A taxonomy of hospitals based on partnerships for population health management

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Background: Hospitals face growing pressures and opportunities to engage with partner organizations in efforts to improve population health at the community level. Variation has been observed in the degree to which hospitals develop such partnerships.

Purpose: The aim of this study was to generate a taxonomy of hospitals based on their partnerships with external organizations, employing the theoretical notion of organizations' focus on exploration versus exploitation.

Methodology: With 1,238 valid cases from the 2015 American Hospital Association Population Health Survey, our study uses items asking about the level of partnership strength for 36 named partner types. Excluding three variables with low reliability, 33 variables are classified into six partner groups by factor analysis. Then, cluster analysis is conducted to generate a taxonomy of hospitals based on their partnerships with the six partner groups.

Findings: Of 1,238 hospitals, 26.1% are classified as *exploratory* hospitals that develop more collaborative relationships with partners outside the medical sector. *Exploitative* hospitals (18.3%) focus on relationships with traditional medical sector partners. *Ambidextrous* hospitals (27.0%) develop partnerships both in and outside the medical sector. Finally, *independent* hospitals (28.6%) do not establish strong partnerships. Larger hospitals, not-for-profit hospitals, and teaching hospitals are more likely to be classified as exploratory.

Practice Implications: The four-cluster taxonomy can provide hospital and health system leaders and managers with a better understanding of the wide variation in partnerships that hospitals establish and insights into their different strategic options with regard to partnership development.

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Pressures for more value-driven health care, including the enactment of the Affordable Care Act, have resulted in the emergence of new payment models such as value-based reimbursement systems (e.g., global budgeting and capitation approaches) and new delivery systems such as accountable care organizations. Hospitals and health care delivery systems have experienced considerable changes in the environment externally and in their strategies internally. In particular, environmental forces have led hospitals to increase their focus on population health management in terms of preventive care service, chronic disease management, and community wellness (Health Research & Educational Trust, 2012, 2013, 2014).

Hospitals' partnerships with other community organizations are a key component in effectively addressing the health of the communities they serve. Community and social service organizations have long been involved with hospitals in attempts to meet communities' medical and nonmedical needs (Carlton & Singh, 2018; Prybil et al., 2014). Partnerships with them can lead hospitals to develop a better understanding of the nonmedical needs of their communities. Furthermore, hospitals can develop more expansive or targeted population health management programs by integrating the hospitals' resources, skills, and knowledge with their community partners (Health Research & Educational Trust, 2012, 2013, 2014; Kindig & Isham, 2014).

Despite hospitals' efforts to engage in partnerships for community health, variations have been observed in their collaboration with other organizations (Begun & Potthoff, 2017; Health Research & Educational Trust, 2012). For example, although 87% of hospitals responding to a community partnership survey reported some degree of relationship with other hospitals, they were less prone to collaborate with housing/transportation authorities (Health Research & Educational Trust, 2014, 2015). Whereas some hospitals are likely to establish more collaborative partnerships with external organizations outside the medical sector, others try to maintain their familiar partnerships within the medical sector.

Given the importance of hospital–community partnerships, little is known about the varying levels of hospitals' partnerships or the integration of medical and nonmedical services to improve population health (Fraze, Lewis, Rodriguez, & Fisher, 2016; Health Research & Educational Trust, 2015; Hogg & Varda, 2016). This study aims to develop a taxonomy of hospitals based on their partnerships with external organizations to improve population health. The taxonomy will help policymakers and practitioners better understand hospitals' partnering behaviors and allow for a more useful assessment of collaborative relationships.

Theoretical Framework

To conceptualize types of partnerships that hospitals establish to improve community health, this study employs the concept of organizations' focus on exploration versus exploitation, which has been widely applied to understanding ways organizations change, innovate, and learn. Exploration involves "a pursuit of new knowledge," whereas exploitation is related to "the use and development of things already known" (Levinthal & March, 1993, p. 105). Employing exploration, organizations can pursue new resources and knowledge to develop new products or services for new customers or markets to maintain their continuous adaptability. In contrast, through exploitative approaches, organizations leverage current resources and knowledge to refine or extend existing products or services to improve their short-term productivity (Benner & Tushman, 2015; Jansen, Van Den Bosch, & Volberda, 2006; Lavie et al., 2010; Levinthal & March, 1993; March, 1991; Raisch & Birkinshaw, 2008). The sole pursuit of exploitation enables organizations to improve favorable short-term productivity by utilizing their existing procedures, but the organizations may fall into a competency trap and cannot respond appropriately to environmental changes (Lavie et al., 2010; Levinthal & March, 1993; Raisch & Birkinshaw, 2008). Although a focus on exploration enhances organizations' ability to search for new resources and create new knowledge for their adaptability, the organizations may become trapped in a cycle of "unrewarding change" and not succeed in enhancing an organization's short-term performance (Benner & Tushman, 2015; Lavie et al., 2010; Levinthal & March, 1993, p. 106; March, 1991; Raisch & Birkinshaw, 2008). Thus, organizations can cultivate both exploitative and exploratory approaches for long-term survival and short-term prosperity (Levinthal & March, 1993; March, 1991; Tushman & O'Reilly, 1996). This ability is known as organizational ambidexterity, defined as "the ability to simultaneously pursue both incremental and discontinuous innovation from hosting multiple contradictory structures, processes, and cultures within the same firm" (Tushman & O'Reilly, 1996, p. 24).

Partnerships with other organizations can influence the way that organizations change, innovate, and learn. Interorganizational relationships enable organizations to exploit their existing skills and knowledge or to explore new opportunities and capabilities (Lavie et al., 2010; Lin, Yang, & Demirkan, 2007; Schilling & Phelps, 2007). Collaboration with familiar partners that have similar expertise in the same field can contribute incremental and efficient innovation, mainly drawing on the existing knowledge base (Baum, Calabrese, & Silverman, 2000; Levinthal & March, 1993; Lin et al., 2007). When organizations collaborate with partners having similar expertise, they can develop incremental improvements by efficiently building on familiar knowledge (Beckman, Haunschild, & Phillips, 2004; March, 1991; Phelps, 2010; Phelps, Heidl, & Wadhwa, 2012). However, these partnerships may not offer the new or unique knowledge needed for changes or innovation (Baum et al., 2000; Lin et al., 2007).

In contrast, partnerships with unfamiliar partners that operate in a very different field can drive organizations'

radical and disruptive innovation via employing new knowledge and skills to expand their network boundaries beyond immediate ties (Andriopoulos & Lewis, 2009; Benner & Tushman, 2015; Lavie et al., 2010; Raisch & Birkinshaw, 2008). Organizations collaborating with dissimilar partners have an opportunity to search for innovative solutions of broader scope by accessing or creating new knowledge (Beckman et al., 2004; Jansen et al., 2006; Phelps, 2010; Phelps et al., 2012). Information and expertise from different fields tend to be more complicated, tacit, and noncodifiable than information and expertise from similar fields. Strong and cohesive relationships can facilitate new knowledge creation and the transfer of complex and tacit knowledge by helping organizations better understand their partners' knowledge and the local context in which their partners operate (Phelps, 2010; Phelps et al., 2012; Schilling & Phelps, 2007; Tortoriello, Reagans, & McEvily, 2012). Thus, organizations more intensively collaborating with dissimilar partners can be regarded as having a more exploratory orientation.

Organizations can also put their strategic focus on partnerships with both familiar and nonfamiliar partners rather than leaning exclusively toward the exploratory or exploitative approach (Andriopoulos & Lewis, 2009; Raisch & Birkinshaw, 2008; Tushman & O'Reilly, 1996). We use the exploration and exploitation concepts to interpret empirical clustering of hospitals based on their partnering behavior. It should be noted that a variety of other factors will affect partnering choices, including physical proximity to potential partners, mission alignment, local health needs and demands, and other characteristics of the local health care market.

Methods

Data Sources and Sample

The 2015 American Hospital Association (AHA) Population Health Survey data are used to generate a taxonomy of hospitals. The survey was conducted from January through May 2015 to identify the infrastructure created by hospitals to support their population health activities (Health Research & Educational Trust, 2015). The survey was mailed to 6,365 hospitals across the nation, and 1,418 hospitals responded (response rate = 22%). General medical/surgical hospitals represent 83.6% of respondents' service type. Compared to national percentages, the South Atlantic, Southeast, and West South Central states are underrepresented, whereas the Midwest is overrepresented. Large hospitals (300 beds or more), not-for-profit hospitals, and teaching hospitals are overrepresented (Table 1).

Of the 1,418 hospitals in the sample, 30.4% have at least one missing response on the question used in our analysis. An analysis of nonresponse data finds that they are not missing completely at random (Little's Missing Completely at Random Test: $\chi^2 = 5,232.41$, $df = 4,604$, $p < .001$), and they also can be predicted through other observed variables in the data set. Thus, missing values are imputed using expectation maximization (EM) for cases with nonresponses. Cases in which the nonresponse rate exceeded 33% are dropped from the study (Bagheri et al., 2014). After completing the imputation, the complete sample includes 1,238 valid cases.

Measures and Analysis

The AHA survey asks the hospital to report on its level of partnership with 36 different organizational types (Table 2). Responses to the 36 items are measured on a 6-point scale, which closely resembles a Guttman scale. The responses are ordered from relatively simple collaborative activities, such as funding, to more intricate ones, such as a formal alliance (Table 2). Hospitals report the strongest relationships with "other local hospitals or health care systems" (mean of 4.01) and the weakest relationships with "state transportation organizations" (mean of 2.01).

To identify whether the 36 partner organizations can be classified into a smaller number of groups, factor analyses and reliability tests were conducted. Excluding three variables with Cronbach's alphas of <.6, 33 variables were classified into six partner groups: community-based organizations, state agencies, housing/transportation agencies, health sector organizations, local government organizations, and public health care systems (Table 3). Community-based organizations include business, social service, or education organizations that operate in a community. State agencies are organizations related to policy, human services, public health, or public safety at a state level. The housing/transportation agency group includes organizations related to housing/community development and transportation in both state and local levels. Health sector organizations include local hospitals or health care systems other than public health care systems, community health centers, retail clinics, community coalition, or health insurance companies. Local government agencies comprise the fifth group, and the final partner group is composed of public hospitals and health care systems.

Using nonhierarchical (*k*-means) clustering, we examined the partnership scores of each cluster generated by specifying 2–10 clusters with three different populations (total population, acute hospitals only, acute hospitals excluding federal government hospitals). A four-cluster solution provided the clearest distinction of clusters to interpret, and the four-cluster solution was robust across the three different populations of hospitals. To identify which of the specific clusters differs from the others based on the results of cluster analysis, we conducted post hoc multiple pairwise comparison tests. Finally, we conducted a discriminant analysis to confirm that the hospitals were

	AHA survey		Study sample		National
	n	**%**	**n**	**%**	**%**
Region					
New England	61	4.30	55	4.40	4.10
Mid-Atlantic	156	11.00	144	11.60	9.00
South Atlantic	146	10.30	125	10.10	14.90
South East	148	10.40	126	10.20	14.60
Midwest	259	18.30	226	18.30	8.20
West North Central	219	15.40	190	15.30	12.60
West South Central	178	12.60	155	12.50	17.10
Mountain	99	7.00	84	6.80	8.30
Pacific	152	10.70	133	10.70	10.30
Hospital size					
Small (<100 beds)	676	47.70	591	47.70	54.80
Medium (100–299 beds)	450	31.70	391	31.60	30.90
Large (≥300 beds)	292	20.60	256	20.70	14.20
Teaching status	476	33.60	417	33.70	25.70
System affiliation	802	56.60	696	56.20	61.70
Governing authority					
Government, nonfederal	339	23.90	286	23.10	20.50
Nongovernment, not-for-profit	871	61.50	770	62.20	50.00
Investor-owned, for-profit	165	11.60	141	11.40	26.10
Government, federal	43	3.00	41	3.30	3.40
Service type					
General medical/surgical	1,186	83.60	1036	83.70	75.80
Psychiatric	100	7.10	86	6.90	7.80
Rehabilitation	28	2.00	25	2.00	4.00
Children's	37	2.60	35	2.80	2.20
Acute long-term care	34	2.40	29	2.30	6.80
Other	33	2.30	27	2.20	3.40

Table 1

Sample representativeness and hospital demographics

Note. AHA regions are used for the nine region classification. AHA = American Hospital Association.

properly classified into the clusters. SPSS Version 24 was used for all analyses.

Results

Cluster Analyses

As noted above, the analyses generated four groups of hospitals based on their partnerships. The clusters are listed in Table 4, along with mean standardized values of relationship strength with each of the six partner groups. The overall mean values (M) indicate that hospitals are more likely to collaborate with community-based organizations, health sector organizations, and local government organizations (mean partnership scores of .54, .53, and .50, respectively). The degree of partnerships with state agencies, housing/transportation organizations, and public health care systems are lower (mean partnership scores of .44, .45, and .41, respectively). On the basis of the substantially lower F values

generated from the analysis of variance, the state agency and health sector organization groups may not be important factors in distinguishing clusters.

To evaluate the extent to which each hospital cluster established collaborative partnerships with each partner group, we examined tercile scores of overall partnerships that all the hospitals develop with each partner group. We use the labels "low," "medium," and "high" to refer to each third. We also examined quartile and quintile scores, with similar conclusions.

The cluster with the most straightforward interpretation based on our theoretical approach is Cluster 4, which we label "independent." Partnerships in Cluster 4 fall in the lowest or middle third for all six partner types. Cluster 4 hospitals comprise 28.6% (n = 354) of the responding hospitals.

Next, we identify the cluster with the strongest relative penchant for relationships with like-minded organizations, which, following March (1991), we label "exploitative." This is Cluster 2, where relationships with health sector organizations fall into the middle third (medium) and with

<table>
<tr><td colspan="3" align="center">**Table 2**</td></tr>
<tr><td colspan="3" align="center">American Hospital Association survey items used and response mean</td></tr>
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Survey items	*n*	*M*
Q9a: Other local hospitals or health care systems	1,302	4.01
Q9b1: Office of the chief elected official (local)	1,316	3.09
Q9b2: Office of the municipal, city, or county manager (local)	1,316	3.07
Q9b3: Public health (local)	1,316	3.81
Q9b4: Human services (local)	1,316	3.11
Q9b5: Public hospital/health care system (local)	1,292	3.08
Q9b6: Public safety (local)	1,292	3.17
Q9b7: Housing/community development (local)	1,278	2.57
Q9b8: Policy/legislative initiatives (local)	1,288	3.19
Q9b9: Transportation (local)	1,278	2.53
Q9c1: Office of the governor (state)	1,288	2.59
Q9c2: Public health department (state)	1,288	3.41
Q9c3: Human services (state)	1,288	2.86
Q9c4: Public hospital/ health care system (state)	1,292	2.75
Q9c5: Housing/community development (state)	1,278	2.11
Q9c6: Public safety (state)	1,288	2.65
Q9c7: Policy/legislative initiatives (state)	1,288	3.05
Q9c8: Transportation (state)	1,278	2.01
Q9d4: National health associations	1,302	2.94
Q9d5: Federally qualified health center, community health center, rural health clinic or free clinic	1,302	3.73
Q9d6: Healthy communities coalitions	1,302	3.46
Q9d7: Health insurance companies	1,302	3.69
Q9d8: Retail clinics	1,302	2.24
Q9d9: Faith-based organizations	1,297	2.97
Q9d10: Early childhood education	1,297	2.51
Q9d11: School districts (primary and secondary education)	1,297	3.28
Q9d12: Post-secondary education (colleges, universities)	1,297	3.36
Q9d13: Chamber of commerce or other business group	1,297	3.41
Q9d14: Local businesses	1,297	3.24
Q9d15: Service leagues (e.g., Lions, Rotary)	1,297	2.94
Q9d16: Neighborhood organizations	1,297	2.59
Q9d17: United Way	1,297	2.81
Q9d18: YMCA/YWCA	1,297	2.42

Note. After imputation, these 33 partner organizations were used for factor analysis to categorize partner groups. Then, six partner groups were put in cluster analysis to generate a taxonomy of hospitals. Response rate ranges from 90.13% to 92.81%. Responses are measured on a 6-point scale: 1 = *not involved* (no current partnerships with this type of organization); 2 = *funding* (grant-making capacity only); 3 = *networking* (exchange ideas and information); 4 = *cooperation* (exchange information and share some resources for similar missions); 5 = *collaboration* (exchange information and share resources to alter activities and enhance the capacity of the other partner); 6 = *alliance* (a formalized partnership among multiple organizations with merged initiatives, common goals, and common metrics). YMCA = Young Men's Christian Association; YWCA = Young Women's Christian Association.

public health care systems in the top third (high). Cluster 2 hospitals represent 18.3% (*n* = 227) of respondents.

Cluster 1 exhibits partnerships both with elements of the health sector (health sector organizations = medium, public health care systems = medium) and nonhealth sector (community based organizations = high, local government = high, housing/transportation = low), so we assign Cluster 1 the label "ambidextrous." Cluster 1 contains 27.0% of hospitals (*n* = 334).

The interpretation of Cluster 3 is less clear. Cluster 3 has characteristics of both an exploratory type (high partnerships in the nonhealth sectors) and an ambidextrous type (medium partnerships with both health sector organizations and public health care systems). Cluster 3's key distinguishing

feature from the ambidextrous type (Cluster 1) is the high level of partnerships with housing/transportation organizations. That striking difference justifies the label "exploratory" for Cluster 3. Cluster 3 includes 26.1% (*n* = 323) of respondents.

Post Hoc Multiple Comparisons

Analysis of variance results indicate a statistically significant difference in the mean scores of partnerships across the final clusters (Table 4). However, we cannot observe which of the specific clusters differs from the other clusters. Thus, we conducted post hoc multiple comparisons tests (data not shown). For community-based organizations, there are significant mean differences in every cluster pairwise

Table 3				
Factor analysis results (N = 1,238)				
Factors	Factor loads	Eigenvalue	Cum.% variance	Cronbach's alpha
Factor 1: Community-based organizations		**13.34**	**40.42**	**.91**
Q9d14: Local businesses	.80			
Q9d13: Chamber of commerce or business group	.79			
Q9d15: Service leagues	.76			
Q9d11: School districts	.65			
Q9d16: Neighborhood organizations	.60			
Q9d10: Early childhood education	.59			
Q9d12: Post-secondary education	.59			
Q9d17: United Way	.54			
Q9d9: Faith-based organizations	.52			
Q9d18: YMCA/YWCA	.51			
Q9d4: National health associations	.39			
Factor 2: State agencies		**2.35**	**47.54**	**.88**
Q9c7: Policy/legislative initiatives (state)	.78			
Q9c1: Office of the governor (state)	.75			
Q9b8: Policy/legislative initiatives (local)	.62			
Q9c3: Human services (state)	.62			
Q9c2: Public health department (state)	.61			
Q9c6: Public safety (state)	.52			
Factor 3: Housing/transportation		**1.40**	**51.77**	**.85**
Q9c5: Housing/community development	.78			
Q9c8:Transportation	.76			
Q9b9: Transportation (local)	.67			
Q9b7: Housing/community development (local)	.66			
Factor 4: Health sector organizations		**1.33**	**55.81**	**.72**
Q9d5: Federally qualified health center, community health center, rural health clinic, or free clinic	.74			
Q9d6: Healthy communities coalitions	.68			
Q9d7: Health insurance companies	.46			
Q9a: Other local hospitals or health care systems	.44			
Q9d8: Retail clinics	.38			
Factor 5: Local government		**1.15**	**59.29**	**.86**
Q9b2: Office of the municipal manager (local)	.76			
Q9b1: Office of the chief elected official (local)	.74			
Q9b3: Public health (local)	.60			
Q9b4: Human services (local)	.42			
Q9b6: Public safety (local)	.41			
Factor 6: Public health care systems		**1.10**	**62.62**	**.80**
Q9b5: Public hospital/health care system (local)	.79			
Q9c4: Public hospital/ health care system (state)	.73			

Note. Three items with Cronbach's alphas of <.6 were excluded: Q9d1: Federal government direct relationship, Q9d2: Tribal and Indian health, Q9d3: World Health Organization. YMCA = Young Men's Christian Association; YWCA = Young Women's Christian Association.

comparison, except for the mean scores between "exploratory–ambidextrous." For state agencies, there are significant differences only in the mean scores between "exploratory–ambidextrous," between "exploratory–independent," and between "exploitative–independent." For housing/transportation agencies, there are significant differences in the mean scores among all cross-cluster comparisons. For health sector organizations, there are no significant differences in the mean scores

of cross-cluster comparisons, except for the pairwise partnerships between the independent cluster and the others. Local government organizations show significant mean differences in every pairwise comparison, except for the mean scores between "ambidextrous–exploitative." Finally, for public health care systems, significant differences exist in the mean scores among all cross-cluster comparisons. Thus, housing/transportation agencies and public health care systems seem

	Table 4						
	Summary of cluster analysis results (N = 1,238)						
Partner group	**Cluster 1 ambidextrous (*n* = 334)**	**Cluster 2 exploitative (*n* = 227)**	**Cluster 3 exploratory (*n* = 323)**	**Cluster 4 independent (*n* = 354)**	***M***	***F***	***p***
Community-based organizations	.65 (high)	.36 (low)	.65 (high)	.45 (low)	.54	335.94	< .001
State agencies	.42 (medium)	.45 (medium)	.49 (medium)	.41 (medium)	.44	16.05	< .001
Housing/transportation	.32 (low)	.46 (medium)	.65 (high)	.39 (medium)	.45	406.98	< .001
Health sector organizations	.54 (medium)	.54 (medium)	.55 (medium)	.49 (medium)	.53	12.01	< .001
Local government	.60 (high)	.62 (high)	.48 (medium)	.33 (low)	.50	397.78	< .001
Public health care systems	.34 (medium)	.53 (high)	.43 (medium)	.37 (medium)	.41	87.30	< .001

Note. Numbers indicate the mean standardized scores of the partnerships of each hospital cluster with each partner group. Labels "low," "medium," and "high" are based on tercile scores of all partnerships of all hospitals in each partner group. Mean values (M) indicate the overall mean standardized scores of the partnerships of all hospitals with each partner, regardless of cluster. F and corresponding p values based on analysis of variance test.

to be the most important partner groups in distinguishing clusters, whereas state agencies and health sector organizations are relatively less influential than other partner groups in differentiating clusters.

Discriminant Analysis

Several studies have conducted discriminant analysis to confirm the validity of clustering solutions (Shortell, Wu, Lewis, Colla, & Fisher, 2014; Wu, Shortell, Lewis, Colla, & Fisher, 2016). This study also employs discriminant analysis to assess the results of our cluster analysis by using hospitals' mean scores of partnerships with each of the six group partners as independent variables and four clusters of hospitals as a grouping variable.

The results of discriminant analysis indicate that 99.1% of *exploratory* hospitals, 92.1% of *exploitative* hospitals, 96.7% of *ambidextrous* hospitals, and 98.9% of *independent* hospitals are correctly classified by the cluster analysis we conducted. Overall, 97.1% of hospitals are grouped into the same cluster to which they are originally assigned. The findings enhance support for the resulting taxonomy of hospitals based on their partnerships.

Partnership Type and Structural Characteristics

To explore characteristics of hospitals that are related to partnership type, we compared three key structural characteristics of hospitals—hospital size, ownership type, and teaching status—across partnership types. The results are shown in Table 5.

We find a significant relationship between hospital size and partnership types. Of the total sample, small hospitals account for 47.7%, medium hospitals account for 31.6%,

and large hospitals account for 20.7%. Of small hospitals, 34.5% are classified as independent, compared to 26.9% of medium hospitals and 17.6% of large hospitals. On the other hand, 40.6% of large hospitals are classified as exploratory, compared to 28.6% of medium hospitals and 18.1% of small hospitals (Table 5). The results show that smaller hospitals (fewer than 100 beds) are less likely to engage in partnerships. In contrast, large hospitals (more than 300 beds) are more likely to be involved in partnerships with nonmedical organizations. It may be that the small hospitals do not have sufficient resources and capabilities to engage in extensive partnerships. Large hospitals' resources, capabilities, and motives as leaders can drive their higher tendency toward nonmedical organization partnerships (Josefy, Kuban, Ireland, & Hitt, 2015).

For the relationship between hospital ownership and partnership type, the analysis also indicates a statistically significant relationship. Of the total sample, 62.2% of hospitals are not-for-profit and 11.4% are for-profit. Government/nonfederal hospitals account for 23.1%, and government/federal hospitals account for 3.3%. Within the not-for-profit group, 31.4% develop ambidextrous partnerships, and 29.9% have exploratory partnerships. Within for-profit hospitals, 17.7% are classified as ambidextrous and 21.3% are classified as exploratory. It appears that whereas not-for-profit hospitals are more likely to engage in a wide range of partnerships, for-profit hospitals are more likely to be independent and not focused on the strategy of partnership development. Not-for-profit hospitals are more likely to be driven by missions and social agendas that promote and benefit community health (Oliver, 1991; Proenca, Rosko, & Zinn, 2000). On the basis of their missions and interests, not-for-profit hospitals can collaborate with nonmedical partners through ambidextrous or exploratory partnerships to address community health and benefits.

Table 5
Comparison of internal characteristics across partnership clusters

Results of chi-square test for hospital size across hospital partnership types

Bed size category	Cluster 1 ambidextrous (*n* = 334)	Cluster 2 exploitative (*n* = 227)	Cluster 3 exploratory (*n* = 323)	Cluster 4 independent (*n* = 354)	Total (*N* = 1,238)	χ^2	Sig.
Small (<100)	150 (25.4%)	130 (22.0%)	107 (18.1%)	204 (34.5%)	591	67.4	*p* < .001
Medium (100–299)	121 (30.9%)	53 (13.6%)	112 (28.6%)	105 (26.9%)	391	(*df* = 6)	
Large (≥300)	63 (24.6%)	44 (17.2%)	104 (40.6%)	45 (17.6%)	256		

Results of chi-square test for ownership type across hospital partnership types

Ownership	Cluster 1 ambidextrous (*n* = 334)	Cluster 2 exploitative (*n* = 227)	Cluster 3 exploratory (*n* = 323)	Cluster 4 independent (*n* = 354)	Total (*N* = 1,238)	χ^2	Sig.
Not-for-profit	242 (31.4%)	107 (13.9%)	230 (29.9%)	191 (24.8%)	770	99.92	*p* < .001
For-profit	25 (17.7%)	19 (13.5%)	30 (21.3%)	67 (47.5%)	141	(*df* = 9)	
Government	67 (20.5%)	101 (30.9%)	63 (19.3%)	96 (29.4%)	327		
Federal	2 (4.9%)	11 (26.8%)	17 (41.5%)	11 (26.8%)	41		
Nonfederal	65 (22.7%)	90 (31.5%)	46 (16.1%)	85 (29.7%)	286		

Results of chi-square test for teaching status across hospital partnership types

Teaching status	Cluster 1 ambidextrous (*n* = 334)	Cluster 2 exploitative (*n* = 227)	Cluster 3 exploratory (*n* = 323)	Cluster 4 independent (*n* = 354)	Total (*N* = 1,238)	χ^2	Sig.
Nonteaching	228 (27.8%)	159 (19.4%)	175 (21.3%)	259 (31.5%)	821	46.38	*p* < .001
Teaching	106 (25.4%)	68 (16.3%)	148 (35.5%)	95 (22.8%)	417	(*df* = 6)	
Major	20 (19.4%)	21 (20.4%)	49 (47.6%)	13 (12.6%)	103		
Minor	86 (27.4%)	47 (15.0%)	99 (31.5%)	82 (26.1%)	314		

Note. Numbers in parentheses indicate row percentages.

Government hospitals are likely to engage in both exploitative partnerships (30.9%) and the independent approach (29.4%) at a similar level. Among government hospitals, federal hospitals and nonfederal hospitals show very different patterns in partnership development. Federal hospitals, such as Air Force, Army, Navy, and Veterans Affairs hospitals, tend to develop exploratory partnerships (41.5%), whereas nonfederal hospitals operated by the state, city, or county are more engaged in exploitative partnerships (31.5%) and display an independent tendency (29.7%). Nonfederal government hospitals may have to focus on imminent care services rather than programs directed at social determinants of health. Also, they may not be able to secure sufficient resources to address various health needs in the community through collaborating with community organizations.

The results also reveal a statistically significant relationship between teaching status and partnership type. Of the total sample, 66.3% of hospitals are nonteaching hospitals, and 33.7% are teaching hospitals. Of teaching hospitals, 35.5% are classified as exploratory, compared to 21.3% of nonteaching hospitals. The finding is even stronger for major teaching hospitals (47.6% are classified as exploratory). This finding suggests that teaching hospitals are more interested in developing partnerships with nonmedical partners. Teaching hospitals' multiple missions of supplying health care to a market, providing educational programs, and conducting research may drive them to develop a broader array of partnerships (Shahian et al., 2012).

Discussion

Our cluster analysis generates four types of hospitals based on partner type and the extent to which hospitals collaborate with partners. Building on the framework of exploration versus exploitation, of the 1,238 hospitals under analysis, 26.1% are classified as *exploratory* hospitals, which are pioneers in the development of cross-sector relationships. *Exploitative* hospitals (18.3%) focus on relationships with traditional medical partners. *Ambidextrous* hospitals (27.0%) establish a balance between these two strategies. A final segment,

independent hospitals (28.6% of the total), does not establish strong collaborative relationships with partners.

The findings are consistent with the broader conceptual typology of strategic behaviors developed by Miles and Snow (Miles, Snow, Meyer, & Coleman, 1978). They suggested classifying organizations in one of four categories based on the organizations' strategic choices and responses: *prospectors, defenders, analyzers*, and *reactors*. Prospectors are likely to search for new products and market opportunities and pursue innovativeness with a high market orientation, which corresponds to our *exploratory* type. Defenders work in a narrow and stable product–market domain to pursue efficiency, much like our exploitative type. Focusing on balance, analyzers search for profit opportunities while minimizing risk, corresponding to *ambidextrous* organizations. Finally, reactors often employ a residual strategy without a clear focus.

The Miles and Snow typology has received considerable attention in both strategic management and organizational research (Fiss, 2011), including application to hospitals (Helmig, Hinz, & Ingerfurth, 2014; Shortell & Zajac, 1990; Zajac & Shortell, 1989). Some studies have also discussed typologies that combine Miles and Snow's approach and March's exploration and exploitation perspective (Fiss, 2011; Helmig et al., 2014). We speculate that, to the extent such broad strategic types exist, the partnering behavior of hospital may fall into similar categories.

Our study joins several others that classify health care organizations into types using a taxonomic approach (Bazzoli, Shortell, Dubbs, Chan, & Kralovec, 1999; Mays, Scutchfield, Bhandari, & Smith, 2010; Shortell et al., 2014). Using structural characteristics, Shortell et al. (2014) derived three cluster types for accountable care organizations: larger integrated, smaller physician-led, and hybrid. Bazzoli et al.'s (1999) classifications of health systems and of health networks were based on internal characteristics and include five types of systems and four types of networks. Mays et al. (2010) described seven distinct configurations of public health delivery systems based on their core public health activities. Further studies that examine similarities and differences among these taxonomies, the methods used to generate them, and their congruence with the Miles and Snow typology would be useful.

The taxonomy of hospitals also provides research opportunities to explore (a) the association of hospitals' partnership type with the demographic/socioeconomic conditions of the community in which the hospital operates and (b) the relationship between hospitals' partnership type and their financial and process performance and clinical and community health outcomes. These comparative studies will contribute to understanding the extent to which hospitals engage in more exploratory partnerships, with which structural characteristics, and under which external community conditions.

Furthermore, longitudinal data on hospitals' partnership development would allow for the study of the movement of individual hospitals and the population of hospitals into different clusters over time. Such a study would provide insights into the trajectory of hospitals from adoption to maturation of exploratory strategy and the indicators of trends in population health management.

This study has several limitations. Our taxonomy classifies hospitals based on the existence and strength of partnerships, with the implicit assumption that stronger partnerships lead to higher levels of programming to address population health. This should be tested empirically, however. The "strength of weak ties" argument notes that overlapping weak ties can result in powerful outcomes (Granovetter, 1973). For example, multiple weak ties with nonmedical organizations may result in multisector collaboration as well or better than a few strong ties.

This study uses instruments asking about hospitals' partnership attributes from the 2015 AHA Population Health Survey. Although the survey respondents are thought to be knowledgeable regarding the hospitals' strategies, the respondents may not have accurately responded to all the questions. In addition, EM imputation is used to deal with nonresponses. Although EM imputation is widely used to fill in missing values for nonresponses, any imputation process may produce a level of bias in the data. The data provide only the hospital's perception of the relationship with other organizations, without validation from the other organizations. Finally, our sample is not representative of U.S. hospitals on at least four dimensions: geographic region, size, teaching status, and ownership. More representative samples may generate different results.

Practice Implications

Given the changes in policy and legislation (i.e., Affordable Care Act enactment), the health care market (e.g., new care systems and new payment models), and health status (e.g., an aging population and more people with chronic disease), hospitals and health care delivery systems need to pay more attention to partnering for population health management (Health Research & Educational Trust, 2012, 2013, 2014).

One managerial issue involves the extent to which hospitals develop cross-sector partnerships with organizations outside the health care sector to address social determinants of health and provide community benefits as a population health management strategy. Because hospitals are less familiar with addressing community needs related to social determinants of health than clinical factors, collaborating with nonmedical partners around social determinants of health can enhance their ability to address social determinants and nonmedical issues. Despite these benefits from partnerships, our cluster analysis shows wide variation in the degree to which hospitals are forming partnerships with nonmedical organizations. The degree to which hospitals can and should form such partnerships is a very open question and one that deserves careful scrutiny by hospital leaders and governing boards (Kindig & Isham, 2014).

The four-cluster taxonomy can provide hospital leaders and managers with insights into different potential strategic options with regard to partnership development. When the taxonomy is combined with data on hospitals' structural characteristics and social conditions of the communities that hospitals serve, hospital leadership can identify which types of partnerships are more likely to be developed or desirable under which organizational and community conditions. The patterns of internal characteristics and external conditions in the taxonomy of hospitals' partnerships can provide a useful benchmark for hospitals to establish more optimal partnerships based on partnerships developed in "peer groups," that is, hospitals with similar internal and external conditions (Mays et al., 2010).

Also pressing for hospitals is the development and collection of evidence on the effectiveness of partnerships with community organizations. The taxonomy can be useful in comparing the process performance and population health outcomes influenced by the partnerships in different types of hospitals. Furthermore, when hospitals need to alter their strategies as legislation/regulation and the external environment change or when they want to improve their capability for more effective cross-sector partnerships, hospital managers can gain a better understanding of the conditions required for doing so in different types of hospitals.

In summary, our study develops a taxonomy of hospitals and provides a starting point for continued comparative research. Future research should be conducted to compare differences in hospitals' external conditions as well as process performance and health outcomes based on the types of hospital partnership. Hospital leaders can use the research findings to make strategic decisions to develop the most feasible partnerships based on the hospitals' internal characteristics and resources as well as the continuously changing external conditions hospitals face.

References

Andriopoulos, C., & Lewis, M. W. (2009). Exploitation–exploration tensions and organizational ambidexterity: Managing paradoxes of innovation. *Organization Science*, *20*(4), 696–717.

Bagheri, N., McRae, I., Konings, P., Butler, D., Douglas, K., Del Fante, P., & Adams, R. (2014). Undiagnosed diabetes from cross-sectional GP practice data: An approach to identify communities with high likelihood of undiagnosed diabetes. *BMJ Open*, *4*(7), e005305.

Baum, J. A. C., Calabrese, T., & Silverman, B. S. (2000). Don't go it alone: Alliance network composition and startups' performance in Canadian biotechnology. *Strategic Management Journal*, *21*, 267–294.

Bazzoli, G. J., Shortell, S. M., Dubbs, N., Chan, C., & Kralovec, P. (1999). A taxonomy of health networks and systems: Bringing order out of chaos. *Health Services Research*, *33*(6), 1683–1717.

Beckman, C. M., Haunschild, P. R., & Phillips, D. J. (2004). Friends or strangers? Firm-specific uncertainty, market uncertainty, and network partner selection. *Organization Science*, *15*(3), 259–275.

Begun, J. W., & Potthoff, S. (2017). Moving upstream in U.S. hospital care toward investments in population health. *Journal of Healthcare Management*, *62*(5), 343–353.

Benner, M. J., & Tushman, M. L. (2015). 2013 Decade award invited article. Reflections on the 2013 decade award—"Exploitation, exploration, and process management: The productivity dilemma revisited" ten years later. *Academy of Management Review*, *40*(4), 497–514.

Carlton, E. L., & Singh, S. R. (2018). Joint community health needs assessments as a path for coordinating community-wide health improvement efforts between hospitals and local health departments. *American Journal of Public Health*, *108*(5), 676–682.

Fiss, P. C. (2011). Building better causal theories: A fuzzy set approach to typologies in organization research. *Academy of Management Journal*, *54*(2), 393–420.

Fraze, T., Lewis, V. A., Rodriguez, H. P., & Fisher, E. S. (2016). Housing, transportation, and food: How ACOs seek to improve population health by addressing nonmedical needs of patients. *Health Affairs*, *35*(11), 2109–2115.

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, *78*(6), 1360–1380. doi:10.1086/225469.

Health Research & Educational Trust. (2012). *Managing population health: The role of the hospital*. Chicago, IL: Health Research & Educational Trust.

Health Research & Educational Trust. (2013). *The role of small and rural hospitals and care systems in effective population health partnerships*. Chicago, IL: Health Research & Educational Trust.

Health Research & Educational Trust. (2014). *Hospital-based strategies for creating a culture of health*. Chicago, IL: Health Research & Educational Trust.

Health Research & Educational Trust. (2015). *Approaches to population health in 2015: A national survey of hospitals*. Chicago, IL: Health Research & Educational Trust.

Helmig, B., Hinz, V., & Ingerfurth, S. (2014). Extending Miles & Snow's strategy choice typology to the German hospital sector. *Health Policy*, *118*(3), 363–376.

Hogg, R. A., & Varda, D. (2016). Insights into collaborative networks of nonprofit, private, and public organizations that address complex health issues. *Health Affairs*, *35*(11), 2014–2019.

Jansen, J. J. P., Van Den Bosch, F. A. J., & Volberda, H. W. (2006). Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Management Science*, *52*(11), 1661–1674.

Josefy, M., Kuban, S., Ireland, R. D., & Hitt, M. A. (2015). All things great and small: Organizational size, boundaries of the firm, and a changing environment. *The Academy of Management Annals*, *9*(1), 715–802.

Kindig, D. A., & Isham, G. (2014). Population health improvement: A community health business model that engages partners in all sectors. *Frontiers of Health Services Management*, *30*(4), 3–20.

Lavie, D., Stettner, U., & Tushman, M. L. (2010). Exploration and exploitation within and across organizations. *Academy of Management Annals*, *4*(1), 109–155.

Levinthal, D. A., & March, J. G. (1993). The myopia of learning. *Strategic Management Journal*, *14*, 95–112.

Lin, Z., Yang, H., & Demirkan, I. (2007). The performance consequences of ambidexterity in strategic alliance formations: Empirical investigation and computational theorizing. *Management Science*, *53*(10), 1645–1658.

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*(1), 71–87.

Mays, G. P., Scutchfield, F. D., Bhandari, M. W., & Smith, S. A. (2010). Understanding the organization of public health delivery systems: An empirical typology. *Milbank Quarterly*, 88(1), 81–111.

Miles, R. E., Snow, C. C., Meyer, A. D., & Coleman, H. J. (1978). Organizational strategy, structure, and process. *Academy of Management Review*, 3(3), 546–562.

Oliver, C. (1991). Strategic responses to institutional processes. *Academy of Management Review*, 16(1), 145–179.

Phelps, C. (2010). A longitudinal study of the influence of alliance network structure and composition on firm exploratory innovation. *Academy of Management Journal*, 53(4), 890–913.

Phelps, C., Heidl, R., & Wadhwa, A. (2012). Knowledge, networks, and knowledge networks: A review and research agenda. *Journal of Management*, 38(4), 1115–1166.

Proenca, E. J., Rosko, M. D., & Zinn, J. S. (2000). Community orientation in hospitals: An institutional and resource dependence perspective. *Health Services Research*, 35(5), 1011–1035.

Prybil, L., Scutchfield, F. D., Killian, R., Kelly, A., Mays, G. P., Angela, C., … Fardo, D. W. (2014). *Improving community health through hospital-public health collaboration: Insights and lessons learned from successful partnerships.* Lexington, KY: Commonwealth Center for Governance Studies.

Raisch, S., & Birkinshaw, J. (2008). Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*, 34(3), 375–409.

Schilling, M. A., & Phelps, C. C. (2007). Interfirm collaboration network: The impact of network structure on firm innovation. *Management Science*, 53(7), 1113–1126.

Shahian, D. M., Nordberg, P., Meyer, G. S., Blanchfield, B. B., Mort, E. A., Torchiana, D. F., & Normand, S.-L. T. (2012). Contemporary performance of U.S. teaching and nonteaching hospitals. *Academic Medicine*, 87(6), 701–708.

Shortell, S. M., Wu, F. M., Lewis, V. A., Colla, C. H., & Fisher, E. S. (2014). A taxonomy of accountable care organizations for policy and practice. *Health Services Research*, 49(6), 1883–1899.

Shortell, S. M., & Zajac, E. J. (1990). Perceptual and archival measures of Miles and Snow's strategic types: A comprehensive assessment of reliability and validity. *The Academy of Management Journal*, 33(4), 817–832.

Tortoriello, M., Reagans, R., & McEvily, B. (2012). Bridging the knowledge gap: The influence of strong ties, network cohesion, and network range on the transfer of knowledge between organizational units. *Organization Science*, 23(4), 1024–1039.

Tushman, M. L., & O'Reilly, C. A. (1996). Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*, 38(4), 8–30.

Wu, F. M., Shortell, S. M., Lewis, V. A., Colla, C. H., & Fisher, E. S. (2016). Assessing differences between early and later adopters of accountable care organizations using taxonomic analysis. *Health Services Research*, 51(6), 2318–2329.

Zajac, E. J., & Shortell, S. M. (1989). Changing generic strategies: Likelihood, direction, and performance implications. *Strategic Management Journal*, 10, 413–430.