL; PLS-SEM; Multigroup analysis; Hospital management*

INTRODUCTION

Healthcare is shifting from provider-centred care to patient-centred care, which treats the patient's experience, values, and preferences as the objective or outcome of care, not a by-product of clinical activity (Epstein & Street, 2011; Institute of Medicine, 2001). This has brought about a change, and now, handling patient relations is important for hospitals. However, delivering poor-quality care has now come to be seen as a bigger constraint on population health than the availability of services, and a significant proportion of preventable deaths in LMICs are due to available care but poor-quality care (Kruk et al., 2018; World Health Organization et al., 2018). Today, the issue for the hospital manager is not simply one of meeting the needs for services; it is also a question of whether they are being provided in a way that makes a patient "want" to use the hospital, adhere to treatment and refer others.

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Patient loyalty (wanting to keep using and recommend the provider) is valuable for the hospital as well as for the patient. Loyal patients are a good source of stable demand, lower acquisition costs and favourable word of mouth (Zeithaml et al., 1996) for hospitals. Continuity with one health care provider is linked to adherence and care outcomes for individuals (Birkhäuer et al., 2017). Service quality has always been suggested as one of the important antecedents of loyalty, and the SERVQUAL model, which represents five dimensions of tangibles, reliability, responsiveness, assurance and empathy, is the most used lens for measuring the quality of services in hospital settings (Babakus & Mangold, 1992; Parasuraman et al., 1988). Empirical studies have repeatedly found these dimensions to correlate with satisfaction and behavioural intentions in hospital settings (Fatima et al., 2018; Kitapci et al., 2014; Meesala & Paul, 2018; Padma et al., 2010).

But there are some distinctions between healthcare and most other services that make the quality–loyalty connection less direct. Patients face a distinct information disadvantage, are highly susceptible to the service they receive, and often cannot assess it even after it is provided (Berry & Bendapudi, 2007). In such circumstances, return intention is very much dependent upon the level of trust that the patient has in the provider — his competence and his acting in the patient's interests. Commitment-trust theory proposes that trust is the key factor in turning positive exchanges into long-term relationships (Morgan & Hunt, 1994), while research in the medical field indicates that trust has a partial effect on service quality in shaping a patient's attitude (Chang et al., 2013). However, in most hospital studies, service quality is shown to influence loyalty either directly or via satisfaction, and only a few studies investigate the ‘mediation mechanism’ dimension of trust dimensionally.

Three gaps motivate the study. First, it's not clear which dimensions of service quality contribute to building trust, and which have a direct impact on loyalty; using overall service-quality measures masks differences that managers need to make priorities. Second, there is little evidence on the full or partial transmission of each dimension's effect on loyalty, especially in emerging economies. Third, hospital ownership is often ignored, even though public and private hospitals differ in resources, incentives, patient expectations, and patient alternatives (Andaleeb, 2001; Gilson, 2003). These differences can shape how quality and trust translate into loyalty in mixed health systems like India, where people shift between public and private facilities.

This study addresses these gaps by investigating the relationship between service quality, patient trust and loyalty in tertiary-care hospitals, using partial least squares structural equation modelling (PLS-SEM). It poses four research questions: (RQ1) What service quality dimensions affect patient trust? How important is the role of patient trust in loyalty? (RQ2) (RQ3) Is patient trust a mediator in the relationship between each service quality dimension and loyalty? (RQ4) Are there differences in these relationships in public and private hospitals?

The study has three contributions. It integrates the SERVQUAL framework with commitment–trust theory and provides a one-to-one representation that illustrates, dimension-wise, how service quality contributes to loyalty through trust mediation. Contrary to this, methodologically, it exceeds the level of explanatory fit by assessing the out-of-sample predictive power through PLSpredict, as well as by establishing measurement invariance prior to making a comparison between groups, and finally, by providing the importance–performance map analysis to help manage path estimates and turn them into managerial priorities. In practical terms, it pinpoints what kind of investments can provide a higher return on trust and loyalty for the public and private hospitals, respectively.2. Theoretical background and hypotheses

2.1 Theoretical foundations

The study is based on two theories. The first is the gap model of service quality, which states that perceived quality is the patient's overall judgement of the excellence of a health service and breaks it down into five dimensions (Parasuraman et al., 1985, 1988). Tangibles includes the physical facilities, equipment and appearance of staff, reliability is dependable and accurate service as promised, responsiveness is willingness to help patients and provide prompt service, assurance is the knowledge and courtesy of the staff and ability to inspire patients' confidence and empathy is caring and individualised attention for patients. The five-dimension model of service quality was adapted and has been validated in various hospitals in developed and developing countries (Andaleeb, 2001; Babakus & Mangold, 1992; Padma et al., 2010), although the dimensionality of service quality is discussed (Brady & Cronin, 2001; Cronin & Taylor, 1992). She follows Cronin and Taylor (1992), focusing on the measurement of performance perceptions rather than expectation–perception gaps.

The second foundation is commitment–trust theory, which proposes that trust, the degree of confidence placed in exchange partners as reliable and trustworthy, mediates the relationship between antecedents and results, including relational outcomes of cooperation and continued exchange (Morgan & Hunt, 1994). Trust lowers the perceived risk of an exchange and matters most when outcomes are unknown, and the trusting party is at risk (Doney & Cannon, 1997; Moorman et al., 1992). In fact, healthcare is an extreme example of such an exchange. Thus, patients rely on cues they encounter, such as provider facilities, service punctuality, providers' attitudes and abilities, and the attention they receive, as indicators of the service provider's trustworthiness (Sirdeshmukh et al., 2002;

Berry & Bendapudi, 2007). Oliver's (1999) loyalty development process, which progresses from cognitive evaluation to affective attachment and then to behavioural intention, offers further insight that this transference is loosely similar: quality evaluations (cognitive) to trust (affective–relational) to loyalty (conative).

Integrating these two ideas gives the following conceptual model shown in Fig. 1. The five service-quality dimensions are represented as antecedents of patient trust; patient trust is an antecedent of patients' loyalty and serves as a mediator between each of the quality dimensions and loyalty. As a moderator of the structural relationships, ownership of hospitals is examined.

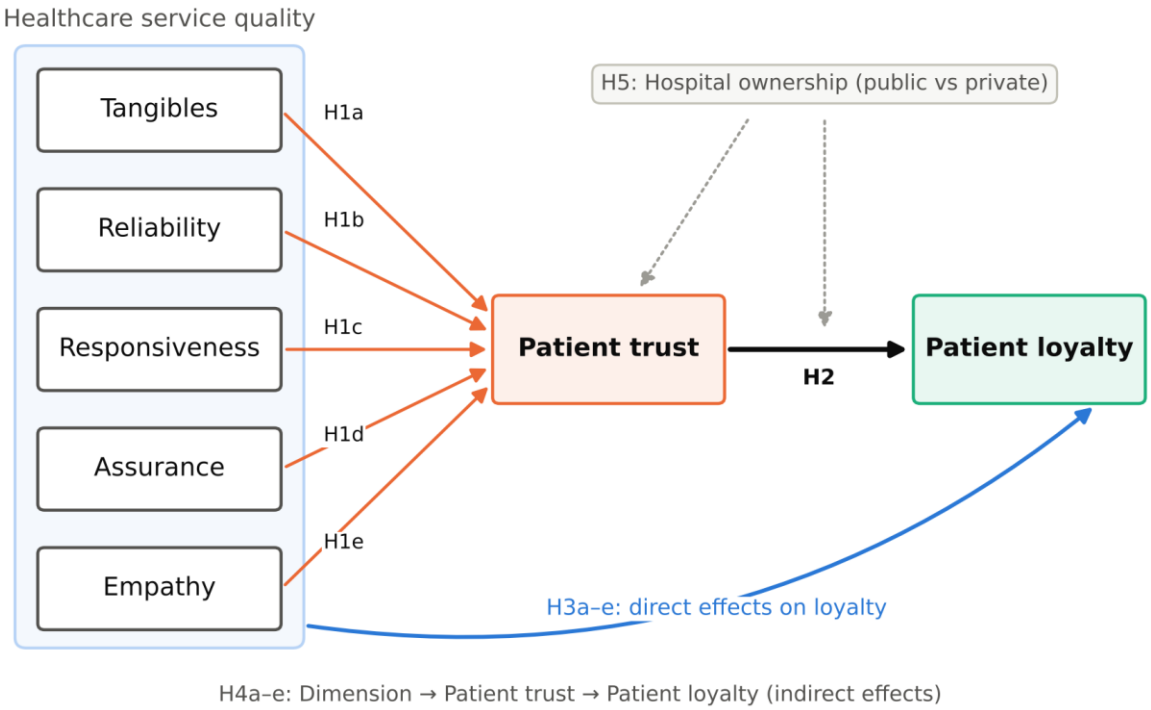


Fig. 1. Conceptual model and hypotheses

2.2 Service quality and patient trust

Patient trust is defined here as the patient's confidence that the hospital and its staff are competent, honest and will act in the patient's best interest (Hall et al., 2001). There is trust between individuals (clinicians) and trust in the institution (hospital) (Gilson, 2003; Ozawa & Sripad, 2013). Patients are not immediately able to evaluate the competence level of the clinician and they assess it by how credible the service is, based on their experience of it (Chang et al., 2013).

Each of the SERVQUAL dimensions provides a different cue. A well-kept up environment and contemporary equipment demonstrate investment and a sense of professionalism and, in the eyes of the patients, competence (Andaleeb, 2001). The dependability aspect of trust in the credibility component of the C-T-B reflects service reliability, including accurate records, correct diagnosis, and procedures performed as promised (Doney & Cannon, 1997). Responsiveness indicates that staff respond to patients' needs and reflects benevolence. Assurance, demonstrated by employee knowledge and friendliness, clearly and directly communicates competence and thus boosts confidence (Parasuraman et al., 1988). The provider's caring signal, illustrated by empathy achieved through individualised attention and respect for the patient's concern, mediates interpersonal trust in physicians. This caring signal reflects the provider's empathy, obtained through individualized attention and respect for the patient's concern, and represents an important avenue for interpersonal trust in the physician. We therefore hypothesise:

H1. Perceived (a) tangibles, (b) reliability, (c) responsiveness, (d) assurance and (e) empathy each have a positive effect on patient trust.

2.3 Patient trust and patient loyalty

Loyalty is defined as a strong inclination to return to a preferred service provider and encourage others to do the same, based on attitudinal and behavioral intentions (Dick & Basu, 1994; Oliver, 1999). In healthcare, loyal patients plan to use the hospital again, refer family and friends, and are hesitant to switch to another hospital (Fatima et al., 2018; Kessler & Mylod, 2011). Commitment–trust theory suggests that the more trust, the lower the perceived risk of continuing the relationship and the less attractive the switching alternative is (Morgan &

Hunt, 1994). Compared with other services, healthcare decision-making is high-stakes and more complex to assess; as a result, a patient who has placed trust in a hospital has a stronger incentive to return than to choose an unfamiliar provider (Sirdeshmukh et al., 2002). Trust in physicians is also positively associated with continuity of care and patient-reported health benefits (Birkhäuer et al., 2017; Hall et al., 2001). Hence:

H2. A Patient Trust Is Correlated With Patient Loyalty

2.4 Service Quality/Patient Loyalty

Service quality can also directly impact their loyalty. According to the behavioural-consequences model, higher service quality leads to greater positive behavior, for instance, the intention to return, and the intention to recommend (Zeithaml et al., 1996). Despite varying relationship strengths between service-quality dimensions and repurchase intentions or word of mouth (Kitapci et al., 2014; Meesala & Paul, 2018) across dimensions and contexts, the literature reports direct linkages between the two. Evaluating the direct and indirect methods results in the determination of the type of mediation (Zhao et al., 2010):

H3. Perceived (a) tangibles, (b) reliability, (c) responsiveness, (d) assurance, and (e) empathy positively and directly influence patient loyalty on their own.

2.5 Patient trust as the mediator

When the relationship is based on a belief in the other's trustworthiness, deduced from service-quality cues, then some or all of the influence of service quality on the relationship should be vested in trust. According to commitment-trust theory, trust can be explicitly considered a mediating variable (Morgan & Hunt, 1994), and related studies in medical encounters show that trust helps connect service quality with resulting evaluations (Chang et al., 2013). General dimensions that are indicating competence and dependability (tangibles and reliability) may act mostly through trust, while the general dimensions indicating aspects where personal contacts occur (assurance and empathy) may also directly impact loyalty. We therefore propose:

H4. The roles of tangibles, reliability, responsiveness, assurance and empathy as mediators of patient trust in relation to patient loyalty are calculated.

2.6 The moderating role of hospital ownership

Public and private hospitals differ in funding, workforce, patient numbers, and patient demands (Andaleeb 2001; Mosadeghrad 2014). In public hospitals, patients may pay little or nothing for services and have few alternatives, so their repeated use of the hospital may be less based on relational factors. Retention may be influenced more by trust, as private hospitals charge fees and compete for patients who can choose where to seek medical services, and interpersonal attention may matter more. Furthermore, institutional trust varies between publicly and privately governed organisations (Gilson, 2003). These contextual differences may change the mechanisms that lead to the establishment of trust and the effects of that trust, and so we hypothesize:

H5. Hospital ownership (public and private) moderates the relationships between service-quality dimensions, patient trust, and patient loyalty.

3. Methodology

3.1 Research Design And Setting Were The Three Things That Happened With The Material

This study used a cross-sectional, quantitative survey design. Data were collected in four tertiary-care hospitals — two public (government) and two private — in Pune, Maharashtra, India. We selected these hospitals because they provide comparable multispecialty facilities and serve urban and rural catchment areas, with patients transferring to and from them, making them a meaningful comparison for ownership types. Reporting is in line with the STROBE guidelines for cross-sectional studies.

3.2 Population, Sampling And Sample Size

The population of interest was all adult patients (ages 18 and above) served by participating hospitals in outpatient or inpatient settings. Eligibility criteria included at least one completed encounter (consultation, diagnostic service, or discharge service) and the capacity to provide informed consent. Those in emergency, critical and unable to participate were excluded. A systematic sampling procedure was adopted at outlet points from the outpatients and discharge desks, selecting candidates one in three and quotas were set to achieve a similar number in public and private hospitals.

We determined the minimum sample size in two ways. An a priori power analysis (assuming a small to medium effect size of $f^2 = 0.05$, an alpha level of .05 and a power of .90) was conducted for the most complicated regression in the model (six predictors of loyalty), suggesting at least 355 respondents (Faul et al., 2009). Using a minimum path coefficient of .13 at the 5% significance level, the inverse square root method determined a sample size of 366 respondents (Kock & Hadaya, 2018). There is a greater than 45% response rate, well above both thresholds, of the 500 patients approached, 450 agreed and 430 returned questionnaires, with 18 questionnaires discarded as incomplete or straight-lined, leading to 412 valid questionnaires (196 public, 216 private).

3.3 Measurement instrument

Multi-item reflective scales, adopted from existing instruments and worded for use in the hospital setting, were used to measure all constructs (Appendix A). The answers for each

item were measured using a seven-point Likert scale ranging from strongly disagree (score of 1) to strongly agree (score of 7). We measured a five-service-quality dimensions framework, including 4 items each from SERVQUAL and its hospital adaptations (Babakus & Mangold, 1992; Dagger et al., 2007; Parasuraman et al., 1988). We adapted four patient trust items, competence, honesty, and benevolence, from Hall et al. (2001) and Anderson and Dedrick (1990). Patient loyalty was measured with five items adapted from Zeithaml et al. (1996) and Fatima et al. (2018) that address intentions to return, recommend, and resist switching hospitals. Using back-and-forth translation, bilingual experts developed the questionnaire in English and later translated it into Marathi and Hindi. After five experts in hospital administration and health services research conducted a content validity check, the instrument was pre-tested with 30 patients, resulting in a few wording changes. These pilot responses were not used in the main sample.

3.4 Data Collection And Ethical Issues

Trained research assistants who did not work in the participating hospitals collected the data from March 2026 to August 2026. Participants self-administered questionnaires, with assistants reading items aloud for those who requested it. The participating research institution's Institutional Ethics Committee approved the study (approval no.: ethics clearance reference to be verified) in accordance with the Declaration of Helsinki. All participants were provided with written informed consent, the participation was anonymous and voluntary, and no identifying/clinical information was kept. Common method bias was controlled for by several procedural measures that Podsakoff et al. (2003) suggested: respondents were assured of their anonymity, and there were no right or wrong answers, items of the predictor and outcome constructs were separated into distinct sections of the questionnaire, and the questionnaire was filled out outside of the presence of the treating staff.

3.5 Data analysis

This study's target constructs were the score of Short Circuit, the score of Single Response, and the Total score, which must be explained and predicted, and several of the relationships in the model are mediated relationships, and there were few values that deviated from normal, so PLS-SEM was selected (Hair et al., 2019, 2022). The PLS algorithm was based on Mode A estimation with the path weighting scheme (Lohmöller, 1989). We conducted the analysis in two phases, as suggested by Anderson and Gerbing (1988) and Hair et al. (2019). The measurement model was appraised using indicator loadings, internal consistency reliability (ICR) using Cronbach's α and ρA and ρC, convergent validity (CV) using average variance extracted (AVE) and discriminant validity (DV) using Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT) (Henseler et al., 2015; Fornell & Larcker, 1981; Dijkstra & Henseler, 2015). In the second step, a collinearity test (VIF), the significance of path coefficients by percentile bootstrapping (with 5,000 resamples), coefficient of determination (R^2), effect sizes (f^2) and out-of-sample predictive power (PLSpredict with 10 folds and 10 repetitions) (Shmueli et al., 2016, 2019) were used to evaluate the structural model. An approximate fit index (Hu & Bentler, 1999) is the standardised root mean square residual (SRMR).

The indirect effects were bootstrapped (Preacher & Hayes, 2008), and the variation accounted for (VAF) was reported as a descriptive indicator of the strength of the mediation effect following Zhao et al. (2010). To identify managerial priorities, we applied an importance–performance map analysis (IPMA) based on the target construct of patient loyalty (Ringle & Sarstedt, 2016). The three-step MICOM procedure (Henseler et al., 2016) was applied to test for measurement invariance and differences in path coefficients between groups were determined by a permutation test (Sarstedt et al., 2011) with 5,000 permutations. All analyses were performed in Python 3 (NumPy, pandas, SciPy) with an implementation of the PLS-SEM algorithm whose code is provided as supplementary material.

4. Results

4.1 Respondent profile

Table 1 presents the profile of the 412 respondents. Slightly more than half were male (53.9%), and the largest age group was 31–45 years (35.9%). Graduates formed the largest education group (32.8%). Most respondents were outpatients (57.5%), and three-quarters had visited the hospital more than once in the preceding two years. Private-hospital patients made up 52.4% of the sample.

Table 1. Demographic profile of respondents (n = 412).

Characteristic	Frequency	Percentage (%)
Gender		
Male	222	53.9
Female	190	46.1
Age (years)		
18–30	118	28.6
31–45	148	35.9
46–60	103	25.0

> 60	43	10.4
Education		
Up to secondary	103	25.0
Higher secondary	112	27.2
Graduate	135	32.8
Postgraduate	62	15.0
Patient type		
Outpatient	237	57.5
Inpatient	175	42.5
Visits to this hospital (past 2 years)		
First visit	97	23.5
2–3 visits	202	49.0
≥ 4 visits	113	27.4
Hospital ownership		
Public	196	47.6
Private	216	52.4

4.2 Data screening and common method bias

No responses were missing for the retained responses. Shapiro–Wilk tests revealed that all 35 items (ranging from 4.48 to 5.36 on the seven-point scale) were not normally distributed ($p < .05$), which warranted the use of a non-parametric, bootstrapping-based method. Two statistical approaches were used to assess common method bias. In Harman's single-factor test, the first 'unrotated factor' extracted 41.6% of the total variance, as the cut-off is 50% (Podsakoff et al., 2003). The full collinearity assessment showed that all VIF values for the constructs ranged from 1.41 to 2.48, below the recommended 3.3 threshold (Kock, 2015). Common method bias is thus not likely to be a threat to the results.

4.3 Measurement model

Table 2 reports the measurement model results. All 35 indicator loadings were above the recommended .708 threshold (range .767 – .902), and indicator VIFs (1.54 – 3.02) were less than 5, suggesting no problematic indicator collinearity. Cronbach's α, psychological α, and composite reliability were .836–.901, .837–.903, and .891–.930, respectively, and indicated that, within competing items, the internal consistency was high at >.70, but not too high (>.95). All constructs had an AVE greater than .50 (Hair et al., 2022), thus establishing convergent validity.

Table 2. Measurement model: indicator statistics, loadings, reliability and convergent validity.

Construct	Item	Mean	SD	Loading	VIF	α	ρA	ρC	AVE
Tangibles	TAN1	5.36	1.12	.831	1.86	.836	.837	.891	.671
	TAN2	5.29	1.17	.833	1.99				
	TAN3	5.33	1.15	.844	2.06				
	TAN4	5.25	1.13	.767	1.54				
Reliability	REL1	4.85	1.15	.871	2.54	.888	.889	.923	.749
	REL2	4.79	1.18	.878	2.49				
	REL3	4.78	1.20	.867	2.38				
	REL4	4.90	1.17	.846	2.09				
Responsiveness	RES1	4.51	1.18	.818	1.92	.870	.874	.911	.719
	RES2	4.48	1.18	.851	2.13				
	RES3	4.50	1.26	.862	2.29				
	RES4	4.53	1.22	.860	2.11				
Assurance	ASS1	5.13	1.20	.851	2.20	.900	.901	.930	.769
	ASS2	5.12	1.20	.902	3.02				
	ASS3	5.15	1.19	.877	2.62				
	ASS4	5.12	1.22	.877	2.49				
Empathy	EMP1	4.57	1.26	.847	2.20	.885	.889	.921	.744
	EMP2	4.65	1.22	.898	2.77				

	EMP3	4.65	1.22	.869	2.35				
	EMP4	4.62	1.17	.835	2.04				
Patient trust	PT1	4.94	1.16	.835	2.26	.896	.900	.923	.706
	PT2	4.89	1.12	.866	2.48				
	PT3	4.91	1.16	.853	2.33				
	PT4	4.84	1.16	.826	2.09				
	PT5	4.91	1.16	.821	2.13				
Patient loyalty	PL1	5.03	1.15	.844	2.30	.901	.903	.926	.716
	PL2	5.02	1.19	.882	2.84				
	PL3	4.99	1.21	.860	2.43				
	PL4	5.02	1.19	.851	2.42				
	PL5	5.00	1.17	.791	1.91				

Note. SD = standard deviation; VIF = outer variance inflation factor; α = Cronbach's alpha; ρA = Dijkstra–Henseler reliability; ρC = composite reliability; AVE = average variance extracted. All loadings were significant at $p < .001$ (5,000 bootstrap resamples).

Discriminant validity was established by both criteria (Table 3). The square root of each construct's AVE exceeded its correlations with all other constructs (Fornell & Larcker, 1981). All HTMT ratios were below the conservative .85 threshold (maximum .752, between patient trust and patient loyalty), and the upper bounds of the 95% bootstrap confidence intervals were below .85 (maximum .806), confirming that the HTMT values differ significantly from 1 (Henseler et al., 2015) (Fig. 2). The cross-loadings in Appendix B show that every item loads most strongly on its own construct.

Table 3. Discriminant validity: Fornell–Larcker criterion (below diagonal) and HTMT ratios (above diagonal).

Construct	**TAN**	**REL**	**RES**	**ASS**	**EMP**	**PT**	**PL**
Tangibles	.819	*.519*	*.434*	*.460*	*.382*	*.555*	*.432*
Reliability	.448	.865	*.590*	*.553*	*.504*	*.629*	*.551*
Responsiveness	.372	.520	.848	*.497*	*.517*	*.599*	*.553*
Assurance	.399	.495	.441	.877	*.582*	*.644*	*.651*
Empathy	.330	.448	.456	.520	.862	*.603*	*.583*
Patient trust	.481	.567	.534	.582	.541	.840	*.752*
Patient loyalty	.376	.494	.493	.589	.522	.679	.846

Note. Bold diagonal values are the square roots of the AVE; values below the diagonal are construct correlations; italic values above the diagonal are HTMT ratios. TAN = tangibles; REL = reliability; RES = responsiveness; ASS = assurance; EMP = empathy; PT = patient trust; PL = patient loyalty.

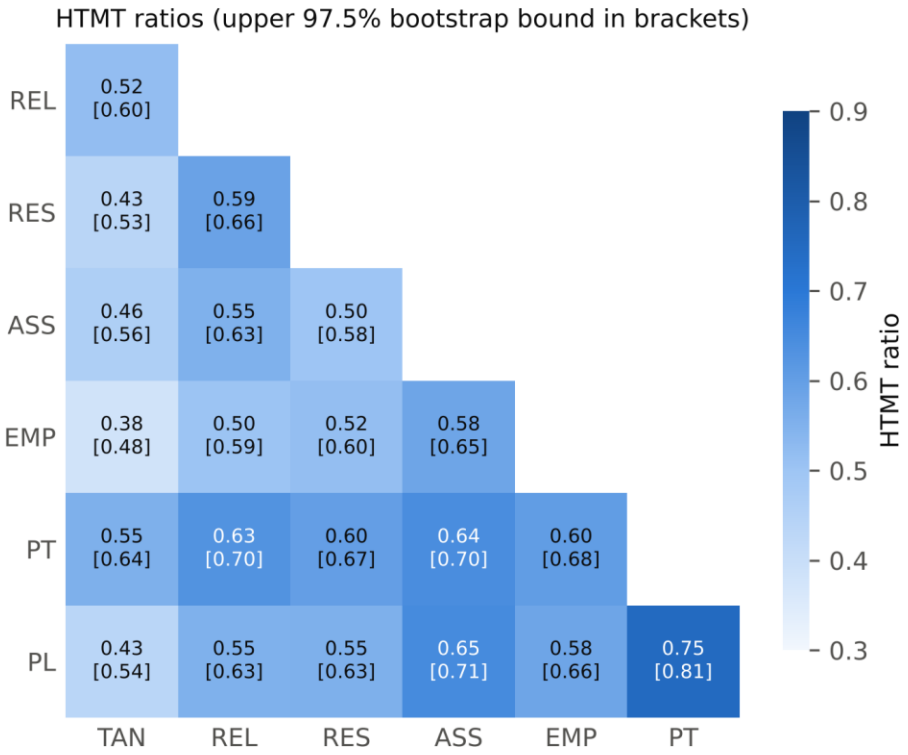


Fig. 2. Heterotrait–monotrait (HTMT) ratios among the constructs. Values in brackets are the upper bounds of the 95% bootstrap confidence intervals (5,000 resamples); all are below the .85 threshold.

4.4 Structural model

Inner VIFs ranged from 1.35 to 2.13, all below 3, suggesting no collinearity among the predictors that would affect path estimates. The model had an acceptable fit (Hu & Bentler, 1999), with an SRMR of .042, below the .08 threshold. The results from the structural model are presented in Table 4 and Fig. 3

All five service-quality dimensions had significant positive effects on patient trust: tangibles ($\beta = .169$, $p < .001$), reliability ($\beta = .194$, $p < .001$), responsiveness ($\beta = .177$, $p < .001$), assurance ($\beta = .240$, $p < .001$) and empathy ($\beta = .193$, $p < .001$). These support H1a–H1e, and especially (most strongly) assurance. The five dimensions accounted for 53.0% of the variance in patient trust (R2 = .530, adjusted R2 = .524) – which is moderate to substantial.

Patient trust had the strongest positive influence on loyalty ($\beta = .404$, $p < .001$; $f^2 = .168$), confirming H2; it was the most important predictor of loyalty and had a medium effect size. Of the direct effects of the quality dimensions on loyalty, those of assurance ($\beta = .224$, $p < .001$), empathy ($\beta = .121$, $p = .010$) and responsiveness ($\beta = .100$, $p = .022$) were significant, whereas those of tangibles ($\beta = -.007$, $p = .860$) and reliability ($\beta = .051$, $p = .250$) were not. H3 c, d and e were supported; H3 a and b were not supported. The model explained 54.1% of the variance in loyalty ($R^2 = .541$; adjusted $R^2 = .534$).

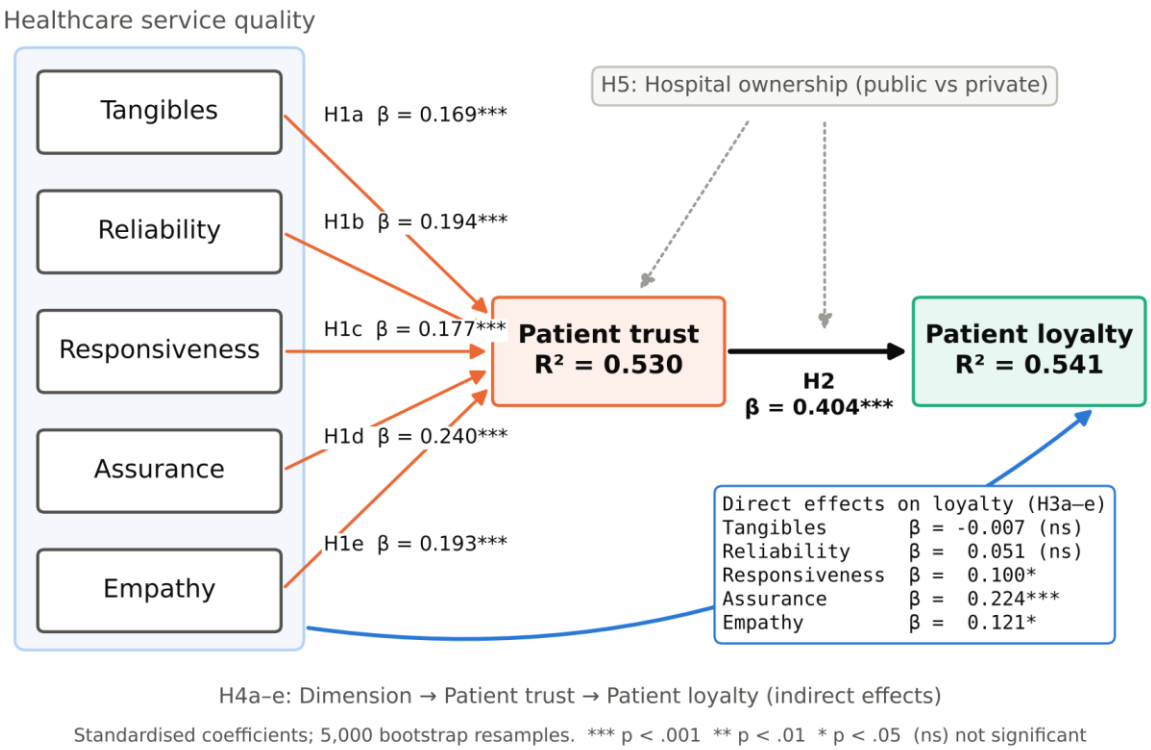


Fig. 3. Structural model results. Standardised path coefficients with bootstrap significance (5,000 resamples); R^2 values are shown for the endogenous constructs.

Table 4. Structural model: hypothesis testing of direct effects.

H	Path	β	SE	t	p	95% CI	f^2	VIF	Decision
H1a	Tangibles → Patient trust	.169	.040	4.267	< .001	[.092, .247]	.045	1.347	Supported
H1b	Reliability → Patient trust	.194	.041	4.724	< .001	[.114, .273]	.047	1.695	Supported
H1c	Responsiveness → Patient trust	.177	.046	3.832	< .001	[.085, .266]	.043	1.555	Supported
H1d	Assurance → Patient trust	.240	.042	5.775	< .001	[.157, .320]	.075	1.635	Supported
H1e	Empathy → Patient trust	.193	.043	4.546	< .001	[.109, .274]	.051	1.548	Supported
H2	Patient trust → Patient loyalty	.404	.048	8.347	< .001	[.310, .500]	.168	2.126	Supported
H3a	Tangibles → Patient loyalty	−.007	.042	-0.176	.860	[−.089, .077]	.000	1.408	Not supported
H3b	Reliability → Patient loyalty	.051	.044	1.151	.250	[−.035, .133]	.003	1.775	Not supported
H3c	Responsiveness → Patient loyalty	.100	.043	2.294	.022	[.012, .181]	.013	1.622	Supported
H3d	Assurance → Patient loyalty	.224	.043	5.227	< .001	[.140, .307]	.062	1.758	Supported
H3e	Empathy → Patient loyalty	.121	.047	2.569	.010	[.029, .212]	.020	1.627	Supported

Note. β = standardised path coefficient; SE = bootstrap standard error; CI = 95% percentile bootstrap confidence interval (5,000 resamples); f^2 = effect size (.02 small, .15 medium, .35 large). R^2(Patient trust) = .530; R^2(Patient loyalty) = .541; SRMR = .042.

4.5 Mediation analysis

Table 5 and Fig. 4 report the mediation results. The indirect effect through patient trust was positive and significant for every service-quality dimension, as none of the 95% bootstrap confidence intervals included zero; H4a–H4e are therefore supported. The pattern of mediation, however, differed by dimension. For tangibles (indirect effect = .068, 95% CI [.036, .106]) and reliability (.078 [.043, .119]), the direct effects on loyalty were not significant, indicating full (indirect-only) mediation: these dimensions influence loyalty only by building trust. For responsiveness (.071 [.033, .114]), assurance (.097 [.059, .139]) and empathy (.078 [.041, .120]), both the direct and the indirect effects were significant and positive, indicating complementary partial mediation (Zhao et al., 2010), with trust accounting for 41.8%, 30.2% and 39.3% of their total effects, respectively.

Table 5. Mediating role of patient trust (specific indirect effects).

H	Indirect path	Indirect	SE	t	p	95% CI	Direct	Total	VAF	Mediation
H4a	Tangibles → PT → PL	.068	.018	3.807	< .001	[.036, .106]	−.007 (ns)	.061	> 100 %	Full (indirect-only)
H4b	Reliability → PT → PL	.078	.019	4.049	< .001	[.043, .119]	.051 (ns)	.129	60.8 %	Full (indirect-only)
H4c	Responsiveness → PT → PL	.071	.020	3.489	< .001	[.033, .114]	.100	.171	41.8 %	Partial (complementary)
H4d	Assurance → PT → PL	.097	.021	4.699	< .001	[.059, .139]	.224	.322	30.2 %	Partial (complementary)
H4e	Empathy → PT → PL	.078	.020	3.849	< .001	[.041, .120]	.121	.199	39.3 %	Partial (complementary)

Note. PT = patient trust; PL = patient loyalty; VAF = variance accounted for (indirect/total effect); ns = not significant. Mediation classified following Zhao et al. (2010). For tangibles the direct effect is slightly negative, so VAF exceeds 100%.

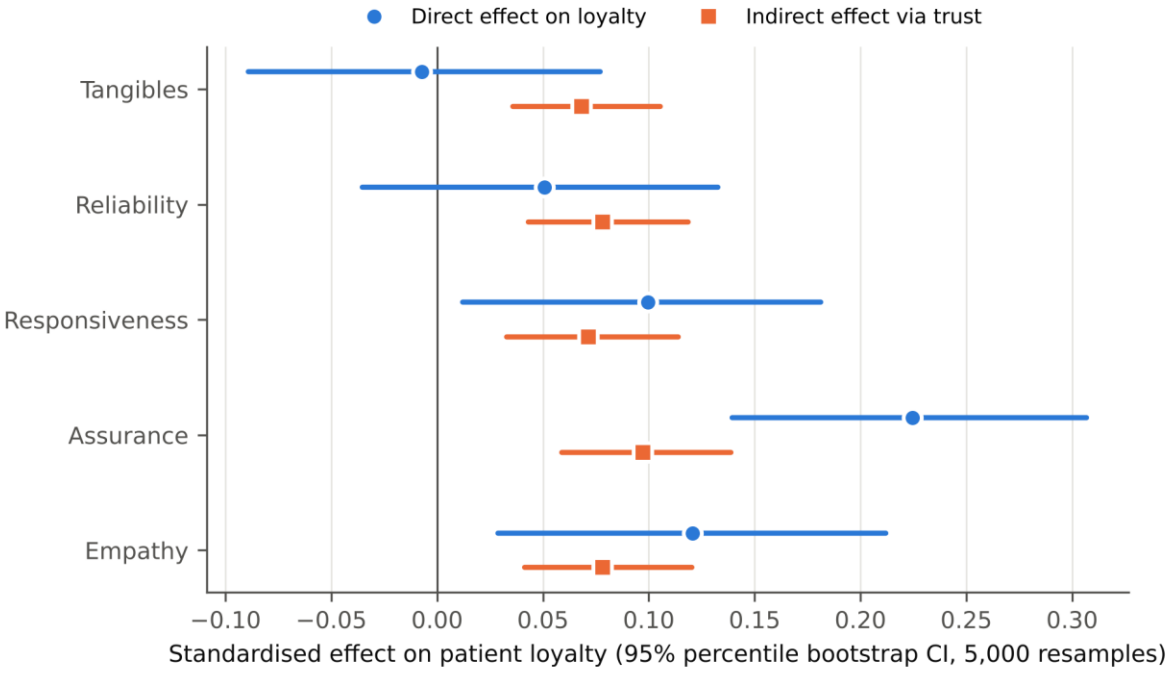


Fig. 4. Direct effects of the service-quality dimensions on patient loyalty and their indirect effects through patient trust, with 95% percentile bootstrap confidence intervals.

4.6 Predictive power

Out-of-sample predictive power was assessed with PLSpredict (Shmueli et al., 2019). All Q^2predict values for the indicators of patient trust and loyalty were positive (.247–.432), indicating that the model outperforms the naïve mean benchmark. Moreover, the PLS-SEM model produced lower root mean squared errors (RMSE) than the linear-model benchmark for all 10 indicators (Table 6; Fig. 5). According to Shmueli et al. (2019), this indicates high predictive power.

Table 6. PLSpredict assessment of out-of-sample predictive power.

Indicator	Q^2predict	RMSE (PLS)	MAE (PLS)	RMSE (LM)	MAE (LM)	ΔRMSE (PLS − LM)
PT1	.293	.976	.788	1.005	.809	−.029
PT2	.432	.842	.689	.865	.708	−.023
PT3	.426	.876	.694	.880	.691	−.004
PT4	.380	.914	.735	.933	.745	−.020
PT5	.278	.988	.788	1.000	.805	−.012
PL1	.328	.946	.774	.975	.795	−.029
PL2	.349	.965	.772	.979	.785	−.014
PL3	.360	.970	.771	.993	.789	−.023
PL4	.320	.983	.795	1.003	.808	−.021
PL5	.247	1.022	.832	1.045	.855	−.023

Note. 10-fold cross-validation with 10 repetitions. LM = linear regression benchmark using all exogenous indicators. Negative ΔRMSE indicates that PLS-SEM predicts better than the benchmark.

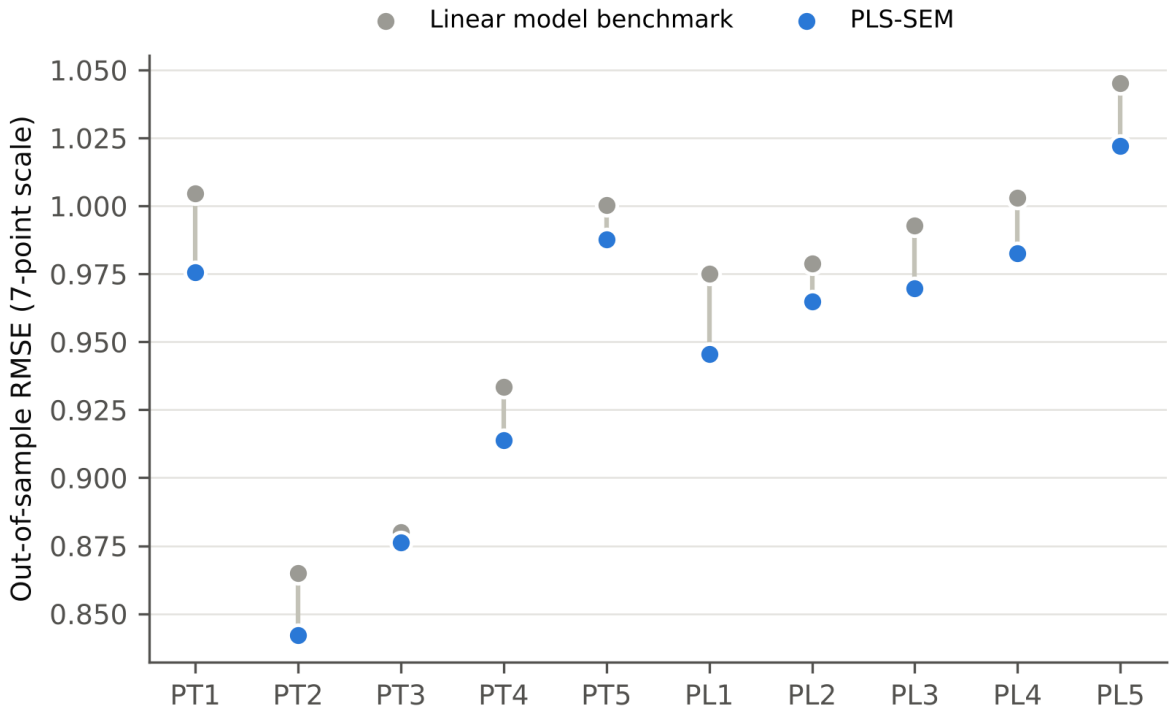


Fig. 5. Out-of-sample prediction errors (RMSE) of the PLS-SEM model and the linear-model benchmark for the indicators of patient trust (PT) and patient loyalty (PL).

4.7 Importance–performance map analysis

The IPMA (Fig. 6; Table 7) compares the overall impact of every construct on loyalty (importance) with its rescaled average (performance, 0–100). Patient trust had the highest importance (.420) but middling performance (64.96), making it the best area for improvement. The service-quality dimensions with the highest impact were assurance (.306) and already had a satisfactory score (68.85). The components with the lowest performance and above-average importance were empathy (.190, 60.38) and responsiveness (.167, 58.44); both were identified as priority areas. Tangibles had the highest performance score (71.85) but the lowest importance (0.065),

indicating that investing the least in physical facilities would be expected to have the greatest impact on loyalty.

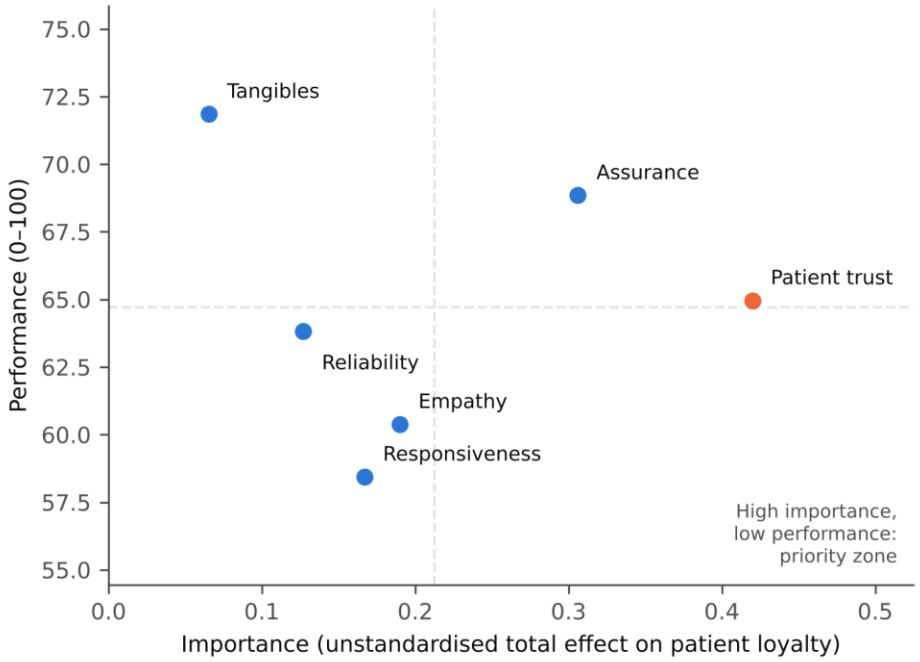


Fig. 6. Importance–performance map for patient loyalty. Dashed lines mark the mean importance and mean performance.

Table 7. Importance–performance map analysis (target construct: patient loyalty).

Construct	Importance (total effect)	Performance (0–100)
Patient trust	.420	64.96
Assurance	.306	68.85
Empathy	.190	60.38
Responsiveness	.167	58.44
Reliability	.127	63.82
Tangibles	.065	71.85

Note. Importance = unstandardised total effect on patient loyalty; performance = mean of rescaled latent variable scores. Performance of patient loyalty = 66.87.

4.8 Measurement invariance and multigroup analysis

To make a comparison between public and private hospitals, first the measurement invariance was examined using the program MICOM (Henseler et al., 2016) (Table 8). Configural invariance (step 1) was demonstrated by selecting exactly the same indicators in both groups and identical data treatments and algorithm settings. Five out of seven constructs showed compositional invariance (step 2). The correlation between composite scores computed using group-specific weights was just below the 5% quantile of the permutation distribution (group-specific weights determined using permutation analyses; 5000 permutations) for tangibles (c = .9943 vs 5% quantile = .9956) and empathy (c = .9987 vs .9988). Step 3 indicated no significant differences in composite variances across constructs, but significant differences in composite means for tangibles and responsiveness, with private-hospital patients scoring higher. Thus, partial measurement invariance was achieved for reliability, responsiveness, assurance, trust, and loyalty, allowing valid comparison of path dimension weights (Henseler et al., 2016). The paths from tangibles and empathy are mentioned for completeness but may not be considered as group differences.**Table 8.** Measurement invariance of composites (MICOM): public vs private hospitals.

Construct	c	5% quantile	Step 2	Mean diff.	95% CI	Equal	Log-var. diff.	95% CI	Equal	Invariance
Tangibles	0.9943	0.9956	No	−.360	[−.187, .196]	No	−.031	[−.251, .256]	Yes	Not establishe

										d
Reliability	0.9998	0.9989	Yes	−.134	[−.189, .189]	Yes	−.186	[−.246, .243]	Yes	Full
Responsiveness	1.0000	0.9984	Yes	−.273	[−.192, .192]	No	−.017	[−.271, .264]	Yes	Partial
Assurance	0.9999	0.9993	Yes	.151	[−.191, .194]	Yes	−.088	[−.287, .277]	Yes	Full
Empathy	0.9987	0.9988	No	−.019	[−.192, .192]	Yes	−.119	[−.264, .264]	Yes	Not established
Patient trust	0.9999	0.9995	Yes	.071	[−.196, .193]	Yes	−.071	[−.274, .275]	Yes	Full
Patient loyalty	1.0000	0.9995	Yes	−.056	[−.194, .198]	Yes	−.001	[−.276, .270]	Yes	Full

Note. c = correlation between composite scores computed with public- and private-group weights; compositional invariance (step 2) holds when c ≥ the 5% permutation quantile. Step 3 compares composite means and log variances (public − private) with 95% permutation intervals (5,000 permutations). Configural invariance (step 1) holds by design.

The permutation-based multigroup analysis (Table 9; Fig. 7) revealed that, for the interpretable paths, hypothesis testing revealed a significant difference in the effect of trust on loyalty between the two groups (larger effect in private hospital; β = .513, p < .001), public hospital; β = .304, p < .001; Δβ = −.209, p = .037). For this to be the case, more variance in loyalty within the private-hospital patient segment would be attributed to the model than within the public-hospital patient segment to the model (.663 in the private-hospital patient segment vs. .433 in the public-hospital patient segment), while there would not be a significant difference in variance explained in relation to trust (.567 vs .530). There were no significant differences between groups with regard to any other interpretable paths. The empathy–trust path was also larger in private hospitals (β = .307, p < .001) than in the public hospital group (β = .088, p = .108; Δβ = −.219, p = .010), but because compositional invariance tests were not conducted on empathy, this is not viewed as evidence of moderation. Thus H5 is partially supported.

Table 9. Multigroup analysis: public vs private hospitals.

Path	**β Public (n = 196)**	**β Private (n = 216)**	**Difference**	**p (permutation)**	**Significant**
Tangibles → Patient trust†	.203***	.176***	.027	.741	No
Reliability → Patient trust	.262***	.157**	.105	.215	No
Responsiveness → Patient trust	.257***	.127*	.130	.169	No
Assurance → Patient trust	.183**	.201***	−.018	.831	No
Empathy → Patient trust†	.088	.307***	−.219	.010	Yes
Tangibles → Patient loyalty†	−.042	.027	−.069	.405	No
Reliability → Patient loyalty	.004	.089	−.086	.338	No
Responsiveness → Patient loyalty	.154*	.017	.137	.122	No
Assurance → Patient loyalty	.276***	.193***	.083	.340	No
Empathy → Patient loyalty†	.104	.119*	−.015	.883	No
Patient trust → Patient loyalty	.304***	.513***	−.209	.037	Yes

Note. *** p < .001, ** p < .01, * p < .05 (group-specific bootstrapping, 2,000 resamples). Difference = β Public − β Private; p from permutation test (5,000 permutations). † Compositional invariance not established for tangibles and empathy; differences in these paths are not interpreted. R^2(PT): public = .530, private = .567; R^2(PL): public = .433, private = .663.

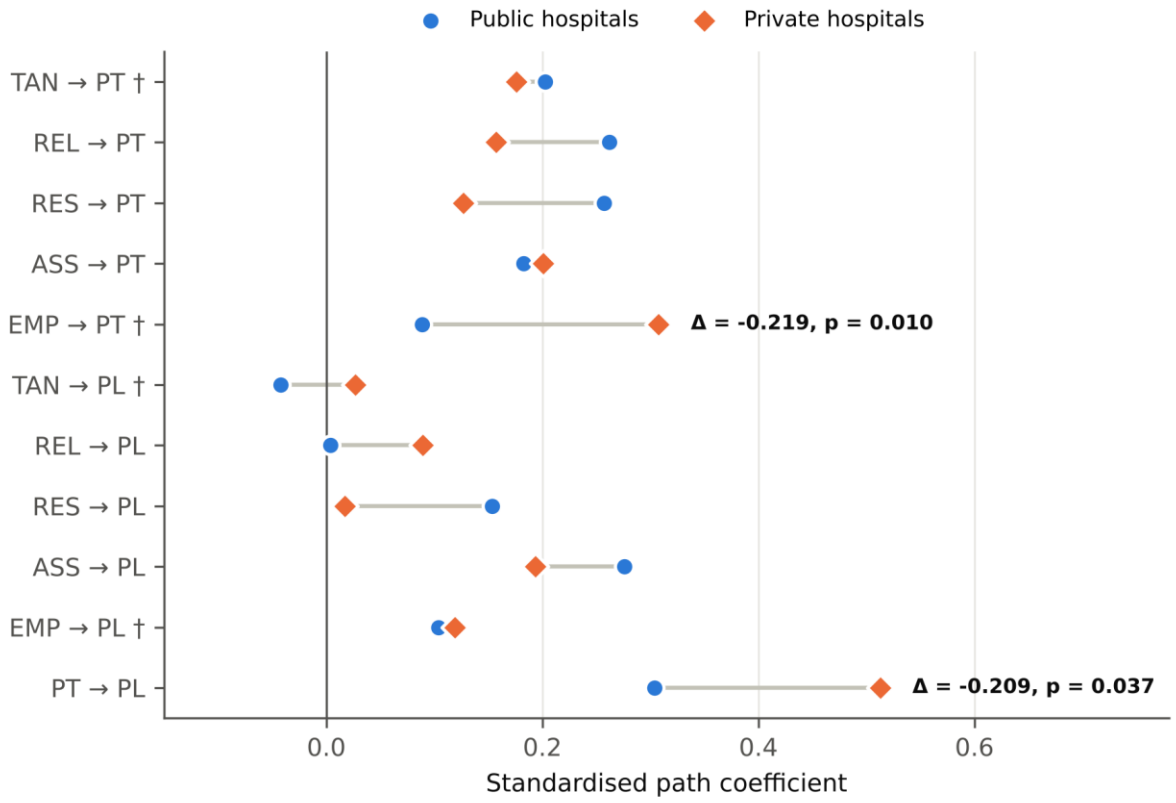


Fig. 7. Path coefficients in public and private hospitals. Labelled paths differ significantly between groups (permutation test, 5,000 permutations); † marks paths whose group difference is not interpreted because compositional invariance was not established.

4.9 Summary of hypothesis tests

Table 10 summarises the results of the hypothesis tests. Of the 16 hypothesised direct and indirect relationships (H1–H4), 14 were supported; the two direct effects of tangibles and reliability on loyalty were not. The moderating hypothesis H5 was partially supported.

Table 10. Summary of hypothesis testing.

Hypothesis	Relationship	Result
H1a	Tangibles → Patient trust	Supported
H1b	Reliability → Patient trust	Supported
H1c	Responsiveness → Patient trust	Supported
H1d	Assurance → Patient trust	Supported
H1e	Empathy → Patient trust	Supported
H2	Patient trust → Patient loyalty	Supported
H3a	Tangibles → Patient loyalty	Not supported
H3b	Reliability → Patient loyalty	Not supported
H3c	Responsiveness → Patient loyalty	Supported
H3d	Assurance → Patient loyalty	Supported
H3e	Empathy → Patient loyalty	Supported
H4a	Tangibles → Patient trust → Patient loyalty	Supported (full mediation)
H4b	Reliability → Patient trust → Patient loyalty	Supported (full mediation)
H4c	Responsiveness → Patient trust → Patient loyalty	Supported (partial mediation)
H4d	Assurance → Patient trust → Patient loyalty	Supported (partial mediation)
H4e	Empathy → Patient trust → Patient loyalty	Supported (partial mediation)
H5	Hospital ownership moderates the structural relationships	Partially supported (Patient trust → Patient loyalty)

5. Discussion

This research investigated the relationship between healthcare service quality and patient trust and loyalty, the role of trust in these relationships, and differences between public and private hospitals. The results indicate that ownership context shapes the trust-formation process and, consequently, how much it contributes to customer loyalty, making service quality more important for developing customer loyalty primarily by fostering trust.

5.1 The importance of service quality for building trust

All 5 dimensions of service quality contributed significantly to patient trust, accounting for over 50% of the variance. It is known that patients cannot make a direct assessment of clinical quality and are likely to base their inferences about a hospital's trustworthiness on the visible cues of service (Berry & Bendapudi, 2007; Chang et al., 2013). Assurance was the strongest predictor of trust, consistent with the idea that staff competence and courtesy are the most direct indicators of a provider's credibility (Doney & Cannon, 1997; Hall et al., 2001). However, the other four dimensions are reasonably well spread, suggesting that building trust is a cumulative effort rather than something one can excel at in just one area. This aligns with recent studies in hospitals (Dagger et al., 2007; Fatima et al., 2018) that view service quality as multidimensional and builds on these studies to show that each dimension is distinctly associated with trust while accounting for the other dimensions.

5.2 Strategies for Building and Maintaining Customer Loyalty

Patient trust was the strongest predictor of patient loyalty, about twice as strong as the most influential service quality dimension. This aligns with commitment-trust theory, which centers trust as key to understanding why patients continue with their providers (Morgan & Hunt, 1994), and evidence that patients who trust their providers are more likely to remain engaged in care (Birkhäuer et al., 2017). A refinement of this conclusion is provided by the results of the mediation. Trust was the only factor in which tangibles and reliability impacted loyalty: modern facilities and dependable processes do not make patients come back; they give patients a greater sense of trust, which leads to loyalty. By contrast, responsiveness, assurance and empathy (those that focus on actual interactions with staff) affected loyalty both directly and through trust. This mirrors Oliver's (1999) conception that loyalty is forged along cognitive and affective paths, with interpersonal aspects seemingly fostering affective loyalty beyond the norms of trust which they engender. The lack of a direct effect of tangibles also explains inconsistent findings in the previous literature on hospitals (Kitapci et al., 2014; Meesala & Paul (2018): the effect of physical facilities on loyalty might be valid but purely indirect, and it may not show up if the relationship is not modelled by introducing trust into the model.

5.3 Hospital ownership

Both sets of results indicated that the second step prediction held for private hospitals, with trust predicting loyalty to a stronger extent and a higher amount of variance for patients attending private hospitals being explained by the model. One possible explanation is that leaving is mainly driven by the level of trust in the private hospital provider, who typically asks for payment, while in public hospitals, the link between trust and loyalty is weaker, because it may happen due to low cost or limited alternatives (Andaleeb, 2001; Mosadeghrad, 2014). The larger path between private-hospital patients leads in a similar direction, as patients who pay for hospital care might think they receive individualised attention as evidence of the provider's intentions; however, given that there is no confirmation of the compositional invariance of empathy, this should be corroborated in future research before it could be called a true "ownership effect". This finding also suggests that a one-size-fits-all approach to patient relationships is inappropriate across ownership types and supports the view that "trust is a function of the institutional context of care" (Gilson, 2003).

5.4 Theoretical implications

The article contributes in three ways to the theory. First, it connects the SERVQUAL framework with commitment–trust theory by showing that trust links perceived quality of healthcare services to loyalty. When mediation is estimated for each dimension, it is revealed that mediation does not work in the same manner for every dimension, with competence-signalling dimensions (tangibles and reliability) being fully mediated and interpersonal dimensions (responsiveness, assurance and empathy) being partially mediated. Second, the study clarifies the context in which the service quality–loyalty relationship works: ownership type moderates trust formation and its behavioral consequences, with implications for theories of patient loyalty that tend to ignore the institutional and economic setting in which patients select providers. Third, the study validates the model's high out-of-sample predictive power, demonstrating its usefulness not only for explaining the dynamics of patient trust and loyalty but also for predicting them, thereby enhancing its value for evidence-based hospital management (Shmueli et al., 2019).

5.5 Managerial implications

The findings suggest some implications for patient-centred healthcare management. First, hospital managers should take the patient's trust itself as a performance measure in addition to satisfaction as the quality of service leads to satisfaction and then to trust. Second, the IPMA shows that empathy and

responsiveness are important factors that currently perform worst and therefore, likely offer the greatest opportunity for improvement. Practical actions include providing training in patient-oriented communication, ensuring adequate consultation time, clearly explaining diagnosis and treatment, reducing waiting times, and making complaint procedures visible (Epstein & Street, 2011; Rathert et al., 2013). Third, continual professional development and a uniform level of courtesy are key to ensuring assurances are maintained, and the best bid for trust is unchanged. Fourth, there is further investment in the 'facilities' which is justified by the confidence it contributes and not by its direct effect on loyalty: tangibles already perform well and work through loyalty only by way of trust. Finally, because trust is most likely to become loyalty in a private hospital, the private sector may need to prioritize and invest in building trust as a retention tool, while the public sector may need to take other measures (such as improving access/continuity of care) alongside building trust to improve loyalty.

7. Key takeaways

There are some caveats. First, it is a cross-sectional study, so causal inferences are not possible; longitudinal or experimental designs could examine how trust develops over repeated encounters. Second, the data were gathered in Pune, India, in the state of Maharashtra, and may not represent other health systems or primary care. Third, while statistical and procedural tests suggested that common method bias was unlikely, all constructs were self-reported; future research should link survey responses to actual outcomes (return visits). Fourth, loyalty was assessed through intentions, which do not necessarily reflect actual practice, especially in public hospitals where choice is limited. Fifth, a test of compositional invariance has not been conducted for the tangibles and empathy dimensions, and therefore, group comparisons using these dimensions should not be interpreted, although larger group samples and better indicators would allow a better test. Future research may also explore other mediators, such as satisfaction or perceived value, and moderators, such as health literacy, illness severity, and insurance status, and differentiate between interpersonal trust in doctors and institutional trust in hospitals (Ozawa & Sripad, 2013).

7. Conclusion

This study shows that service quality fosters patient loyalty primarily by building patients' trust. Patient trust increased in all five SERVQUAL dimensions, the strong factors to increase patient trust were trust, tangibles, reliability, responsiveness, assurance and empathy, whereas empathy had a partial mediating effect. The relationships also differed by ownership type, as trust was stronger in a private hospital than in a public hospital. The message for managers seeking to provide patient-centred care is that trust can be managed and that the investments that contribute most to building trust, empathetic communication and responsive service, should be adapted to the hospital's institutional environment.

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Appendix A. Measurement items

All items were rated on a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). Respondents answered with reference to the hospital at which they had just received care.

Tangibles (TAN) — *Adapted from Parasuraman et al. (1988); Babakus & Mangold (1992)*

TAN1 The hospital has modern, well-functioning medical equipment.

TAN2 The wards, waiting areas and facilities are clean and comfortable.

TAN3 Staff are neat and professional in appearance.

TAN4 Signage, forms and information materials are clear and easy to use.

Reliability (REL) — *Adapted from Parasuraman et al. (1988); Dagger et al. (2007)*

REL1 The hospital provides services at the time it promises.

REL2 Diagnoses, tests and treatments are performed correctly the first time.

REL3 My medical records and bills are accurate.

REL4 When I have a problem, the hospital shows a sincere interest in solving it.

Responsiveness (RES) — *Adapted from Parasuraman et al. (1988); Babakus & Mangold (1992)*

RES1 Staff tell me exactly when services will be performed.

RES2 I receive prompt service without unnecessary waiting.

RES3 Staff are always willing to help me.

RES4 Staff respond quickly to my requests and complaints.

Assurance (ASS) — *Adapted from Parasuraman et al. (1988); Dagger et al. (2007)*

ASS1 The doctors have the knowledge and skill to treat my condition.

ASS2 The behaviour of staff instils confidence in me.

ASS3 I feel safe receiving treatment at this hospital.

ASS4 Staff are consistently courteous to me.

Empathy (EMP) — *Adapted from Parasuraman et al. (1988); Andaleeb (2001)*

EMP1 Staff give me individual attention.

EMP2 Doctors listen carefully to my concerns.

EMP3 Staff understand my specific needs.

EMP4 The hospital has my best interests at heart.

Patient trust (PT) — *Adapted from Hall et al. (2001); Anderson & Dedrick (1990)*

PT1 I trust this hospital to provide competent medical care.

PT2 I believe the doctors and staff here are honest with me.

PT3 I trust that this hospital puts my health needs first.

PT4 I can rely on the information this hospital gives me about my treatment.

PT5 Overall, I have complete confidence in this hospital.

Patient loyalty (PL) — *Adapted from Zeithaml et al. (1996); Fatima et al. (2018)*

PL1 I will return to this hospital when I need medical care in future.

PL2 I would recommend this hospital to my family and friends.

PL3 I say positive things about this hospital to other people.

PL4 This hospital is my first choice for medical care.

PL5 I would continue to use this hospital even if another hospital were available.

Appendix B. Cross-loadings

Table 11. Cross-loadings of the indicators.

Item	TAN	REL	RES	ASS	EMP	PT	PL
TAN1	.831	.398	.297	.345	.285	.407	.326
TAN2	.833	.408	.314	.313	.268	.395	.295
TAN3	.844	.340	.287	.306	.281	.409	.284
TAN4	.767	.320	.322	.342	.246	.362	.327
REL1	.381	.871	.433	.419	.360	.462	.417
REL2	.409	.878	.453	.423	.403	.526	.424
REL3	.370	.867	.472	.427	.380	.481	.429
REL4	.390	.846	.440	.444	.407	.490	.438
RES1	.247	.390	.818	.370	.362	.421	.366
RES2	.319	.445	.851	.391	.405	.472	.403
RES3	.330	.469	.862	.342	.374	.433	.415
RES4	.357	.455	.860	.391	.401	.481	.478
ASS1	.382	.429	.369	.851	.470	.510	.505
ASS2	.314	.426	.405	.902	.455	.504	.543
ASS3	.357	.412	.377	.877	.449	.476	.488
ASS4	.347	.468	.394	.877	.451	.547	.526
EMP1	.273	.368	.358	.420	.847	.417	.434

EMP2	.319	.424	.422	.494	.898	.502	.486
EMP3	.299	.390	.404	.453	.869	.484	.463
EMP4	.242	.361	.384	.423	.835	.460	.415
PT1	.399	.434	.402	.437	.389	.835	.538
PT2	.396	.518	.519	.540	.494	.866	.615
PT3	.410	.562	.467	.512	.502	.853	.604
PT4	.440	.469	.475	.481	.463	.826	.554
PT5	.374	.380	.365	.464	.413	.821	.531
PL1	.328	.409	.400	.504	.470	.586	.844
PL2	.361	.451	.427	.526	.436	.597	.882
PL3	.313	.437	.463	.526	.456	.607	.860
PL4	.312	.395	.404	.516	.439	.552	.851
PL5	.273	.393	.389	.409	.404	.525	.791

Note. Bold values are loadings on the assigned construct; each exceeds the item's loadings on all other constructs.