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Why Can Some Service Employees Provide Service of a Consistently High Quality While Others Cannot?

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Abstract. Variation in service quality results in service failure and subsequent customer defection, and thus knowing how to manage such variation is critical for service managers. However, little is known about why, and at which workplaces, some service employees can provide service of a consistently high quality but others cannot. This study addresses this issue using the perspective of signal detection theory. Multiple-source and matched data from 160 nurses and 480 patients were used for the analysis. We found that job tenure was negatively related to variation in all dimensions of service quality. Moreover, control over practice interacts with job tenure and expertise to impact service variation and the average level of all dimensions of service quality. These factors interactively determine whether service employees can provide a consistently high quality of service. To our knowledge, this is the first empirical study addressing this issue by examining viable employee and workplace characteristics. The findings provide a means for service managers to ensure a consistently high level of service quality.

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Keywords: service quality variation • control over practice • job tenure • expertise • self-efficacy

Introduction

Service quality has been a popular issue in service research (Barrutia and Gilsanz 2013, To et al. 2013) because of its impacts on customer satisfaction, loyalty, and various dimensions of behavioral intentions (Zeithaml et al. 1996). Service has been characterized with the feature of *variability* (or heterogeneity), which is the inconsistency (or variation) between one service transaction and the next (Bateson and Hoffman 2008), i.e., how service quality varies for any one service worker.

Service quality variation (or its opposite, consistency) has been recognized as critical in business practice. For example, Gallup surveyed 45,000 customers to evaluate 4,600 customer service representatives of companies known for their service and found that their performance differed widely, with some representatives costing \$40 million a year but likely driving customers away (Huselid et al. 2005). Service failure requires firms to devote managerial attention and prompt compensation, and customers may make excessive claims and still have low satisfaction even after their claims are settled (Wirtz 2011). Therefore, if customers experience service quality variability, this could threaten an enterprise's sustainability, regardless of what the average service level is (Fleming et al. 2005).

Variability of service quality differs from *level* of service quality in several aspects. First, variability of service quality describes how the level of service quality varies from one service transaction to another, i.e., quality inconsistency among *multiple* service transactions, while the level of service quality describes the evaluation of service in a *single* service transaction or as an *average* derived from several transactions. Thus, service variability can be high or low regardless of whether the average level is high or low, and vice versa, indicating that variability of service quality is distinct from the average level of service quality. Second, using statistical terms, variability of service quality describes the *dispersion* of the quality provided by a service employee, while the average level of service quality describes the *central tendency* of the quality provided by a service employee.

Third, variability can be high or low regardless of the average level is high or low, and vice versa, indicating that variability of service quality is distinct from the average level of service quality.

Knowledge of ways to increase the average level of service quality may not be as effectively applied to reducing the variability of service quality. Contrarily, managerial efforts motivating employees to provide extraordinarily high-quality service in some situations likely leave them less energy for sustaining their original service quality, resulting in greater variability of service quality. Thus, research is needed to understand service variability as distinct from service quality as a whole.

Variability in service creates varied impacts on service outcomes, i.e., “service performance sometimes meets expectations, sometimes falls below expectations (‘service failure’), and sometimes exceeds expectations (‘service delight’)” (Sivakumar et al. 2014, p. 41). Customers have rated transaction experiences from very dissatisfactory to very satisfactory (Bitner et al. 1990). However, there is limited knowledge guiding the management of service quality variability, indicating a need for research into how employees can be managed to reduce such variability.

Past literature has examined how service employees enhance service quality, and the personality of service employees has been identified as influential (Hurtz and Donovan 2000, Teng et al. 2007). Customers’ self-efficacy (an individual’s belief in their own ability) in using a service also helps improve their perceptions of service value (McKee et al. 2006). Two mechanisms explaining the impact of service employees on service outcomes are emotional contagion (Pugh 2001) and extra-effort service behaviors (Donovan et al. 2004), but the two may be limited in busy stores (Grandey et al. 2011). The relevant literature has explained why some employees deliver *averagely high* quality service while others do not. However, it has not clearly explained why some employees deliver a *consistently high* quality of service while others deliver a *varied* quality of service, warranting further investigations into issues of service quality variation.

As variation in service likely creates service failure and consequently triggers customer dissatisfaction and defection, it should be reduced. Currently, various means have been suggested for reducing variation, including setting quality standards, redesigning product elements for simplicity and failure proofing, implementing sound procedures for recovery from service failure (Wirtz et al. 2012), intensive personnel training, and replacing personnel with machines (Bateson and Hoffman 2008). However, little is known about which aspects of personnel training are most related to reduction in service quality variation, and in which workplaces, indicating the first gap in the literature. Such an omission hinders service managers from effectively utilizing personnel training.

Moreover, there is no theory devoted to explaining service quality variation, demonstrating a second research gap. We found that signal detection theory can be useful in explaining quality variation. This theory posits that an individual’s ability to detect a signal (the relevant information) amid noise (irrelevant information) depends on how strong the signal is (Tanner and Swets 1954) and how alert the detector is (Peterson et al. 1954). This theory can help us identify who is able to detect relevant signals in service contexts and thus may provide a consistently high quality of service. Thus, we chose to use this theory as our theoretical foundation.

The purpose of this study is to fill the two gaps in the literature by applying signal detection theory to explaining how personnel and workplace characteristics affect service quality variation. This study defines service quality variation as the degree to which service provided by an employee varies across customers. This study operationalized service quality variation by asking sets of customers to evaluate the service quality of each employee, and used the statistical variance among their evaluations to represent service quality variation. Although some antecedents herein are not new to the literature, the dependent variable and its links to the antecedents are all new to the literature, representing the newness of this study.

This study contributes to service science literature in several ways. First, it proposes a new research question: why can some service employees provide consistently high-quality service while others cannot? Answers to this question provide service managers with competitive advantages, and are thus likely to inspire further research using various theoretical perspectives. Although a recent study (i.e., Teng and Hsu 2012) attempted to address the issue of service quality variation, it proposed only a single correlate, i.e., agreeableness of service employees, leaving fertile ground for research opportunities. Moreover, that study neither posed nor answered the research question herein.

Second, this study contributes to service encounter management by offering insights into ensuring successful encounters. Service employees are critical to creating successful service encounters via complementary behavior or employee–brand alignment (Ma and Dubé 2011, Sirianni et al. 2013). The present study agrees that employees should be adaptive for ensuring successful service encounters, but proposes specific employee characteristics that are likely the keys to such adaptation.

Third, service employees should impact service outcomes via extra-effort service behaviors (Donovan et al. 2004). This study agrees with that perspective and further argues that, prior to extra-effort service behaviors,

Table 1. Prior Research on the Impact of Service Employees on Service Quality

Study	Research focus	Guiding theory	Main findings and propositions	Empirical study	Addressing SQV
Bitner et al. (1990)	Categorization of critical incidents	Gap theory	Incidents can be grouped as employees' actions to handle failures, respond to requests, and provide surprises.	Yes	No
Pugh (2001)	Emotional contagion	Theory of emotional expressiveness	Display of employee positive emotion is related to customer positive affect.	Yes	No
Donovan et al. (2004)	Impact of customer orientation	Fit theory	Customer orientation increases employees' perceived job fit, commitment to the firm, and organizational citizenship behavior.	Yes	No
Grandey et al. (2011)	Moderator role of store busyness	Emotional contagion theory	Employee satisfaction has less impact on customer satisfaction and service responsiveness in busy than in slow stores.	Yes	No
Ma and Dubé (2011)	Process and outcome dependency	Interpersonal circumplex model	Complementary interactions between the employee and customer enhance customer satisfaction.	Yes	No
Teng and Hsu (2012)	Impact of employee agreeableness	Personality theory	Employee agreeableness is negatively related to variation in service quality.	Yes	Yes
Wirtz et al. (2012)	Inputs and outputs of service operations vary widely	Not specified	Managers should carefully design and standardize service processes, train employees carefully, and automate tasks previously performed by humans.	No	Yes
Sirianni et al. (2013)	Impact of alignment	Congruity theory	Employee–brand alignment increases overall brand evaluation and customer-based brand equity.	Yes	No
Sivakumar et al. (2014)	Impact of service delights and failures	Prospect theory	Frequency, timing, proximity, and sequence of service delights and failures should impact the overall evaluation of services.	No	No
This paper	Provision of a consistently high quality of service	Signal detection theory	Job tenure, expertise, self-efficacy, and control over practice determine provision of a consistently high quality of service.	Yes	Yes

Notes. This table is used for easy understanding of related studies, but cannot list all their findings. SQV, service quality variation.

employees should be capable of detecting subtle but important signals revealing customer needs. Using signal detection theory, this study identified and verified the determinants of employee detection capability.

Fourth, this study contributes to the literature on store busyness by indicating the relevance of control over workplace (practice). Employees in busy stores are unlikely to transfer their positive emotions to customers (Grandey et al. 2011); i.e., store busyness restrains the positive impact of employees on service outcomes. The present study provides consistent but additional findings that control over practice (the degree to which staffing levels of service personnel are sufficient for delivering quality service) triggers the positive impacts of job tenure (the duration of one's working career in a specific organization/unit) and expertise (knowledge to answer customer questions and meet customer needs) on ensuring service quality.

How Service Employees Impact Service Quality

Previous studies have intensively examined how service employees impact customer evaluation of services. Table 1 lists the most related studies and compares them with the present one. The literature has continually emphasized the importance of employees to the delivery of quality services. Therefore, understanding which employees can detect customer needs and what enables them to do so should facilitate successfully detecting customer needs.

Service employees have been considered a major source for creating positive customer responses to service. The positive emotion of employees can have a positive effect on customers via the emotional contagion mechanism; i.e., employees' emotional expressions produce congruent changes in customers' emotional expressions and their emotions (Pugh 2001). This mechanism encounters a boundary condition when the workplace (i.e., store) is busy; in a busy workplace, employees are restrained from paying substantially more attention and providing extra-effort service to customers (Grandey et al. 2011).

In a busy workplace, one constructive means of preventing service failure is to reduce service variability through product redesign, service and failure-recovery process design (Wirtz et al. 2012), and service workforce

management (Bateson and Hoffman 2008). However, these need evidence from empirical studies to increase manager confidence. Moreover, intensive personnel training could be more useful to managers when key aspects of desired change are identified. The present study contributes to the literature by providing empirical evidence on the means for reducing service quality variation and identifies key aspects for personnel training that can help managers reduce such variation.

Empirical studies into service quality variation are limited. A recent one (i.e., Teng and Hsu 2012) showed that employee agreeableness was negatively related to variation in all dimensions of service quality (Teng and Hsu 2012). However, employee agreeableness was not easily made viable by managerial actions, restraining the usefulness of the study findings. That study provided a new path for service management research, that is, research addressing how service quality variation can be managed. The present study addresses factors that are viable for managerial action. Moreover, it proposes and answers two new research questions: Which employees can provide a consistently high quality of service and which cannot? And at what workplaces?

Signal Detection Theory and Identification of Potential Predictors of Service Quality Variation

Signal detection theory posits that an individual's ability to detect a signal amid noise depends on how strong the signal is (Tanner and Swets 1954) and how alert the detector is (Peterson et al. 1954). This argument can be supported by the finding that experience is related to increased sensitivity to signal changes (Lueddeke and Higham 2011). This argument is also consistent with the finding that signal repetition is related to correct detection of the signal (Higham et al. 2009). Furthermore, work experience is a predictor of job outcome (Teng et al. 2009). Thus, the alertness of the detector may be related to job tenure because when an individual has worked for an organization for many years, they become highly familiar with determining relevant signals and irrelevant noise, increasing detection alertness. Detection of relevant information enables service personnel to deliver service relevant to customers, reducing very low customer evaluations and subsequently variation. Therefore, job tenure should be considered a predictor of service quality variation.

Service quality may also vary because employees have varied levels of expertise, which contributes to interaction quality (Brady and Cronin 2001). Expertise is the accumulated knowledge enabling service employees to recognize relevant information. Expertise can therefore increase employees' ability to detect relevant information and thus further reduce variation. Therefore, expertise should also be considered a predictor of service quality variation.

Detection may depend on motivation as well as abilities. Motivation to engage in a specific action can be affected by self-efficacy, the individual's belief in their own ability (Bandura 1982). Therefore, self-efficacy likely facilitates detection of relevant information and subsequently reduces service quality variation, supporting the decision of this study to include self-efficacy as a predictor.

Whether an individual can detect relevant information amid noise is associated with the relative strength of the relevant information when compared with the strength of the noise (Tanner and Swets 1954). In service environments, control over practice is the degree to which staffing levels are sufficient for the delivery of quality service (Halcomb et al. 2010). Lack of control over practice forces an individual service employee to take on a heavy workload and the associated information. Abundant information serves as noise, interfering with the detection of relevant information, and thus limits the employee's ability to distinguish information from noise. On the contrary, strong control over practice reduces the amount of noise, and thus service employees are more able to detect relevant information. Such an inference motivates this study to hypothesize a moderator role of control over practice in the relationship between employee characteristics and service quality variation.

Inclusion of the three potential predictors (i.e., job tenure, expertise, and self-efficacy) and the potential moderator (i.e., control over practice) provides service managers with insights into training, job assignment, and workplace design. For example, if expertise is related to a reduction in service quality variation, service managers can focus on enhancing expertise when designing training courses. And, for example, if control over practice strengthens the relationship between expertise and reduced service quality variation, service managers can adjust work processes to increase control over practice and assign employees with high expertise to jobs with strong control over practice. To sum up, these propositions help service managers reduce service quality variation, ensuring quality service and customer satisfaction.

Specifically, the purpose of this study is to examine whether job tenure, expertise, and self-efficacy are related to variations in service quality. Moreover, this study examines whether control over practice moderates such relationships (or interactions). Existing literature on the study constructs has not covered how these interactively cause variations in service quality.

Formulation of Service Quality Variation

Service is typically delivered by service employees, and this study discusses the formulation of service quality variation by examining service-employee-related constructs. First, in the work setting, employees may be overloaded with information and are therefore frequently forced to detect what is relevant and what is not, i.e., to perform detection tasks. As the duration of their career increases, a worker can accumulate a long history of performing detection tasks, enabling the individual to contrast the current information with that experienced in the past and thus making them more alert to the relevant signal.

According to the signal detection theory (Peterson et al. 1954, Tanner and Swets 1954), the alertness enhances detection correctness. Moreover, the signal detection theory posits that experience helps improve sensitivity to signal changes (Lueddeke and Higham 2011). Experience helps an individual to identify a signal that appears repetitively, increasing the detection of the signal (Higham et al. 2009). Therefore, the signal detection theory could be used to infer that employees with long working experience (i.e., high job tenure) can correctly detect signals relevant to serving customers, enabling them to provide a consistently high quality of service and subsequently reduce service quality variation. Thus, this study hypothesized a negative relationship between job tenure and service quality variation.

Hypothesis 1 (H1). *Job tenure is negatively related to service quality variation.*

The signal detection theory (Peterson et al. 1954, Tanner and Swets 1954) posits that alertness to detecting signals is important for correctly identifying those signals. Such alertness may come from expertise, which is the employees' ability to answer customer questions and meet their needs (Brady and Cronin 2001) and represents their professional knowledge. Expertise (or professional capability) can thus lead to positive evaluation by customers (Chiou 2003). Employees with sufficient professional knowledge understand the explicit features of implicit problems, increasing their sensitivity when processing information regarding such features; that is, expertise increases alertness. According to the signal detection theory (Peterson et al. 1954, Tanner and Swets 1954), alertness is further related to correctness of signal detection. Applying the signal detection theory to the service quality variation issues, expertise should be related to the correctness of detecting signals relevant to service quality maintenance. Therefore, expertise likely helps the maintenance of a consistently high quality of service, reducing service quality variation.

Hypothesis 2 (H2). *Expertise is negatively related to service quality variation.*

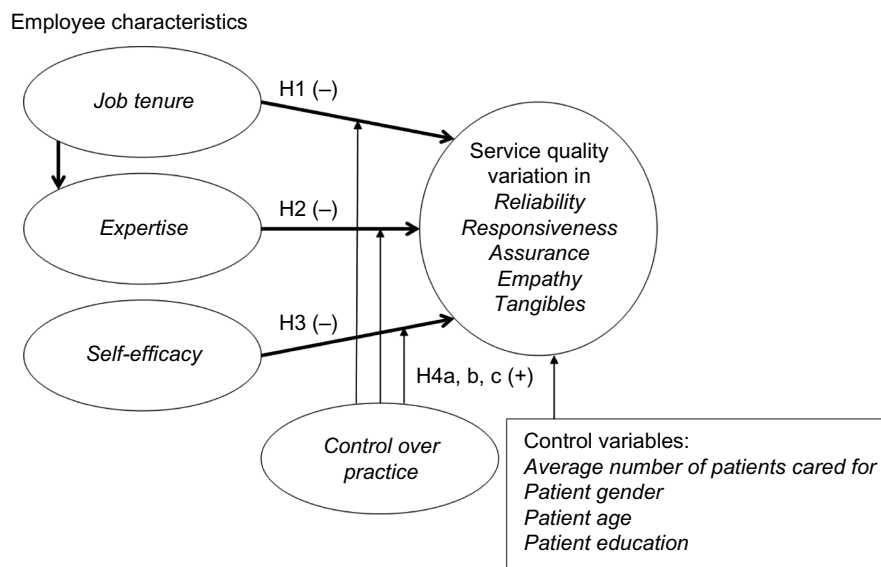
Self-efficacy is defined as one's own confidence in one's ability to engage in a specific behavior and should influence thought patterns and actions, e.g., encourages engagement in a specific behavior (Bandura 1982) and help reduce attention bias in certain cases (Brown et al. 2012). Therefore, self-efficacy improves job performance (Lubbers et al. 2005). Applying previous findings to the present study, self-efficacy encourages engagement in detecting relevant information about delivering quality service to customers. Active engagement should boost alertness. According to the signal detection theory (Peterson et al. 1954, Tanner and Swets 1954), alertness assists correct detection of signals. Therefore, self-efficacy should help employees detect relevant information and subsequently reduce variation in service quality.

This study adopted a theory-then-research approach. Hence, this study had a clear position regarding this hypothesis, although the analytical results may not fully support this hypothesis.

Hypothesis 3 (H3). *Self-efficacy is negatively related to service quality variation.*

The literature on signal detection theory indicates that correct signal detection is negatively related to the number of stimuli, because stimuli accumulate as noise and divide an individual's attention (Mazyar et al. 2013). Correct signal memory and retrieval are also negatively related to the number of stimuli (Guzel and Higham 2013). Applying the findings to the present research settings, control over practice is associated with reduced workload, or noise. Therefore, control over practice helps maintain undivided attention, enabling an individual to detect vital signals that reveal a customer's subtle needs. Undivided attention is essential to alertness to the signals. According to the signal detection theory, alertness positively contributes to successful detection of signals. Hence, when an individual's attention is undivided, their alertness (from job tenure, expertise, and self-efficacy) can lead to successful detection of signals. But, when an individual's attention is divided, i.e., they are distracted, the individual cannot detect signals successfully, even when they are alert to them. Therefore, this study hypothesized that control over practice is a moderator in the formation of service quality variation.

Hypothesis 4 (H4). *Control over practice strengthens the relationship between (a) job tenure, (b) expertise, (c) self-efficacy, and service quality variation.*

Figure 1. Research Framework

Hypotheses in this study are new to the literature, because H1, H2, and H3 are associated with service quality variation, which is new to the literature. Moreover, H4 is associated with a moderator role (i.e., interactions) that is more complex than direct relations (i.e., H1, H2, and H3). Hence, all hypotheses herein are new to the literature. Figure 1 illustrates the research framework and the study hypotheses.

Methods

Sample and Data Collection Process

We tested our research model by using multiple-source and matched data in health service contexts. Among service sectors, health services comprise a significant proportion of a nation's gross domestic product (ranging from 8.8% to 17.1% in 2013; Commonwealth Fund 2016), indicating their importance. Moreover, health services deal with life-and-death issues. Hence, service quality variation is an important research question to examine in health services. Among health service workforces, nurses frequently interact with customers (i.e., patients). Therefore, nurses and patients were chosen as the participants in this study.

The research design for this study is a cross-sectional one. Questionnaires were used to collect data in one medical center in northern Taiwan from January to April 2013. The ethical aspects of this study were approved by the institutional review board of the medical center (101-3651C), and written informed consent was obtained from all participants. This study surveyed all the day-shift nurses in 49 wards. Inclusion of all day-shift nurses reaches a high level of sample representativeness in the research context.

This study collected sample sets of nurses and patients, with one sample set comprising one nurse and three corresponding patients. The study included full-time nurses but excluded nursing supervisors. When a nurse consented to participate in the study, three of the patients under that nurse's care were then randomly sampled and approached. When patients were unavailable for participation, other patients were then randomly sampled and approached instead, until all patients cared for by the nurse had been approached. The matched sample approach ensures multiple sources of data (i.e., responses from nurses and patients) and thus minimizes problems associated with common method variance (CMV).

As required by the ethical standards, participating nurses knew that the patients would evaluate their service quality. However, the busy working schedule should have prevented them from distorting the evaluation results. Patients who consented to participate in this study completed the questionnaires in half an hour and returned them directly to the research assistants. Patients were assured that their responses would not be made available to medical center personnel and would be used only to achieve the research purpose. In sum, data collection processes were carefully designed to increase confidentiality and thus increase data validity.

In total, 297 nurses were approached. Among them, one declined to participate, four did not complete questionnaires, one returned an incomplete questionnaire, and five returned questionnaires containing at least one page with the same responses (e.g., "strongly agree" for all items). Their responses were determined as invalid, leaving 286 valid responses collected from nurse participants. Moreover, 690 patients consented to participate

in this study. Among them, 11 returned incomplete questionnaires that were determined as invalid, leaving 679 valid responses. In total, 160 complete sample sets—comprising one nurse and three patients—were formed, with 160 nurses and 480 patients. The above criteria for determining and excluding invalid responses avoided mixing valid and invalid responses, increasing the validity of the data used for analysis.

Measures and Psychometric Properties

The data in the present study are from multiple sources: service quality data were collected from patients; self-efficacy and job tenure (years of working as nurses) data were collected from nurses; expertise data were collected from nurses, but their responses were checked using the personnel information system, increasing measurement rigor. Items used in this study are listed in the appendix.

This study adopted the 20-item health service quality scale developed by Teng et al. (2010) to measure service quality. The scale, which was tested using a sample of 229 patients and demonstrated sufficient reliability and validity, originated from the SERVQUAL instrument of Parasuraman et al. (1988). The variance of the responses from the three patients for each nurse was used as the measure of service quality variation of the target nurse. This measure took advantage of our one-nurse-to-three-patients matched sample, whereas a one-nurse-to-one-patient matched sample cannot be used to measure variation.

This study adopted the four-item scale of Hartline and Ferrell (1996) to measure the self-efficacy of the nurse. One item, “Professionally speaking, my job exactly satisfies my expectations of myself,” was dropped because of its low item-to-total correlation. This study adopted the four-item scale of Halcomb et al. (2010) to measure control over practice. Expertise was measured using information on nursing accreditation levels that formally recognize nurses’ professional knowledge and skills. Self-reported data were verified and supported by the objective accreditation data. Moreover, self-reported data were more complete than the objective accreditation data, and thus used for analysis. Details of the nursing accreditation system can be found in Teng et al. (2012).

Items measuring each construct had a Cronbach’s α exceeding 0.81, indicating sufficient reliability (Nunnally and Bernstein 1994). Cronbach’s α values have confidence intervals with lower bounds exceeding 0.77, further supporting “confident” reliability (Iacobucci and Duhachek 2003). A confirmatory factor analysis was conducted. Items measuring each construct had composite reliability (CR) exceeding 0.89 and average variance extracted (AVE) exceeding 0.67, demonstrating acceptable reliability (Bagozzi and Yi 1988). Items had indicator loadings exceeding 0.68, indicating sufficient convergent validity (Hair et al. 1998). Pairs of constructs had squared correlation smaller than the AVE for the involved constructs, except for the reliability and assurance pair (4.8%). Such analytical results indicate tolerable discriminant validity (Fornell and Larcker 1981).

Bagozzi (2010) suggested the use of the nonnormed fit index (NNFI), comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA) as the indices for evaluating the model fit. In the present study, NNFI = 0.96 (> 0.90), CFI = 0.96 (> 0.90), and SRMR = 0.034 (< 0.07), fulfilling the criteria of Bagozzi (2010). Moreover, RMSEA = 0.09 (< 0.10), fulfilling the criterion of Browne and Cudeck (1993). The χ^2/df value = 4.88 (< 5), satisfying the criterion of Jöreskog (1970). Overall, the fit indices demonstrate the quality of measurement in the study.

The correlations between the study constructs are listed in Table 2. The correlations between the constructs indicate that the correlations between self-efficacy (or control over practice) and service quality are low. However, the correlations between the service quality dimensions are high. Health service contexts frequently involve such high correlations between service quality dimensions (as in Teng and Hsu 2012). Moreover, nearly all measures of this study exhibit tolerable discriminant validity, indicating the minimum measurement problems owing to the high correlations. The data of the present study came from multiple sources, minimizing the issues

Table 2. Correlations Between Constructs

Construct	Mean	SD	1	2	3	4	5	6	7	8
1. Reliability	6.32	0.87	1.00							
2. Responsiveness	6.37	0.89	0.82**	1.00						
3. Assurance	6.41	0.85	0.84**	0.88**	1.00					
4. Empathy	6.23	0.95	0.78**	0.87**	0.88**	1.00				
5. Tangibles	6.57	0.76	0.73**	0.77**	0.81**	0.76**	1.00			
6. Job tenure	2.76	1.28	0.05	0.01	0.07	0.04	0.01	1.00		
7. Expertise	3.03	1.32	0.05	0.02	0.07	0.06	0.03	0.84**	1.00	
8. Self-efficacy	4.21	0.74	0.03	−0.04	−0.03	−0.05	−0.04	0.42**	0.41**	1.00
9. Control over practice	3.50	1.42	−0.01	0.04	0.02	0.01	0.02	0.06	0.05	0.02

** $p < 0.01$.

Table 3. Demographics of Nursing Participants

Variable	Category	Number	Percentage
Gender	Female	160	100.0
Age	≥20 and <30 years old	91	56.9
	≥30 and <40 years old	61	38.1
	≥40 and <50 years old	8	5.0
Educational level	College or university	157	98.1
	Missing	3	1.9
Years of working experience (Job tenure)	<1 years	24	15.0
	≥1 and <5 years	54	33.7
	≥5 and <10 years	35	21.9
	≥10 and <15 years	27	16.9
	≥15 and <20 years	13	8.1
	≥20 years	4	2.5
	Missing	3	1.9
Nursing accreditation level (Expertise)	N0 (entrance level)	29	18.1
	N1 (basic nursing)	23	14.4
	N2 (acute nursing)	49	30.6
	N3 (teaching and holistic nursing)	32	20.0
	N4 (research and specialty nursing)	27	16.9
Average number of patients cared for	≥1 and ≤5 patients	1	0.6
	≥6 and ≤10 patients	126	78.8
	≥11 and ≤15 patients	27	16.9
	≥16 and ≤20 patients	1	0.6
	Missing	5	3.1

associated with CMV. However, the present study adopted the suggestion of Podsakoff et al. (2003, p. 968). The model including CMV cannot converge and has a higher χ^2 value (2196.01 > 1477.20) but a lower degree of freedom (269 < 303) than the model excluding CMV, indicating that the model excluding CMV significantly outperforms the model including CMV; that is, CMV is minimum, supporting data validity in the present study.

Results

Sample Characteristics

Table 3 summarizes the profile of the nurse participants. All nurses were female. Among them, 95.0% were between 20 and 40 years old, 98.1% had attended university, 55.6% had 1 to 10 years of work experience in nursing (job tenure), 50.6% had obtained the N2 or N3 nursing accreditation, and 95.7% cared for 6 to 15 patients on average.

Table 4 summarizes the profile for patient participants. Among them, 56.3% were female, 64.0% were aged 40 years old or above, 68.3% had attended senior high school or higher, 86.2% were in two-bed or three-bed wards, and 61.9% had monthly income less than US\$1,334.

Hypotheses Testing

Structural equation modeling (SEM) was used to test the hypotheses. This study adopted the method of Little et al. (2006) to model interactions in one structural model. Such a structural model enables us to test all the hypotheses at the same time. The dependent variables are variation in reliability, responsiveness, assurance, empathy, and tangibles. The independent variables are job tenure, expertise, and self-efficacy. The moderator is control over practice; i.e., its interactions with three independent variables were included in the model.

The control variables are the average number of patients cared for, patient gender, patient age, and patient education. The average number of patients cared for may imply the workload that likely impacts the feasibility of providing a consistently high quality of service. Patient gender and age were considered as influential to consumer evaluations. Education is likely related to personal knowledge or expertise for evaluation. Therefore, we used these as control variables. Since we have clear predictions for the impact of each independent variable, we used one-tailed tests throughout.

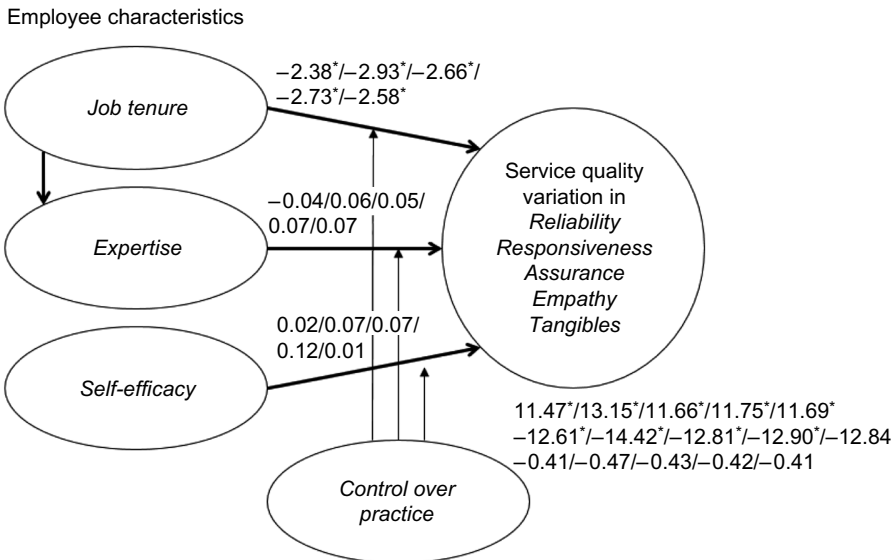
Figure 2 illustrates the analytical results directly associated with hypotheses testing. Control variables are included in the SEM to increase the rigor of the analyses. Intuitively, job tenure should be related to expertise. Our analytical results support this intuition by indicating that their correlation is high (0.84). Such a high correlation motivates us to add a path from job tenure to expertise. As Little et al. (2006) used unstandardized

Table 4. Demographics of Patient Participants

Variable	Category	Number	Percentage
Gender	Female	270	56.3
	Male	207	43.1
	Missing	3	0.6
Age	<20 years old	17	3.5
	≥20 and <30 years old	55	11.5
	≥30 and <40 years old	99	20.6
	≥40 and <50 years old	107	22.3
	≥50 and <60 years old	90	18.8
	≥60 years old	110	22.9
	Missing	2	0.4
Educational level	Primary school or below	72	15.0
	Junior high school	73	15.2
	Senior high school	152	31.7
	College or university	149	31.0
	Graduate institute or above	27	5.6
	Missing	7	1.5
Room type	One bed	34	7.1
	Two beds	199	41.4
	Three beds	215	44.8
	Four beds	16	3.3
	Five beds or more	9	1.9
	Missing	7	1.5
Monthly income	US\$ 666 and less	154	32.1
	US\$667–1,333	143	29.8
	US\$1,334–2,000	94	19.6
	US\$2,001–2,666	20	4.2
	US\$2,667–3,333	13	2.7
	US\$3,334 and more	18	3.7
	Missing	38	7.9

terms, the present study also presents unstandardized path coefficients. The t values were used test the significance of the path coefficients. Analytical results indicate that job tenure is negatively related to variation in all dimensions of service quality. Moreover, control over practice interacts with job tenure and expertise to impact variation and the average level of all dimensions of service quality.

Figure 2. Analytical Results



Notes. Numbers are unstandardized path coefficients. Control variables were included in the analyses, but are not reported here for brevity.
* $p < 0.05$.

The structural model explains the very high proportions of variance of the dependent variables, i.e., 79% of variation in reliability, 83% of variation in responsiveness, 91% of variation in assurance, 72% of variation in empathy, and 76% of variation in tangibles. Such proportions are equivalent to very large effect sizes, according to Cohen (1992).

Discussion

Main Findings and Contributions

This study found that job tenure is negatively related to variation in all dimensions of service quality. Moreover, control over practice can weaken the impact of job tenure on variation in service quality. Control over practice also interacts with expertise to reduce variation in service quality.

The analytical results provide several insights for answering the research question: why can some service employees provide consistent high-quality service but others cannot? First, employees having a high level of job tenure can provide a consistently high quality of service. Such an effect is highly prominent when service employees have weak control over practice.

Second, employees having a high level of expertise can provide consistent high-quality service when they have strong control over practice. Such findings on interactions are an interesting extension to the research.

Findings of this study contribute new knowledge to the literature, because this study utilized a novel outcome, service quality *variation*, which differs from the *level* of service quality. Although job tenure, expertise, self-efficacy, and control over practice have been discussed in management literature, this study examined whether these factors could contribute to reducing service quality variation. This study is the first addressing how these factors interactively contribute to reducing service quality variation.

Theoretical Implications

This study advances recent service research on service performance dynamics by identifying an insufficiently studied problem, i.e., some service employees provide various levels of service quality while others provide consistent high-quality service. Recent service literature (i.e., Sirianni et al. 2013) demonstrated that employees can strongly improve customers' evaluations of a brand via successful (i.e., employee-brand aligned) service encounters. Such an advance indicates the critical role of every service encounter and the importance of managing service employees to consistently achieve successful service encounters. The present study offers a means for consistently achieving successful service encounters by identifying relevant employee characteristics and verifying their influences.

Service quality literature has recently indicated that consumer expertise explains value perception (i.e., Barrutia and Gilsanz 2013), indicating the importance of expertise in the formation of service outcomes. The findings of the present study are consistent with this literature in addressing the importance of expertise. However, the present study is unique in addressing the expertise of service *employees* rather than the expertise of *consumers*, adding novel knowledge to efforts to effectively manage expertise to ensure service quality.

Service literature (i.e., Rotte et al. 2006) has examined how magnitude and uncertainty of trust impact loyalty and found that uncertainty of trust reduces the impact of stated trust on loyalty. Rotte et al. (2006) was one of the first studies to examine the mean-variance issue in services, i.e., the variance of service evaluation *by a single customer*. When compared with theirs, the present study is new in examining the variance of service evaluations *among several customers*, further deepening our understanding of the usefulness of the mean-variance structure in services.

In service literature, Wirtz et al. (2012) indicated the importance of service quality variation and suggested useful means for reducing it, including the simplification of product elements, the design of failure-proofing mechanisms, and the introduction of sound failure-recovery processes. The present study is consistent with Wirtz et al. (2012) in suggesting ways to reduce service quality variation but is unique in examining how personnel management (e.g., improving employee expertise and self-efficacy) assists in reducing service quality variation. The findings of this study contribute to service theory by providing additional actionable means for service managers, adding to the knowledge body on ensuring service quality.

Service theory has begun to address the issue of service quality variation. The present study joins in empirical efforts aimed at reducing such variation and examines expertise and self-efficacy, which are more manageable than personality (e.g., agreeableness in Teng and Hsu 2012); that is, our study provides new actionable perspectives to service managers, contributing to successful service management.

In service quality theory, Yang (2011) used six categories of customer variability, including variability in arrival, request, capability, effort, preference, and communication. Yang's (2011) customer variability categories help service managers to plan and implement strategic actions to accommodate service customer variability; that

is, they address variability in *customers*, while our study addresses variability in service *workers*. The perspective of Yang (2011) and that of the present study make progress toward a complete picture of sources of service quality variability.

Recent service literature has emphasized subtle cultural differences in service quality evaluation, specifically how Chinese consumers evaluate service quality (i.e., To et al. 2013). The present study was conducted in a country where Chinese comprise the majority of the population, consistent with the emphasis of the literature. The present study was conducted in healthcare services, contributing to efforts toward fully understanding Chinese consumers and service employees in that setting.

Managerial Implications

Competitive business environments that impose pressure on companies to reduce costs and payrolls may lead companies to cut jobs, which damages their long-term performance (Ewing 2011). Moreover, a reduced workforce hinders managers from successfully accommodating demand fluctuation and thus unavoidably creates service quality variation. The findings of this study help service managers to deal with this problem by suggesting useful strategies on selecting and retaining the right people to maintain a consistently high level of service quality. Moreover, most suggestions do not incur costs additional to those of routine service processes, indicating the value and feasibility of the findings to service managers.

This study found that job tenure is negatively related to the variation in all dimensions of service quality. Therefore, service managers can encourage their experienced service employees to share insights into how to provide a consistently high quality of service. Moreover, service managers can emphasize job tenure when recruiting frontline service employees. Additionally, service managers can assign experienced employees to handle service delivered to customers who are sensitive to service quality variation. For example, hotels keeping records on customer complaints can easily identify repeat customers sensitive to service quality variation. Therefore, hotel managers can set the policy that new employees should consult experienced employees to collectively handle requests from these customers.

A novel finding in our study was that control over practice amplified the impact of expertise on reducing variation in service quality; that is, control over practice facilitates a reduction in service quality variation for a highly professional workforce. Therefore, service managers can improve control over practice via enhanced leadership and active teamwork, since leadership (MacPhee et al. 2010) and active teamwork (Ajeigbe et al. 2013) positively contribute to control over practice. Enhanced control over practice enables service employees to mobilize their working experience and expertise to maintain consistently high-quality service outcomes. In healthcare services, managers can provide role models to cultivate leadership among team leaders. Enhanced leadership increases coordination and inspires transformation of healthcare team members, providing them with a solid basis for making decisions based on their care experience and professional education.

We observed that job tenure positively contributes to service quality (i.e., reduces its variation), particularly when employees have a weak control over practice. This significant finding indicates the importance of job tenure, particularly in contexts where employees have weak control over practice. Therefore, managers could publicly appreciate, appraise, and approve the contributions of employees with high job tenure. Moreover, managers could seek advice and suggestions from employees with high job tenure. Furthermore, managers could offer novel and challenging tasks for employees with high job tenure to provide a sense of continued professional development for these employees. Meanwhile, managers could encourage employees to participate in activities that facilitate employees' growth. Such participation should further develop the expertise of the employees with high job tenure. Such activities should be feasible and could be effective in retaining employees with high job tenure.

The implications can be applied to both busy stores (where employees have low control over practice) and nonbusy stores (where employees have high control over practice), since the previous implications include both low and high control over practice contexts.

Limitations and Further Research

Service quality variation adversely impacts service outcomes. Therefore, it was valuable for this study to examine means for reducing such variations in health services. But findings originating from our investigations into health services require further study to confirm their applicability to the management of other services.

While we examined personnel and workplace management, service quality variation may result from a heterogeneity of customers, i.e., customer variability. Future studies could utilize the categories of customer variability of Yang (2011) to explore how heterogeneous customers could be managed to reduce variation in service quality. The applications of the variability concept in various fields indicate abundant opportunities for incorporating it into other concepts in various management areas.

This study identifies several determinants for service managers to ensure delivery of consistent high-quality services. Although statistically significant, the determinants identified herein have not explained this issue sufficiently, indicating the abundant research opportunities for exploring determinants using other theoretical perspectives.

This study explains service quality variation by using one important characteristic of a statistical distribution, i.e., variance. A statistical distribution can also be described by skewness and kurtosis, which likely also can explain how service quality varies. The introduction of these two characteristics can assist the successful management of service quality variation.

This study used the signal detection theory to develop the hypotheses and consequently found support for them. The findings provide a basis for further study examining their underlying mechanism. Further study can include actual observations or experiments on how well an employee can correctly detect relevant signals. Clarification of the underlying mechanism will likely provide further insights for designing managerial actions to reduce service quality variation. Introduction of other theories could contribute to such clarification.

One may postulate that a long tenure may create job dissatisfaction and consequently increase, not decrease (as claimed in this paper), service quality variation. However, job dissatisfaction could be a trigger of turnover; i.e., dissatisfied employees quit their jobs. Therefore, the retained employees with a long tenure may not be highly dissatisfied, ruling out the postulation.

This study is the first addressing how to manage service personnel to provide consistently high-quality service, laying a foundation for future studies. Future studies could include store busyness (referring to Grandey et al. 2011) and the time of a day; i.e., service workers may be energetic in the beginning but tired at the end. Moreover, future studies could include emotion ability, i.e., the ability to recognize and detect emotions. Such extensions should deepen our understanding of service quality variation.

Although this study included seven control variables, future studies could further examine the role of the type of disease and the type of nursing service. Such advanced knowledge could provide further insights for healthcare managers.

This study asked three patients to evaluate a nurse's service quality. This number (three) enables calculation of variance and thus should be statistically sufficient. More patients evaluating a single nurse's service quality should improve precision of the findings. Yet such an approach might encounter problems such as feasibility and low representativeness of the sample. Moreover, this study asked the patients to each evaluate one nurse (rather than multiple nurses). Our research used the simple random sampling technique, which statistically minimizes the systematic biases owing to patient characteristics, justifying the approach used herein.

Conclusions

This study contributes to service science literature by identifying and examining constructs that interactively influence service quality variation. This study is one of the first to address how service managers can ensure a consistently high quality of service by understanding and reducing service quality variation. Our findings verify the applicability of signal detection theory to health services, providing future researchers with a novel starting point from which to discuss service quality variation. Samples in this study comprised health service employees and customers, but future studies could examine how to reduce variation in service quality in other important service sectors.

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Appendix. Measurement Items and Validity Assessments

Items were rated using a seven-point Likert scale (1 = "strongly disagree," and 7 = "strongly agree").

α is Cronbach's α value.

Reliability ($\alpha = 0.81$, CR/AVE = 0.89/0.67)

The nurse...

1. Provides services as promised
2. Is dependable in handling patients' service problems
3. Performs services correctly the first time
4. Provides services at the scheduled time

Tangibles ($\alpha = 0.96$, CR/AVE = 0.98/0.91)

1. Has a neat, professional appearance
2. Has a clean appearance
3. Has medical materials neatly arranged on the nursing trolley
4. Looks energetic

Appendix. (Continued)

Items were rated using a seven-point Likert scale (1 = “strongly disagree,” and 7 = “strongly agree”).
 α is Cronbach's α value.

Responsiveness ($\alpha = 0.90$, CR/AVE = 0.94/0.79)

1. Keeps patients informed about when a service will be performed
2. Provides prompt service to patients
3. Is willing to help patients
4. Is ready to respond to patients' requests

Assurance ($\alpha = 0.91$, CR/AVE = 0.95/0.83)

1. Instills confidence in patients
2. Makes patients feel safe in their hospitalization
3. Is consistently courteous
4. Has the knowledge to answer patient questions

Empathy ($\alpha = 0.92$, CR/AVE = 0.95/0.83)

1. Gives patients individual attention
2. Deals with patients in a caring fashion
3. Has the patients' best interest at heart
4. Understands the needs of patients

Self-efficacy ($\alpha = 0.90$, CR/AVE = 0.92/0.80)

1. I feel that I am overqualified for the job I am doing
2. I feel confident that my skills and abilities equal or exceed those of my colleagues
3. I could have handled a more challenging job than the one I am doing

Control over practice ($\alpha = 0.89$, CR/AVE = 0.90/0.70)

My workplace has...

1. Enough staff to provide quality patient care
2. Enough staff to get the work done
3. Enough time and opportunity to discuss patient care problems with other staff
4. Adequate support services to allow me to spend time with patients

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