Organizational Culture and Its Relationship with Hospital Performance in Public Hospitals in China

Ping Zhou, Kate Bundorf, Ji Le Chang, Jin Xin Huang, and Di Xue

---

Objective. To measure perceptions of organizational culture among employees of public hospitals in China and to determine whether perceptions are associated with hospital performance.

Data Sources. Hospital, employee, and patient surveys from 87 Chinese public hospitals conducted during 2009.

Study Design. Developed and administered a tool to assess organizational culture in Chinese public hospitals. Used factor analysis to create measures of organizational culture. Analyzed the relationships between employee type and perceptions of culture and between perceptions of culture and hospital performance using multivariate models.

Principal Findings. Employees perceived the culture of Chinese public hospitals as stronger in internal rules and regulations, and weaker in empowerment. Hospitals in which employees perceived that the culture emphasized cost control were more profitable and had higher rates of outpatient visits and bed days per physician per day but also had lower levels of patient satisfaction. Hospitals with cultures perceived as customer-focused had longer length of stay but lower patient satisfaction.

Conclusions. Managers in Chinese public hospitals should consider whether the culture of their organization will enable them to respond effectively to their changing environment.

Key Words. Business and management, comparative health systems/international health, hospitals, organization theory

---

In 2009, the Chinese government announced a major health care system reform, with public hospitals being an important target for reform efforts. Public hospitals generate the bulk of their revenues from regulated fees charged to patients and insurers. As the government sets fees for basic services very low to make these services more accessible to patients, hospitals have strong

incentives to over-provide more profitable high-tech services and pharmaceuticals to remain financially viable. A key objective of the proposed reforms is to change the behavior of public hospitals.

A key determinant of the effectiveness of the proposed reforms will be how public hospitals respond to potentially dramatic changes in their external environment. While major organizational changes without changes in organizational culture often fail (Umiker 1999), little is known about the organizational culture of Chinese public hospitals. The main purposes of this study were to determine how employees perceive organizational culture in China's public hospitals, to compare perceptions of hospital culture among different types of employees, and to examine the association between employee perceptions of hospital culture and hospital performance.

Organizational Culture

While consensus does not exist on how to define organizational culture (Cooke and Rousseau 1988; King and Byers 2007; Zhang, Li, and Pan 2009), a commonly used definition is "the set of shared, taken-for-granted, implicit assumptions that a group holds and that determine how it perceives, thinks about, and reacts to its various environments" (Kreitner and Kinicki 2008). Thus, the essence of culture is a core of basic assumptions. Behavioral norms and values are a manifestation of these assumptions, and values and norms, in turn, encourage activities that represent the expression of organizational culture (Hatch and Cunliffe 2006).

Organizational climate, in contrast, is defined as employees' shared perceptions regarding an organization's policies, procedures, and practices, which in turn serve as indicators of the types of behavior that are rewarded and supported in work settings (Schneider, Gunnarson, and Niles-Jolly 1994; Zohar and Luria 2010). Organizational culture is a broader concept than organizational climate, and organizational culture can be used to explain why an organization focuses on certain priorities. While our study focuses on organi-

---

Address correspondence to Di Xue, Ph.D., M.P.H., M.D., Professor, Director, Department of Hospital Management, School of Public Health, Fu Dan University, Shanghai, 200032, China; e-mail: xuedi@shmu.edu.cn. Ping Zhou, Ph.D., is with the Department of Hospital Administration, School of Public Health, Fu Dan University, Shanghai, China. Kate Bundorf, Ph.D., M.B.A., M.P.H., is with the School of Medicine, Stanford University, Stanford, CA. Ji Le Chang, M.D., is with the Health Bureau of Gansu Province, Gansu Province, China. Jin Xin Huang, M.B.A., M.D., is with the Health Department of Hubei Province, Hubei Province, China.

zational culture, we refer to some studies on organizational climate, particularly in the context of patient safety, which examine related issues.

Assessment of Hospital Culture

Two conceptual frameworks are often used to assess hospital culture: the Denison model and Quinn and Rohrbaugh's competing values framework (CVF). The Denison framework is based on four cultural traits: mission, consistency, adaptability, and involvement (Denison 1990). Mission refers to a long-term direction for the organization; consistency refers to the values and systems that are the basis of a strong culture; adaptability refers to the ability to translate the demands of the business environment into action; and involvement refers to building human capability, ownership, and responsibility. Each of these traits is characterized by three sub-dimensions. The Denison model has been used to assess culture in a variety of industries (Hatch and Cunliffe 2006).

Studies in the health services field often use Quinn and Rohrbaugh's CVF (Quinn and Rohrbaugh 1981). In the CVF, there are two sets of competing values. The first is centralization and control over organizational processes versus decentralization and flexibility. The second is whether the organization is oriented toward its own internal environment and processes or the external environment and relationships with outside entities (such as regulators, suppliers, competitors, partners, and customers).

In our study, we developed a tool for organizational culture assessment (TOCA) drawing from both models. We used three dimensions (consistency, adaptability, and involvement) mainly from Denison model; we used CVF to form a fourth dimension of "orientation," which reflects the extent to which the organization focuses on external expectations of stakeholders. We also added the elements of "internal regulations and rules" and "cost control" to the dimension of consistency, to capture salient issues for Chinese public hospitals.

Different Perceptions of Hospital Culture

A subculture is a subset of an organization's members who identify themselves as a distinct group within the organization and who routinely take action on the basis of their unique collective understandings (Hatch and Cunliffe 2006). Subcultures may form within a hospital among employees who have similar interests, who share professional, gendered, occupational identities, or who interact more due to shared territory or equipment. For example, in U.S.

hospitals, different types of employees have different perceptions of organizational patient safety climate (Thomas, Sexton, and Helmreich 2003; Hartmann et al. 2008; Singer et al. 2009), with senior managers having more positive perceptions than either frontline workers or supervisors (Singer et al. 2008). As managers, physicians, health technicians, nurses, and other employees in public hospitals in China have different functions and work under different environments, they may represent different subcultures within a hospital with different perceptions of the organizational culture. On the basis of findings of Singer et al. (2008), we propose that a key factor in determining perceptions of organization culture is the extent to which employees interact with patients. We hypothesize that managers' perceptions of organizational culture will differ from those of frontline workers who interact directly with patients.

Relationship between Hospital Culture and Hospital Performance

While both managers and academic researchers believe that organizational culture can influence performance (Kreitner and Kinicki 2008), studies of the correlation between organizational culture and organizational performance do not produce consistent results (Damanpour 1992; Denison, Haaland, and Goelzer 2004; Kreitner and Kinicki 2008). In the health care field, studies have analyzed different indicators of performance, such as quality improvement activities, patient-care quality and efficiency, effectiveness of provider teams, health care provider job satisfaction, and patient satisfaction, making it difficult to identify consistent relationships across studies (Coeling and Wilcox 1988; Platonova et al. 2006; Williams et al. Konrad 2007; Zazzali et al. 2007). In addition, a vast majority of literature on the organizational culture of hospitals examines the United States or other high-income countries. Little is known about hospital organizational culture in countries with different socioeconomic and cultural environments (Helfrich et al. 2007).

We analyze the relationship between organizational culture and four types of performance indicators, which encompass key concerns of policy makers and the public regarding hospital behavior. The indicators include resource use per patient (length of stay [LOS]), productivity in resource use (outpatient visits per physician per day [OVPPPD], bed days per physician per day [BDPPPD]), short-term profitability, patient satisfaction with medical care, and employee satisfaction.

When examining the relationship between culture and performance, we develop hypotheses based on a subset of the sub-dimensions of culture within each of the dimensions we identify above (see Appendix SA2 for a

list of the dimensions and sub-dimensions). We develop hypotheses based on sub-dimensions, rather than on dimensions, because the different sub-dimensions may have different relationships with specific performance measures. The sub-dimensions within a dimension, however, are highly correlated by construction. Thus, in empirical models, we drop one sub-dimension from each dimension we analyze, and our method for choosing the dropped sub-dimensions is discussed in the data analysis section. Finally, our performance measures encompass only a subset of possible hospital performance indicators. Thus, we identify hypotheses only for the subset of the dimensions of culture we assess for which we have strong a priori hypotheses regarding their effects on the available performance measures. We hypothesize that the following relationships exist between specific aspects of culture and these four types of indicators of organizational performance (also see Table 1).

Orientation. A hospital with a culture emphasizing social responsibility will put the interests of society ahead of those of individual hospitals or patients. Public hospitals in China have relatively high occupancy rates (90.0 percent in average in 2010) and relatively long LOS (10.7 days in average in 2010) (Chinese Ministry of Health 2011). And the perception exists that capacity constraints prevent many people who need treatment from receiving it. Thus, the notion of social responsibility in this context refers to reducing LOS for individual patients to provide access for more patients. While the possibility exists that this may not be in the social interest due to negative effects of shorter stays on quality of care, because LOS is unusually long in China relative to other countries, we believe that this type of unintended effect is unlikely.

We propose that hospitals compete based on profitability, which is driven by the volume of profitable services they provide as they are paid by fee-for-service. Thus, we hypothesize that, hospitals with cultures emphasizing competition will use resources more productively, resulting in more outpatient visits and BDPPPD, and will be more profitable.

Consistency. We hypothesize that a culture emphasizing cooperation among employees will be associated with a greater employee satisfaction. A strong culture of internal rules and regulations, in contrast, will be associated with lower levels of employee satisfaction. Theoretically, a consistency culture will

Table 1: Hypotheses of the Relationship between Hospital Culture and Performance

<i>Culture Sub-dimension</i>	<i>Performance Measures</i>					
	<i>LOS</i>	<i>OVPPPD</i>	<i>BDPPPD</i>	<i>ROIOE</i>	<i>Patient Satisfaction</i>	<i>ESOHDR5Y</i>
Orientation						
Social responsibility	Decrease					
Sense of competition		Increase	Increase	Increase		
Consistency						
Internal regulations and rules						Decrease
Cooperation						Increase
Cost control		Increase	Increase	Increase	Decrease	
Involvement						
Capability development						Increase
Empowerment						Increase
Adaptability						
Customer focus	Increase	Decrease			Increase	

Note. Cell entry indicates the direction of change in the performance measure associated with an increase in the strength of the culture measure. The table includes a subset of the sub-dimensions measured in the TOCA. We did not develop hypotheses for the sub-dimensions of sustainable development, core values, team orientation, and creating change due to concerns over multicollinearity in empirical models. See the data analysis section for a discussion. We did not have any hypotheses for the relationship between organizational learning and the available performance measures. Thus, these sub-dimensions are not included in Table 1.
BDPPPD, bed days per physician per day; ESOHDR5Y, employee satisfaction; LOS, length of stay; OVPPPD, outpatient visits per physician per day; ROIOE, ratio of operational income over operational expense.

enable an organization to make consistent efforts to reach its goals. The TOCA allows us to measure the extent to which the culture is consistent with respect to the goal of cost containment, but not other goals. We hypothesize that a hospital with a culture of cost containment will have shorter LOS, more OVPPPD, and more BDPPPD as cost containment goals create pressure to use resources more efficiently. This, in turn, will lead to a greater short-term profitability but lower patient satisfaction.

Involvement. Involvement cultures emphasize the development of organizational manpower. Consistent with other research demonstrating a positive

association between involvement cultures and employee satisfaction and greater efficiency in the delivery of medical care (Platonova et al. 2006), we hypothesize that employee satisfaction will be greater in public hospitals with cultures emphasizing capability development and empowerment.

Adaptability. Organizations with a culture of adaptability can make timely adjustments to strategic objectives in response to changes in the external environment (Zhang, Li, and Pan 2009). While public hospitals with more adaptable cultures will have better performance as a result, the effect on indicators of performance depends on the hospital objectives. As we do not observe the objectives of hospitals, our hypotheses are limited to specific aspects of adaptability. We hypothesize that organizations with a culture of customer focus will have higher levels of patient satisfaction, as well as longer LOS and fewer OVPPPD, as employees place a greater focus on patient care.

METHODS

Data Sources

The primary data sources are surveys of 93 public hospitals, their employees, and their patients in Shanghai, Hubei Province, and Gansu Province conducted between June and October of 2009. The selection of regions and the sampling of hospitals within regions were designed to capture varying levels of socioeconomic status within China. We first selected three provinces representing high, middle, and low levels of socioeconomic status. We then selected three districts or prefecture-level cities representing high, middle, and low levels of socioeconomic status within each province. Finally, we randomly selected three to four tertiary hospitals, three to four secondary hospitals, and three to four community hospitals in each district or city. In Shanghai, nine tertiary general hospitals were selected from the region as a whole (because tertiary general hospitals are distributed very unequally among the districts). In the hospital survey, we collected measures of hospital performance that are routinely reported to the government, including LOS, outpatient visits per year, bed days per year, number of physicians in the hospital, annual hospital operational income, and annual hospital operational expense.

Employee and patient surveys were administered in each hospital using paper-based questionnaires. For the employee survey, 10 percent of managers (at least 10 managers) and 10 percent of physicians, nurses, and health

technicians (at least 30 in each group) were randomly selected to receive a survey in the secondary-level and tertiary general hospitals, and 50 percent of the managers, 10 physicians, 5 nurses, and 5 health technicians were randomly selected to receive a survey in community hospitals. If this algorithm resulted in fewer than 20 people surveyed in a community hospital, then all employees in the community hospital were selected for the survey. In this study, “manager” refers to employees with management responsibilities at top and middle levels, including physician-managers, nurse-managers, and technician-managers. Frontline workers are employees without management responsibilities who interact directly with patients.

In their survey, employees evaluated 80 statements regarding the organization’s culture. The rating scale was 1 (fully disagree), 2 (essentially disagree), 3 (partially disagree), 4 (partially agree), 5 (essentially agree), and 6 (fully agree). When the data were analyzed, the rating scores of the statements that were phrased negatively were reversed so that a higher score represents a view that the culture is stronger along a particular dimension. The employee survey also included questions about employee characteristics and satisfaction with the overall hospital development in the most recent 5 years. The rating scale for the satisfaction question was 1 (very dissatisfied), 2 (dissatisfied), 3 (relatively dissatisfied), 4 (relatively satisfied), 5 (satisfied), and 6 (very satisfied). All responses to the employee survey were anonymous.

For the patient survey, 50 patients treated in the outpatient setting and 50 patients admitted to each hospital were randomly selected to receive an anonymous questionnaire. The scale for the question for overall satisfaction with medical care provided in the hospital was the same as that for employee satisfaction.

Measures

Organizational Culture. We used the TOCA to develop measures of organizational culture. The TOCA included 80 items, grouped into four dimensions, including orientation, consistency, involvement, and adaptability, and 13 sub-dimensions (see Appendix SA2 for a sample question, translated from Mandarin, from each sub-dimension). We consulted with experts of hospital management in developing questions and adjusted some questions based on the results of pilot tests. Using factor analyses, we developed measures of organizational culture from the items on the TOCA. The scores were calculated according to the framework of the

TOCA and were weighted according to the loadings of the first eigenvector on the dimensions of organizational culture in principal component analysis.

We conducted item analysis (item correlation and Cronbach's alpha), exploratory factor analysis (principal factor analysis with rotate = promax), and confirmatory factor analysis (structural equation model) to test the reliability and validity of the TOCA (Hoyle 1995; Byrne 2001; Grembowski 2001; Arbuckle 2003; Cole, Ciesla, and Steiger 2007). In confirmatory factor analysis, we used modification indices (MIs) to modify the model and used the fitness indices to select the best model from alternative models. Based on these analyses, four dimensions based on 73 items were ultimately included in the TOCA (see Appendix SA3). Orientation (F1) included the sub-dimensions of social responsibility (F11), sense of competition (F12), and sustainable development (F13); consistency (F2) included the sub-dimensions of core values (F21), internal regulations and rules (F22), cooperation (F23), and cost control (F24); involvement (F3) included sub-dimensions of capability development (F31), team orientation (F32), and empowerment (F33); and adaptability (F4) included the sub-dimensions of creating change (F41), organizational learning (F42), and customer focus (F43). The item scores were correlated with the total score (correlation coefficients ranged from 0.43 to 0.81) and were also correlated with the related dimension score (the correlation coefficients ranged from 0.59 to 0.85).

The analysis of TOCA's structural equation model using a randomly assigned calibration sample ($n = 1,718$) showed that the root-mean-square error of approximation (RMSEA) = 0.053, the standardized root mean square residual (SRMR) = 0.052, the normed fit index (NFI), the incremental fit index (IFI), non-normed fit index (NNFI), and the comparative fit index (CFI) were greater than 0.85, and that the goodness-of-fit index (GFI), the adjusted goodness-of-fit (AGFI), and the parsimony goodness-of-fit (PGFI) were 0.760, 0.745, and 0.714, respectively. The analysis of TOCA's structural equation model by using a randomly assigned validation sample ($n = 1,719$) showed that RMSEA = 0.052 and SRMR = 0.051, that NFI, IFI, NNFI, CFI were all greater than 0.85, and that GFI, AGFI, and PGFI were 0.769, 0.754, and 0.722, respectively. The TOCA adequately satisfied standard tests of goodness of fit (Janssen, Jonge, and Bakker 1999; Henderson, Donatelle, and Acock 2002; Hau, Wen, and Cheng 2004).

Assessments of within-group agreement are required to determine whether aggregated individual-level scores can be used as indicators of group-level constructs (Dunlap, Burke, and Smith-Crowe 2003). Four

Table 2: Test of Homogeneity of Culture within Hospitals

<i>Culture</i>	<i>ICC(1)</i>	<i>ICC(2)</i>	<i>F Value (One-Way ANOVA)</i>	<i>r_{wg(j)} Index</i>
Total	0.1952	0.9000	10.00***	0.9916
Orientation	0.1870	0.8951	9.53***	0.9710
Social responsibility	0.1264	0.8429	6.37***	0.9325
Sense of competition	0.1528	0.8700	7.69***	0.8730
Sustainable development	0.2021	0.9038	10.40***	0.9305
Consistency	0.1841	0.8932	9.37***	0.9698
Core values	0.1799	0.8906	9.14***	0.9298
Internal regulations and rules	0.1360	0.8538	6.84***	0.9218
Cooperation	0.1431	0.8610	7.20***	0.8351
Cost control	0.1492	0.8668	7.51***	0.8121
Involvement	0.1660	0.8807	8.39***	0.9641
Capability development	0.1763	0.8881	8.94***	0.9019
Team orientation	0.1490	0.8666	7.49***	0.9310
Empowerment	0.1243	0.8404	6.27***	0.8467
Adaptability	0.1677	0.8820	8.48***	0.9658
Creating change	0.1804	0.8909	9.17***	0.9245
Organizational learning	0.1225	0.8382	6.18***	0.9097
Customer focus	0.1545	0.8714	7.78***	0.8613

*** $p < .001$.

complementary measures, ICC(1), ICC(2), $r_{wg(j)}$, and the F -statistic from a one-way analysis of variance (ANOVA), are frequently used to justify statistically the aggregation (Zohar and Luria 2005; Vogus and Sutcliffe 2007). Intraclass correlation coefficients (ICC[1]and ICC[2]) measure homogeneity within the group (values of the former between 0.05 and 0.30, and values of the later equal to or above 0.7 are acceptable). R measures the degree to which individual responses within a group are interchangeable (values of 0.7 or greater are acceptable). A significant F -statistic resulting from a one-way ANOVA with group membership as independent variable demonstrates differences between the groups (Vogus and Sutcliffe 2007). Based on the results of these tests, the measures of organizational culture constructed in this study were characterized by high homogeneity within and high heterogeneity between the hospitals (see Table 2).¹

Hospital Performance. Six indicators were used to measure hospital performance, including LOS, OVPPPD, BDPPPD, ratio of operational income over operational expenditure (ROIOE), patient satisfaction, and employee

satisfaction with overall hospital development in recent 5 years (ESO-HDR5Y).

Data Analysis

We calculated means of the factor scores for the dimensions and the sub-dimensions of organizational culture both overall and by type of employee (manager, physician, nurse, and others). Analysis of variance was used to analyze the differences in the perception of organizational culture among different groups of employees.

We estimated mixed linear models using restricted maximum likelihood to analyze the fixed effect of job type on employee perception of organizational culture, controlling for other employee characteristics and for hospital random effects. We restricted these models to the total score and the four dimensions of organizational culture as little difference existed across the sub-dimensions of a particular dimension.

We estimated separate hospital-level multinomial logistic regressions for each of the six indicators of hospital performance to analyze the relationship between organizational culture and hospital performance. The dependent variable for each model was a three-level indicator of relative performance (less than the 25th percentile, greater than or equal to the 25th percentile and less than the 75th percentile, and greater than or equal to the 75th percentile). The independent variables for each model were nine sub-dimensions of organizational culture. We dropped four sub-dimensions due to the existence of multicollinearity among sub-dimensions. The sub-dimensions that had the highest variance inflation factor (VIF) were dropped one by one until all the VIFs of sub-dimensions <10 (using "PROC REG" with the option of "VIF" in *SAS*). The dropped sub-dimensions included sustainable development, core values, team orientation, and creating change. Although we had no hypotheses for the sub-dimension of organization learning, we included it in the model as a control variable. These models also included controls for hospital type (tertiary, secondary, and community) and location (province).

RESULTS

Characteristics of Surveyed Hospitals, Employees, and Patients

Eighty-seven hospitals (93.55 percent of 93 sampled hospitals) participated in the survey. Twenty-nine (33.33 percent) were tertiary general hospitals, 28

(32.19 percent) were secondary-level general hospitals, and 30 (34.48 percent) were community hospitals. Hospitals from Shanghai, Gansu Province, and Hubei Province accounted for 37.93, 29.89, and 32.18 percent, respectively, of the participating hospitals.

A total of 3,437 hospital employees participated in the survey (75.69 percent respondent rate); 52.87 percent of employee respondents were from tertiary general hospitals, 31.48 percent from secondary-level general hospitals, and 15.65 percent from community hospitals. A total of 22.84 percent were managers, 31.62 percent were physicians, 27.14 percent were nurses, and 18.33 percent were other types of employees. The average age was 35.99 years and 37.65 percent were male. In all, 15.33 percent had master and/or Ph.D. degrees, and 42.03 percent had worked at the hospital for 15 years or more. A total of 3,245 employees of 87 hospitals had no missing data for the questions on organizational culture.

A total of 8,276 patients from 87 hospitals participated in the patient survey with 35.33 percent from tertiary, 33.11 percent from secondary, and 31.56 percent from the community hospitals; 48.36 percent of the patients were male and 49.43 percent received care in the outpatient setting. The response rate for the patient survey was 95.13 percent.² The mean and standard deviation of patient age were 47.32 and 19.39, respectively.

Employee Perceptions of Hospital Culture

Overall, employees perceived the organizational culture as strong along most dimensions (mean of the total score was 4.75, corresponding to a response between partially and essentially agree) (see Table 3). The orientation dimension had the highest mean score (5.03) and involvement had the lowest (4.54). Among the sub-dimensions, internal regulations and rules received the highest mean score (mean = 5.25), while empowerment received the lowest (mean = 4.27).

Differences existed among the different types of employees in their ratings of each sub-dimension of organizational culture except organizational learning (see Table 3). On each measure, managers gave the highest ratings. The analyses using mixed linear models showed that job type was highly correlated with perceptions of organizational culture after controlling for other employee characteristics and hospital-level random effects (see Table 4). Consistent with the unadjusted results, in the multivariate models, managers gave higher rankings than other types of employees for each dimension of organizational culture.

Table 3: Factor Scores of Hospital Culture Overall and by Type of Employee

Factor [‡]	All Staff (No. = 3,245)		Managers (No. = 727)		Physicians (No. = 993)		Nurses (No. = 855)		Others (No. = 578)		F Value [‡]
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Total	4.75	0.75	4.86 ^a	0.73	4.67 ^c	0.80	4.76 ^b	0.76	4.72 ^{bc}	0.68	9.56***
Orientation	5.03	0.74	5.15 ^a	0.69	4.97 ^b	0.79	5.05 ^b	0.73	4.98 ^b	0.70	9.23***
Social responsibility	5.17	0.74	5.19 ^a	0.73	5.18 ^a	0.77	5.22 ^a	0.70	5.07 ^b	0.74	4.67**
Sense of competition	5.08	0.86	5.24 ^a	0.76	5.02 ^b	0.92	5.07 ^b	0.88	5.03 ^b	0.83	9.91***
Sustainable development	4.84	0.92	5.01 ^a	0.86	4.71 ^c	1.01	4.86 ^b	0.90	4.83 ^b	0.83	14.87***
Consistency	4.71	0.79	4.83 ^a	0.77	4.63 ^c	0.85	4.74 ^b	0.79	4.67 ^{bc}	0.74	9.91***
Core values	4.60	0.90	4.76 ^a	0.87	4.48 ^c	0.99	4.61 ^b	0.89	4.58 ^b	0.80	13.83***
Internal regulations and rules	5.25	0.78	5.32 ^a	0.76	5.14 ^b	0.81	5.34 ^a	0.74	5.21 ^b	0.76	12.59***
Cooperation	4.42	0.94	4.53 ^a	0.92	4.36 ^b	0.97	4.42 ^b	0.96	4.39 ^a	0.86	4.61**
Cost control	4.64	1.03	4.77 ^a	0.97	4.59 ^b	1.07	4.65 ^b	1.03	4.56 ^b	1.04	5.71***
Involvement	4.54	0.88	4.67 ^a	0.86	4.46 ^b	0.93	4.54 ^b	0.88	4.52 ^b	0.78	8.33***
Capability development	4.60	1.00	4.80 ^a	0.94	4.48 ^b	1.06	4.58 ^b	1.01	4.57 ^b	0.87	15.26***
Team orientation	4.75	0.84	4.77 ^{ab}	0.81	4.70 ^b	0.87	4.82 ^a	0.84	4.72 ^{ab}	0.79	3.47*
Empowerment	4.27	1.05	4.43 ^a	1.03	4.20 ^b	1.10	4.24 ^b	1.06	4.27 ^b	0.96	7.74***
Adaptability	4.72	0.85	4.80 ^a	0.81	4.64 ^b	0.88	4.74 ^{ab}	0.88	4.72 ^{ab}	0.76	5.51**
Creating change	4.65	0.97	4.82 ^a	0.89	4.53 ^c	1.03	4.65 ^b	1.00	4.66 ^b	0.85	12.54***
Organizational learning	4.83	0.85	4.80	0.86	4.82	0.86	4.91	0.86	4.83	0.78	2.44
Customer focus	4.67	0.94	4.80 ^a	0.89	4.58 ^b	0.97	4.68 ^b	0.97	4.67 ^b	0.85	7.52***

[†]If the groups are marked with the same letter, their factor means do not differ statistically by using the Student-Newman-Keuls multiple range test.
[‡]Analysis of variance:
*** $p < .001$,
** $p < .01$,
* $p < .05$.

Table 4: Analysis of the Relationship between Employee Job Types and Perceptions of Organizational Culture

Effect [†]	T score		Orientation		Consistency		Involvement		Adaptability	
	Estimate	t Value	Estimate	t Value	Estimate	t Value	Estimate	t Value	Estimate	t Value
Intercept	5.168	39.26***	5.305	40.84***	5.162	37.90***	5.108	34.01***	5.110	35.19***
Fixed effect (manager)										
Physician	-0.180	-4.70***	-0.152	-4.02***	-0.188	-4.57***	-0.237	-5.22***	-0.143	-3.27***
Nurse	-0.196	-4.32***	-0.166	-3.70***	-0.171	-3.52***	-0.259	-4.84***	-0.187	-3.63***
Others	-0.201	-4.62***	-0.224	-5.22***	-0.199	-4.29***	-0.239	-4.65***	-0.141	-2.85***
UN(1,1) [‡] subject = hospital	0.116	Z = 5.33***	0.113	Z = 5.37***	0.112	Z = 5.22***	0.134	Z = 5.12***	0.128	Z = 5.21***
code										
Null Model Likelihood	$\chi^2 = 808.1$ ***		$\chi^2 = 814.2$ ***		$\chi^2 = 792.7$ ***		$\chi^2 = 921.2$ ***		$\chi^2 = 909.9$ ***	
Test										

*** $p < .001$,

** $p < .01$,

* $p < .05$.

[†]A total of 2,907 employees in 85 hospitals were included in mixed linear model. The models include controls for the fixed effects of employees' characteristics (education, gender, age, working year) and hospital characteristics (level and location); the manager group is used as comparison group that is indicated in parentheses.

[‡]Unstructured variances and covariances.

Table 5: Logistic Analyses of the Relationship between Organizational Culture and Hospital Performance

<i>Parameter</i> [†]	<i>LOS</i>		<i>OVPPPD</i>		<i>BDPPPD</i>	
	<i>Estimate</i>	χ^2 <i>wald</i>	<i>Estimate</i>	χ^2 <i>wald</i>	<i>Estimate</i>	χ^2 <i>wald</i>
Intercept 1	−9.0045	3.9422*	−0.8337	0.0347	−0.5674	0.0205
Intercept 2	−5.0465	1.3039	3.6244	0.6602	2.3011	0.3369
Social responsibility	−3.7925	6.6219*	−0.1207	0.0067	−1.8535	2.0732
Sense of competition	1.7349	1.3888	−0.9186	0.3930	0.2218	0.0287
Internal regulations and rules	1.1659	0.4781	1.3498	0.6540	1.8528	1.5572
Cooperation	3.0717	3.3535	−1.6674	1.0291	−1.7539	1.4994
Cost control	−0.9000	0.6917	2.3967	4.2677*	2.0297	3.8621*
Capability development	−3.0678	4.4796*	−0.2678	0.0370	1.2197	0.7899
Empowerment	−1.9174	1.5139	−0.3719	0.0581	−1.1494	0.6206
Organizational learning	−0.0647	0.0016	2.0458	1.6668	0.8527	0.3234
Customer focus	4.7267	6.8484**	−2.8921	2.8065	−2.0387	1.7487
χ^2	63.1026***		68.8052***		33.0794**	
	<i>ROIOE</i>		<i>Patient Satisfaction</i>		<i>ESOHDR5Y</i>	
<i>Parameter</i>	<i>Estimate</i>	χ^2 <i>wald</i>	<i>Estimate</i>	χ^2 <i>wald</i>	<i>Estimate</i>	χ^2 <i>wald</i>
Intercept 1	−4.0291	1.0046	4.6435	1.3159	−29.2377	24.1139***
Intercept 2	−1.2123	0.0921	7.5392	3.3615	−25.0232	20.4407***
Social responsibility	0.3322	0.0614	−0.9438	0.5258	0.7156	0.2524
Sense of competition	0.7220	0.3075	0.9472	0.5133	2.8728	3.4300
Internal regulations and rules	−1.0923	0.5476	1.5352	1.0114	−2.2137	1.6843
Cooperation	−2.0494	2.0680	2.2671	2.3564	0.2639	0.0254
Cost control	2.2069	4.5433*	−2.1136	4.1452*	1.5167	1.8540
Capability development	1.1415	0.7614	2.0279	2.2739	1.5978	1.3333
Empowerment	−0.4277	0.0948	0.8007	0.2983	−1.6559	1.0066
Organizational learning	1.6039	1.1550	−1.5152	1.0143	1.5034	0.8605
Customer focus	−2.2064	2.0667	−4.1336	6.3826*	1.2081	0.4305
χ^2	31.3077**		30.7479**		69.9228***	

Note. Models estimated using hospital-level multinomial logistic regressions.

*** $p < .001$,

** $p < .01$,

* $p < .05$.

[†]The models include controls for hospital level and location.

BDPPPD, bed days per physician per day; ESOHDR5Y, employee satisfaction with hospital development in recent 5 years; LOS, length of stay; OVPPPD, outpatient visits per physician per day; ROIOE, ratio of operational income over operational expense.

Relationship between Hospital Culture and Hospital Performance

In this section, we discuss the extent to which the results of the performance models were consistent with our hypothesized relationships (see Table 5).

As hypothesized, a culture emphasizing social responsibility was negatively associated with LOS, but we found no evidence that a culture emphasizing competition was associated with more productive use of resources.

Among the consistency sub-dimensions, cost control produced findings most consistent with our hypothesized relationships. Hospitals in which employees perceived that the culture emphasized cost control were more profitable and had higher rates of outpatient visits and BDPPD, and also had lower levels of patient satisfaction. We found no evidence that employee satisfaction was associated with either a culture of internal rules and regulations or a culture of cooperation as hypothesized.

We found no evidence that the sub-dimensions of involvement were associated with employee satisfaction as hypothesized.

As hypothesized, hospitals in which employees perceived the culture as customer-focused had longer LOS. However, they also had lower patient satisfaction, which was opposite the hypothesized effect and OVPPD were not lower as hypothesized.

DISCUSSION

Assessment of the Organizational Culture of Public Hospitals in China by Using the TOCA

How to promote effective organizational culture within health care institutions is a management issue that transcends national boundaries. While there is increasing interest in the relationship between organizational culture and health service outcomes, many researchers have expressed concern over the reliability and validity of the instruments measuring organizational culture and the relevance of these instruments to the specific industry in which an organization operates (Chatman and Jehn 1994; Gershon et al. 2004; Kralewski et al. 2005). In our study, we developed an instrument (TOCA) with high content validity by drawing on established models, which have been validated in other cultural and/or industry contexts, and by adapting our instrument for the specific conditions in China. As discussed earlier, the TOCA demonstrated high internal reliability, relatively high construct validity, and some degree of cross validity. The TOCA also had external validity because it was

developed by surveying a large and representative sample of managers, physicians, nurses, and other employees in the tertiary general hospitals, secondary-level general hospitals, and community hospitals in China. Statistical tests supported the measurement of culture at the hospital level by demonstrating both homogeneity within hospitals and heterogeneity across hospitals in employees' perceptions of culture.

Organizational Culture in Public Hospitals in China

Our results indicate that the typical culture of public hospitals in China focuses more on social responsibility, sense of competition, and sustainable development, and less on capability development, team orientation, and empowerment. In addition, the culture of public hospitals, reflecting the culture of China, emphasizes internal and centralized control. These results raise the concern that public hospitals in China may not be prepared for the possibility of dramatic changes in their external environments created by reform. Hospital managers may want to consider emphasizing cultures with greater involvement and adaptability.

Different Perception of Organizational Culture by Managers and Non-Managers

Our study revealed that managers tended to give higher scores to each measure of organizational culture in public hospitals in China. The finding that the managers' perceptions of organizational culture differ from those of non-managers is consistent with research on organizational climate from the United States (Singer et al. 2009). We believe that, because the managers had more influence on the formation of organizational culture, they may be more aware of the organizational culture than non-managers. The gap between managers and non-managers in their assessment of the strength of organization culture may be an explanation for the lack of evidence, in some cases, of a relationship between culture and performance. To close the gap in the perceptions of organizational culture between managers and non-managers in public hospitals in China, it is necessary to form more shared assumptions, values, and norms between managers and non-managers, so that they have similar bases from which to perceive and assess the organizational culture.

Relationship between Perceptions of Hospital Culture and Hospital Performance

Some dimensions of organizational culture were associated with hospital performance. In many cases, these relationships were consistent with

expectations. For example, hospitals with a strong culture of social responsibility tended to have shorter LOS, perhaps responding to the demands of medical societies and governments at all levels in China to increase the efficiency of inpatient care. In contrast, hospitals with cultures emphasizing customer focus had longer LOS despite the pressure to reduce the LOS from the government and medical societies. Hospitals with a culture of cost control appear to provide patient care more productively and to have a greater financial return, at the expense of patient satisfaction. In some cases, however, the relationships we observed were seemingly contradictory. For example, patient satisfaction was not higher in hospitals in which employees believed that the culture was customer-focused. These types of contradictions, however, have also been observed in other studies (Quinn and Rohrbaugh 1983).

More generally, these results demonstrate some of the conflicting interests facing public hospitals in China. For example, hospitals with cultures of social responsibility promote shorter hospital stays, while those with customer-focused cultures provide longer stays. In addition, we find no evidence that hospitals are financially rewarded for their efforts to be more customer-focused. Finally, our results point to important tensions in employee satisfaction. Neither a culture of empowerment nor a culture of capability development tended to increase employee satisfaction with hospital development.

Predictive Validity

Predictive validity was strongest for the measure of the extent to which the culture emphasized cost control. In this case, the empirical results supported each of our hypothesized relationships and we did not find statistically significant effects for the performance measures for which we did not develop hypotheses.

We found less support for the predictive validity of the measure of a cultural emphasis on competition. A possible explanation for the lack of hypothesized effects is that the measure of a culture of competition was characterized by relatively low variation across hospitals, particularly relatively to the mean (mean = 5.08, SD = 0.86). Perhaps the degree of variation across hospitals was inadequate to identify the effect. It is also possible that a culture emphasizing hospital competition manifests itself along alternative dimensions of performance, which we were unable to measure in our study. Further analysis of the effects of this dimension of culture on hospital performance seems warranted.

We also found little support for the predictive validity of measures of culture, which, we hypothesized, would be associated with employee satisfaction. In this case, we believe that the most likely explanation is related to the way in which we measured employee satisfaction. In this study, employee satisfaction was based on “hospital development in the last 5 years.” Measures more directly related to job satisfaction may be more strongly associated with the dimensions of organizational culture, which we examined. Alternatively, it is possible that the dimensions of organization culture, which are associated with employee satisfaction, differ between employees of Chinese public hospitals and those in other settings.

We also note that our analysis included a limited number of hospital-level control variables, although we did include the key characteristics of hospital type and geographic locations, and the results may be affected by omitted variable bias.

CONCLUSION

In the era of health care reform, public hospitals in China face strong pressure to be more sensitive to social responsibility. It is likely that the public hospitals will experience dramatic changes in the future. Our results suggested that organizational culture in public hospitals were ill-prepared to respond to the changes and its environment. Hospital managers and health policy makers should focus more on organizational culture and its implications for hospital performance.

ACKNOWLEDGMENTS

Joint Acknowledgment/Disclosure Statement: This research project was funded by a grant from the National Natural Science Foundation of China, grant number 70873023. We gratefully acknowledge the significant contributions of the following members of the research project team: Jun Chao Zhang, Zhi Liu Tang, Rong Wu, Jia Yan Huang, Ping Wang, Fei Bai, Yuan He, and Jia Bao Fu. The authors thank all the colleagues above for their help in gathering information, analyzing data, and sharing their views with us in the research. The authors also acknowledge all the hospitals that provided assistance with data collection in this research project. Bundorf was funded by a Fulbright fellowship from the U.S. government.

Disclosures: None.

Disclaimers: None.

NOTES

1. In Appendix SA4, we present results of 2-way ANOVA in which we test whether significant differences exist by hospital after controlling for employee job type. We also test the effect of hospital and job type interaction. The results provide support for the existence of significance between hospital variation independent of employee job type.
2. We calculate the response rate assuming that hospitals distributed the survey questionnaires to 100 randomly selected patients as instructed. The hospitals may have distributed slightly more or fewer surveys.

REFERENCES

- Arbuckle, J. L. 2003. *AMOS 5*. Chicago: SmallWaters Corp.
- Byrne, B. 2001. *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Chatman, J., and B. K. Jehn. 1994. "Assessing the Relationship between Industry Characteristics and Organizational Culture: How Different Can You Be?" *Academy of Management Journal* 37 (3): 522–53.
- Chinese Ministry of Health. 2011. "2010 Statistical Bulletin of China's Health Development" [accessed on June 30, 2011]. Available at <http://www.moh.gov.cn/public-files/business/htmlfiles/mohwsbwstjxxzx/s7967/201104/51512.htm>.
- Coeling, H. V. E., and J. R. Wilcox. 1988. "Understanding Organizational Culture: A Key to Management Decision-Making." *JONA* 18 (11): 16–23.
- Cole, D. A., J. A. Ciesla, and J. H. Steiger. 2007. "The Insidious Effects of Failing to Include Design-Driven Residuals in Latent-Variable Covariance Structure Analysis." *Psychological Methods* 12 (4): 381–98.
- Cooke, R. A., and D. M. Rousseau. 1988. "Behavioral Norms and Expectations: A Quantitative Approach to the Assessment of Organizational Culture." *Group Organization Management* 13 (3): 245.
- Damanpour, F. 1992. "Book Review: Corporate Culture and Organizational Effectiveness." *Journal of Management* 18: 175–6.
- Denison, D. R. 1990. *Corporate Culture and Organizational Effectiveness*. New York: John Wiley & Sons.
- Denison, D. R., S. Haaland, and P. Goelzer. 2004. "Corporate Culture and Organizational Effectiveness: Corporate Culture and Organizational Effectiveness: Is Asia Different from the Rest of the World?" *Organizational Dynamics* 33 (1): 98–109.

- Dunlap, W. P., M. J. Burke, and K. Smith-Crowe. 2003. "Accurate Tests of Statistical Significance for rWG and Average Deviation Interrater Agreement Indexes." *Journal of Applied Psychology* 88 (2): 356–62.
- Gershon, R. R. M., P. W. Stone, S. Bakken, and E. Larson. 2004. "Measurement of Organizational Culture and Climate in Healthcare." *JONA* 34 (1): 33–40.
- Grembowski, D. 2001. *The Practice of Health Program Evaluation*. New Delhi, India: Sage Publications.
- Hartmann, C. A., A. K. Rosen, M. Meterko, P. Shokeen, S. Zhao, S. Singer, A. Falwell, and D. M. Gaba. 2008. "An Overview of Patient Safety Climate in the VA." *Health Services Research* 43 (4): 1263–84.
- Hatch, M. J., and A. L. Cunliffe. 2006. *Organizational Theory*. New York: Oxford University Press.
- Hau, K. T., Z. L. Wen, and Z. J. Cheng. 2004. *Structural Equation Model and Its Applications*. Beijing, China: Educational Science Publishing House.
- Helfrich, C. D., Y. F. Li, D. C. Mohr, M. Meterko, and A. E. Sales. 2007. "Assessing an Organizational Culture Instrument Based on the Competing Values Framework: Exploratory and Confirmatory Factor Analyses." *Implementation Science* 2: 13, doi:10.1186/1748-5908-2-13.
- Henderson, J. W., R. J. Donatelle, and A. C. Acock. 2002. "Confirmatory Analysis of the Cancer Locus Control Scale." *Educational and Psychological Measurement* 62 (6): 995–1005.
- Hoyle, R. H. 1995. *Structural Equation Modeling: Concepts, Issues and Applications*. Thousand Oaks, CA: Sage Publications.
- Janssen, P. P. M., J. D. Jonge, and A. B. Bakker. 1999. "Specific Determinants of Intrinsic Work Motivation, Burnout and Turnover Intentions: A Study among Nurses." *Journal of Advanced Nursing* 29 (6): 1360–9.
- King, T., and J. F. Byers. 2007. "A Review of Organizational Culture Instruments for Nurse Executives." *JONA* 37 (1): 21–31.
- Kralewski, J., B. E. Dowd, A. Kaissi, A. Curoe, and T. Rockwood. 2005. "Measuring the Culture of Medical Group Practices." *Health Care Management Review* 30 (3): 184–93.
- Kreitner, R., and A. Kinicki. 2008. *Organizational Behavior*, 8th Edition. New York: McGraw-Hill/Irwin.
- Platonova, E. A., S. R. Hernandez, R. M. Shewchuk, and K. M. Leddy. 2006. "Study of the Relationship between Organizational Culture and Organizational Outcomes Using Hierarchical Linear Modeling Methodology." *Quality Management in Health Care* 15 (3): 200–9.
- Quinn, R. E., and J. Rohrbaugh. 1981. "A Competing Values Approach to Organizational Effectiveness." *Public Productivity Review* 5 (2): 122–40.
- . 1983. "A Spatial Model of Effectiveness Criteria: Towards a Competing Values Approach to Organizational Analysis." *Management Science* 29 (3): 363–77.
- Schneider, B., S. K. Gunnarson, and K. Niles-Jolly. 1994. "Creating the Climate and Culture of Success." *Organizational Dynamics* 23 (1): 17–29.
- Singer, S. J., A. Falwell, D. M. Gaba, and L. C. Baker. 2008. "Patient Safety Climate in US Hospitals: Variation by Management Level." *Medical Care* 46 (11): 1149–56.

- Singer, S. J., D. M. Gaba, A. Falwell, S. Lin, J. Hayes, and L. C. Baker. 2009. "Patient Safety Climate in 92 US Hospitals: Differences by Work Area and Discipline." *Medical Care* 47 (1): 23–31.
- Thomas, E. J., J. B. Sexton, and R. L. Helmreich. 2003. "Discrepant Attitudes about Teamwork among Critical Care Nurses and Physicians." *Critical Care Medicine* 31 (3): 956–9.
- Umiker, W. 1999. "Organizational Culture: The Role of Management and Supervisors." *Health Care Supervisor* 17 (4): 22–7.
- Vogus, T. J., and K. M. Sutcliffe. 2007. "The Safety Organizing Scale Development and Validation of a Behavioral Measure of Safety Culture in Hospital Nursing Units." *Medical Care* 45 (1): 46–54.
- Williams, E. S., L. B. Manwell, T. R. Konrad, and M. Linzer. 2007. "The Relationship of Organizational Culture, Stress, Satisfaction, and Burnout with Physician-Reported Error and Suboptimal Patient Care: Results from the MEMO Study." *Health Care Management Review* 32 (3): 203–12.
- Zazzali, J. L., J. A. Alexander, S. M. Shortell, and L. R. Burns. 2007. "Organizational Culture and Physician Satisfaction with Dimensions of Group Practice." *Health Services Research* 42 (3): 1150–76.
- Zhang, Y. L., Xia. Li, and F. Pan. 2009. "The Relationship between Organizational Culture and Government Performance-Based on Denison Model." *Asian Social Science* 5 (11): 131–7.
- Zohar, D., and G. Luria. 2005. "A Multilevel Model of Safety Climate: Cross-Level Relationships between Organization and Group-Level Climates." *Journal of Applied Psychology* 90 (4): 616–28.
- . 2010. "Group Leaders as Gatekeepers: Testing Safety Climate Variations across Levels of Analysis." *Applied Psychology* 59 (4): 647–73.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Appendix SA2: Factor Labels and Statement Examples of the TOCA.

Appendix SA3: Structural Equation Model for Organizational Culture in Public Hospitals.

Appendix SA4: Variance among Jobs and Hospitals by Two-way ANOVA.

Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.