Abstract

Fostering Creativity to Improve Health Care Quality

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Eliciting and evaluating new ideas to improve the quality of health care are important processes for health care organizations. Creativity, which refers to the generation of novel and useful ideas, is required for innovation and is valued by many organizations. Health care staff (e.g., primary care providers, nurses and medical assistants) can be an important source of creative ideas. In my dissertation, I conducted a longitudinal, mixed methods study of 220 improvement ideas generated over 18 months by improvement team members from 12 federally qualified community health centers. I also analyzed the experiences of 2,201 patients cared for by these individuals. I used data from patient surveys, quality improvement team meeting transcripts, staff surveys and wearable sociometric sensors.

Part one of this research draws on organizational theory to develop hypotheses and tests empirically the impact of creative idea implementation on patient care experiences, the relationship between idea creativity and implementation, and moderators of this relationship. Results suggest that the implementation of creative ideas is positively associated with better patient care experiences, but such ideas are less likely to be implemented. Three staff-level characteristics - more collaborative relationships, longer organizational tenure, and higher network centrality (a more central position in the organization's social network) – increase the likelihood that staff's creative ideas will be implemented. Part two of this research assesses the health care staff characteristics

associated with idea creativity. The results show that staff with a peripheral perspective on care delivery (behavioral health provider and medical assistant), and staff with lower satisfaction and who have a shorter organizational tenure, are significant correlates of idea creativity. Part three of this dissertation focuses on the tactics that quality improvement leaders use to foster idea creativity, evolution, and implementation in their groups. The results suggest that the leader tactic of brainstorming is associated with groups having more creative, rapidly implemented, low-engagement ideas, which might be an effective tactic for leaders seeking disruptive change. The tactic of group reflection on process is associated with slower implemented, high-engagement ideas, which might help leaders elicit well-considered and deliberated solutions. I develop a conceptual framework for understanding creativity in health care organizations based on these findings, which may help scholars and health care professionals improve their understanding of health care innovation and how better to facilitate the expression and implementation of creative ideas.

This dissertation contributes to health services and organizational research by elucidating how creativity in health care organizations is fostered and facilitated, and how it affects outcomes. Understanding how creative ideas may improve the organization and delivery of quality care could facilitate efforts to discover and evaluate new ideas regarding the quality of health care delivery.

Fostering Creativity

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Chapter 1

Introduction

Patients, health care leaders and policy-makers have called for new approaches to improve the quality of health care provided in the U.S. (Institute of Medicine, 2001, 2012). Despite significant spending ($3 trillion in 2014), the U.S. ranks last among industrialized nations on key health care quality indicators of effective care, safe care, coordinated care, and patient-centered care (Davis, Stremikis, Squires, & Schoen, 2014), and falls short of meeting national quality goals (Institute of Medicine, 2012). Health policy experts consider current approaches to quality improvement insufficient to close the gap between current and expected performance (Chassin & Loeb, 2011; Institute of Medicine, 2001). One obstacle is that the rate of change and complexity of challenges in health care (e.g., coordinating care across multiple service providers and organizations) requires organizations to continuously adapt (Batalden & Davidoff, 2007; Plsek & Greenhalgh, 2001). Finding new approaches to improving the quality of care is important for health care organizations because it is a well-accepted aim of the system as well as a strategic issue, as quality measures are being used for performance-based reimbursement, practice recognition, and public reporting (Agency for Healthcare Research and Quality, 2015).

Many aspects of U.S. health care benefit from innovations, that is, ideas, practices, policies or technologies that are new to the context (Rogers, 2003). Health care delivery innovations focused on improving the quality of care, particularly related to the provision of routine care activities or patient care experiences, are less common than

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innovations in biomedical sciences (Bates, Sheikh, & Asch, 2017). The U.S. is considered a world leader in new biomedical tests and treatment development, and its academic medical centers are renowned for breakthrough treatments for cancer, heart disease, prosthetic limbs, and medical devices (Emanuel, 2014). However, the benefits of technology advances have been realized primarily in major academic medical centers, and frequently for complex and specialized medical conditions, which do not cover the majority of health care needs of the U.S. population (Bates et al., 2017; Emanuel, 2014).

Innovations focused on improving the quality of chronic and routine health care provided are less common, despite past successes showing that improvements focused on routine care activities can be effective (Bates et al., 2017). For example, research on patient safety has shown that hospitals that implemented checklists to prevent health care associated infections, consisting of behaviors such as hand washing and inserting intravenous lines under sterile conditions, were able to reduce bloodstream infections by 33% (Provonost et al., 2006). Innovations focused on improving patient health care experiences are also rare, perhaps because this aspect of care has more recently become the focus of many health care organizations' initiatives, or because targeting care to the needs and preferences of patients requires significant effort, attention, and frequently, cultural change (Cosgrove et al., 2013). Since many current health care delivery challenges relate to the provision of routine care activities or patient care experiences, high-technology approaches may not suffice for quality improvement (Emanuel, 2014). There is an urgent need to discover and evaluate new ideas regarding the quality of health care (Bates et al., 2017; Cosgrove et al., 2013).

Creativity, the generation of novel and useful ideas, is required for innovation (Amabile, 1988), and is valued by many organizations because novelty confers distinctiveness in a competitive organizational environment, and useful ideas are more likely to lead to organizational improvement (Amabile, 1982, 1988; Anderson, Potocnik, & Zhou, 2014). Creative (i.e., novel and useful) ideas may benefit health care organizations that seek to change their care delivery practices, when the status-quo is no longer sufficient for achieving the organizations' quality goals (Baer, 2012; Mueller, Melwani, & Gonzalo, 2012). The range and scope of what is considered a creative idea varies: a researcher's proposal for a new pharmaceutical breakthrough could be a creative idea, but so too could a nurse's new approach to hospital shift scheduling to improve integration across multiple service providers and organizations (George, 2007; Van de Van, Polley, Garud, & Venkataraman, 1999). Effective quality improvement in health care delivery frequently involves the latter type of creative idea (i.e., addressing the routine activities and problems of care delivery) rather than the former (i.e., a paradigm shifting product) (Shortell, Bennett, & Byck, 1998). An examination of creativity in this context would aide scholars and practitioners' understanding of how to identify promising improvement ideas in health care organizations.

While there are potential benefits of creativity in this context, little is known about how creativity is fostered in health care organizations. Despite calls for creative approaches to improvement (Gilmartin, 1999; Plsek, 1999), descriptions of formal methods to encourage creativity (Gautam, 2001; Lazarus & Fell, 2011), and empirical studies that measure the innovativeness of practice innovations developed by health care staff (Schultz, Schreyoegg, & von Reitzenstein, 2013; West & Wallace, 1991), we know

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of no published study on creativity in this context. Thus, the importance of creativity to

health care, and more specifically, to the quality of health care delivery, is unknown.

In this dissertation, I present three papers that address questions about creativity:

first, how the implementation of creative ideas affects patients' health care experiences,

the relationship between idea creativity and implementation, and the staff characteristics

that moderate this relationship; second, the antecedents of staff creativity; and third,

which tactics used by quality improvement leaders are associated with idea

creativity, evolution, and implementation in their groups. The relationship between these

three papers are illustrated in Figure 1.1, and described below.

Figure 1. 1   Conceptual Framework

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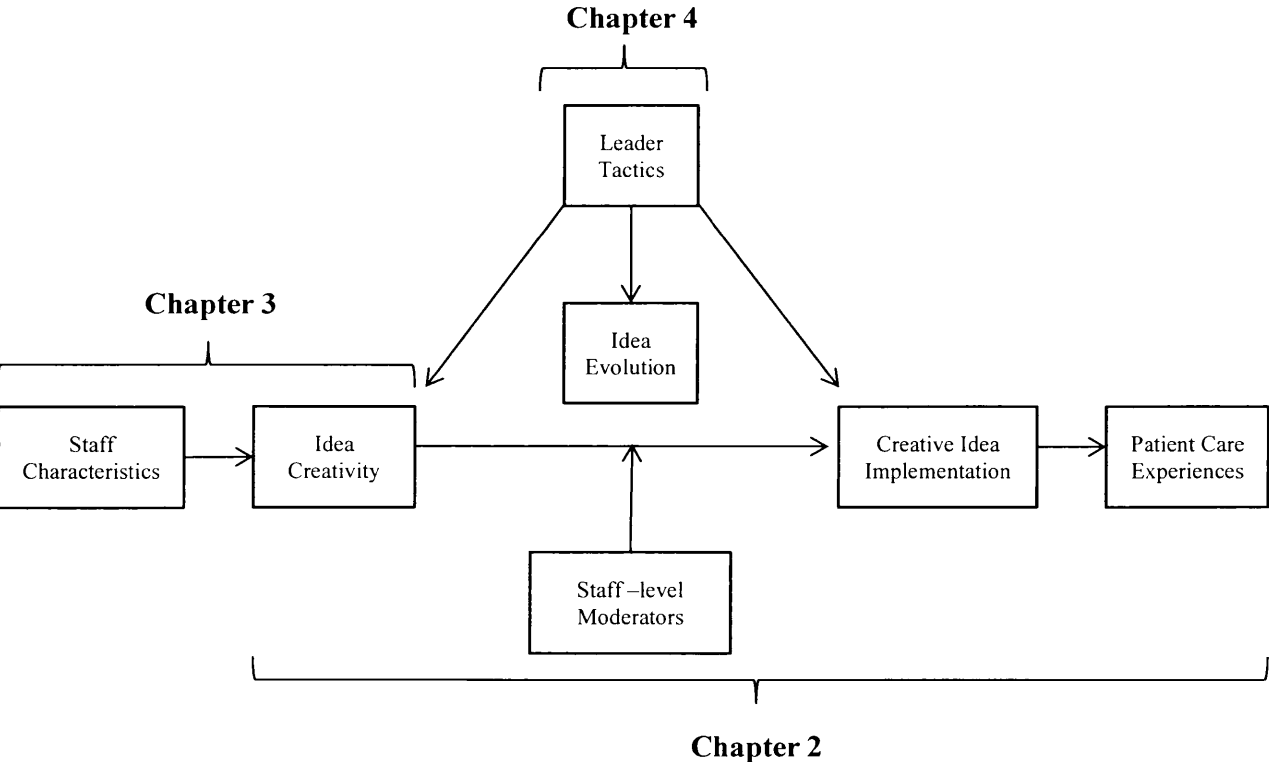
The first part of this research (Chapter 2) draws on organizational theory to develop hypotheses and an empirical test of the effect of creative idea implementation on patient care experiences, the relationship between idea creativity and implementation, and staff characteristics that moderate this relationship. Patient care experiences are a national quality improvement priority (Agency for Healthcare Research and Quality, 2015). Although we expect that creative idea implementation will have a positive impact on patient care experiences, we also expect that creative ideas are less likely to be implemented than less creative ideas (Baer, 2012; Mueller et al., 2012). Thus, we test these hypotheses as well as whether characteristics of those suggesting creative ideas moderate the relationship between idea creativity and implementation. This work highlights the value and challenges of fostering creative idea implementation to improve patient care experiences.

The second part of this research (Chapter 3) explores the antecedents of idea creativity. It presents analyses of the association between three staff characteristics (job satisfaction, professional role, and organizational tenure) that shape the health care work experience, and idea creativity. Past research has focused on staff personality traits, work environments and/or team design factors such as group size, but has not focused on staff characteristics (George, 2007; Shalley, Zhou, & Oldham, 2004). Knowing the staff characteristics associated with idea creativity should enhance scholars' and practitioners' understanding of what fosters creativity in health care, and which individuals are more likely to spur desirable change for quality improvement.

Finally, recognizing that leaders are often responsible for maximizing the likelihood that creative ideas are generated and implemented in their organizations, the

third part of this research (Chapter 4) focuses on the tactics that leaders of quality improvement groups use (Amabile, Schatzel, Moneta, & Kramer, 2004). Past research has focused on leader behaviors and styles, but not on the specific approaches that leaders take to affect creativity (Anderson et al., 2014). This paper not only assesses the effect of different leader tactics on the creativity of ideas shared by staff, but also develops a new typology for idea evolution between idea generation and implementation and examines the association of leader tactics with idea evolution types. The evolution typology describes four patterns of idea evolution that vary according to speed of implementation and level of staff engagement i.e., how much the idea was discussed by the group. In sum, this paper considers three aspects of creativity – idea creativity, evolution, and implementation – and tests the association of leader tactics with these aspects. This work should contribute to our understanding of how leaders can facilitate change in organizations that strive to be more creative.

This dissertation aims to contribute to health services and organizational research by exploring how creativity in health care organizations is fostered and facilitated, and how it affects outcomes. Past research has focused on intra-organizational processes that can improve health care access, cost and quality (e.g., implementation research) but not on creativity (Asch, Terwiesch, Mahoney, & Rosin, 2014; Damschroder et al., 2009; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). Understanding how creative ideas may improve the organization and delivery of quality care aides efforts to discover and evaluate new ideas regarding the quality of health care delivery (Plsek, 1999; Plsek & Greenhalgh, 2001).

Chapter 2

Fostering Implementation of Staff's Creative Ideas to Improve Patient Health Care Experiences

2.1 Abstract

Background. Substantial improvements are needed for the U.S. health care system to achieve its aim of providing excellent patient-centered care. Health care staff (e.g., primary care providers, nurses, and medical assistants) may be an important source of creative ideas to improve patient care experiences. Thus, many health care organizations are encouraging staff creativity, i.e., the generation of novel and useful ideas. The goals of this study were to assess the impact of implementation of creative ideas on patient care experiences, the relationship between idea creativity and implementation, and moderators of this relationship.

Study Design. We conducted a longitudinal, mixed methods study of 220 ideas generated by improvement team members in 12 community health centers over 18 months, and the experiences of 2,201 patients cared for by these individuals. We used data from patient surveys, quality improvement meeting transcripts, staff surveys, and wearable sociometric sensors.

Results. Creative idea implementation was positively associated with better patient care experiences, but such ideas were less likely to be implemented than other ideas. Three staff characteristics increased the likelihood that their creative ideas would be implemented: more collaborative relationships, longer organizational tenure, and a more central position in the organization's social network.

Conclusion. Results show the value and the challenges of fostering creative idea

implementation to improve patient care experiences. Legitimizing creative idea

implementation in health care organizations should advance quality improvement efforts.

2.2 Introduction

Patient experience surveys that indicate substantial improvements are needed to achieve the U.S. health care system aim of providing patient-centered care (Cleary, 2016; Institute of Medicine, 2001). Only about 71 percent of adult patients would definitely recommend their hospital based on their recent experience (Anhang Price, Elliott, Cleary, Zaslavsky, & Hays, 2014; Shaller, 2012). This is of great concern because better patient care experiences are associated with higher levels of adherence to recommended prevention and treatment processes, better patient safety within hospitals, better clinical outcomes and less unnecessary health care utilization (Anhang Price, Elliott, Zaslavsky, et al., 2014; Chatterjee, Tsai, & Jha, 2015). Patient care experiences may influence these outcomes directly (e.g., better communication may improve information flow to providers, resulting in better diagnosis and care planning), or indirectly (e.g., reflecting system characteristics such as management expertise or resource adequacy) (Doyle, Lennox, & Bell, 2013; Tefera, Lehrman, & Conway, 2016). Recently, measures of patient experiences and other quality measures have been used for performance-based compensation, practice recognition, and public reporting (Agency for Healthcare Research and Quality, 2015). This increased emphasis has spurred health care leaders to seek new improvement strategies, as existing approaches may be insufficient to achieve optimal performance (Cosgrove et al., 2013; Wolf, 2014).

Health care staff (e.g., primary care providers, nurses and medical assistants) may be an important source of creative ideas to improve patient experiences. Thus, many health care organizations are encouraging staff creativity that is, the generation of novel and useful ideas (Terwiesch, Mehta, & Volpp, 2013; West & Wallace, 1991). Little is

known about health care staff creativity (Gilmartin, 1999; Lazarus & Fell, 2011), despite the finding that health care staff, like professionals in many industries, often discover ways of doing a job better (Axtell, Holman, Unsworth, Wall, & Waterson, 2000). Staff have access to information on work processes and problems (Shalley & Perry-Smith, 2008), which gives them insight on processes affecting patient experiences that may not be apparent to others in the organization (Darby, Crofton, & Clancy, 2006; Gleeson et al., 2016).

Past research on creativity in organizations indicates that eliciting and implementing creative ideas can be difficult (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Axtell et al., 2000). Even in industries traditionally regarded as innovation-friendly (e.g., those involved with product development), creative ideas are theorized to be less likely to be generated and implemented than less creative ideas because they diverge from standard practice and may fail or cause harm when implemented (Anderson & Gasteiger, 2007; Licuanan, Dailey, & Mumford, 2007; Scott, Shu, & Lubynsky, 2015). An empirical study of creative idea implementation using survey data of employees and their supervisors in an agricultural processing firm found creative ideas have a negative odds of being implemented (Baer, 2012). To our knowledge, no existing study has examined the generation and implementation of creative ideas in health care organizations, and specifically as a quality improvement strategy in health care.

It is difficult to predict how creative ideas might fare in health care settings. Patient safety concerns lead to a tendency to emphasize standardization and risk avoidance (Institute of Medicine, 2001; Starr, 1982), whereas creativity introduces variation and requires a tolerance for risk. Additionally, the medical professional

hierarchy promotes silence about unproven ideas (Nembhard & Edmondson, 2006). Unproven ideas are the foundation for creativity, which would suggest that health care could be unreceptive to staff creativity, but there is sometimes also a culture of continuous quality improvement that embraces variation and novelty as a path to progress (Millar, 2013). This mix of factors may present barriers and/or opportunities for the implementation of creative ideas in health care.

In this study we assess: 1) the impact of implementation of staff's creative ideas on patient care experiences; 2) the relationship between idea creativity and implementation; and 3) moderators of this relationship.

2.3 Theory and Hypotheses

2.3.1 Implementation of Creative Ideas and Patient Care Experiences

The Componential Theory of Organizational Creativity and Innovation (Amabile, 1988) specifies that staff in many types of organizations, not just those involved in the arts or entrepreneurial activities, have the potential for creativity, that is, the generation of novel and useful ideas. Creative ideas are desired by many organizations because novelty confers distinctiveness in a competitive organizational environment, and usefulness is beneficial for the organization's goals (George, 2007). Creative ideas are the raw material necessary for innovation, defined as an idea, practice, policy or technology that is new to the context (Anderson et al., 2014; Rogers, 2003).

Organizational scholars assert that when an organization's staff have unique knowledge of work processes and customer needs, it is beneficial to engage them in the generation of creative ideas to produce innovations (Terwiesch & Xu, 2008). Unique

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knowledge of work arises when staff develop expertise in the micro-processes of service delivery and familiarity with the context, which may lead to discoveries of how to do the job in more creative ways than existing practice (Axtell et al., 2000). Unique knowledge of customer needs arises as staff customize or co-produce solutions with customers as part of their job (Ye, Marinova, & Singh, 2012).

Health care staff have unique knowledge of work processes and problems (Gleeson et al., 2016) and "customer" (patient) needs therefore we expect that efforts to improve patients' health care experiences benefit from staff creativity. Staff play a central role in patient care and often customize care to individual patients (Kenagy, Berwick, & Shore, 1999). This knowledge of the processes affecting the patient experience likely imbues their improvement ideas with a blend of novelty and usefulness that matter to patients (Asch et al., 2014; Gilmartin, 1999), which when implemented (i.e., used in a skilled, consistent and committed manner by staff) (Klein & Sorra, 1996), could improve patient care experiences. We see evidence in support of this in case studies. For example, staff at the University of Pittsburgh Medical Center developed ways to redesign the pediatric blood draw experience that when implemented reduced patient-reported anxiety and fear, and nurses in the Virginia Mason Health System generated ideas to reorganize care patterns that increased the time they spent on direct patient care to 90 percent, which was associated with improved patient satisfaction scores (Cosgrove et al., 2013). Thus, we hypothesize:

> *Hypothesis 1:* Implementation of creative ideas is positively associated with better patient care experiences.

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2.3.2 Idea Creativity and Implementation

Although we expect that the implementation of creative ideas will have a positive impact on patient care experiences, we also expect that creative ideas are less likely to be implemented than less creative ideas. Creative ideas tend to be associated with uncertainty and variation, two characteristics that can result in their rejection, even when organizations and managers claim to support creativity (Berg, 2016; Mueller et al., 2012). Uncertainty about creative ideas may be related to their feasibility (Klein & Knight, 2005), resources required for implementation (Taggar, 2002), and the likelihood of their future success (Berg, 2016). The implementation of creative ideas often requires changes in work practices and processes because they diverge from existing practice (Harvey, 2014). Divergence from the status quo may be perceived as a problem by individuals who value familiarity and organizations that value standardization (Gilson, Mathieu, Shalley, & Ruddy, 2005).

In health care, staff may be reluctant to adopt additional uncertainty given the risks and patient safety concerns inherent in the delivery of care (Starr, 1982). While organizations and leaders may support innovative approaches, the status hierarchy for professionals may prevent staff from voicing support for creative ideas if this is perceived as interpersonally risky (Kessel, Kratzer, & Schultz, 2012). Supporting the implementation of creative ideas may be seen as risky because such ideas may not integrate easily into the organization (Damschroder et al., 2009). Organizational cultures in health care often prioritize standardization as an important process to achieve quality (Klein, Ziegert, Knight, & Xiao, 2006; West & Wallace, 1991). The variation introduced by creative ideas may be viewed as counter-productive to these efforts, leading to the

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perception of poor innovation-environment fit (Kitson et al., 2008). Given that health care organizations must balance unknown effectiveness with immediate pressures to ensure patient safety and avoid risk (Chuang, Jason, & Morgan, 2011), we hypothesize:

Hypothesis 2: Idea creativity is negatively associated with implementation.

2.3.3 Moderators of the Idea Creativity and Implementation Relationship

Idea implementation is a process in which individual factors that signal legitimacy may help overcome resistance to creative idea implementation (Baer, 2012; Fleming, 2007). Three characteristics of staff that convey legitimacy are more collaborative relationships, longer organizational tenure, and a more central position in an organization's social network. We propose that each of these characteristics of staff may increase the likelihood that their proposed creative ideas will be implemented.

Collaboration, i.e., working with others to produce or perform a task (Harvey, 2014), has been found to increase the likelihood that divergent innovations (including creative ideas) were implemented. In an ethnographic study of implementation failure of eight innovations in primary care and acute care (Ferlie, Fitzgerald, Wood, & Hawkins, 2005), researchers found that collaboration fostered support from multiple individuals, which reduced the perceived risk of supporting change. Wang et al.'s (2013) study of patents in a microprocessor manufacturer supports this conclusion. It found that researchers' ability to collaborate created supportive communities and enabled improvement feedback that fostered successful filings for new patent ideas. Staff with more collaborative relationships may enjoy enhanced legitimacy for their creative ideas due to this support and engagement from others, increasing the likelihood of idea implementation (Wang, Rodan, Fruin, & Xu, 2013).

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Organizational tenure, an indicator of the seniority of an individual in an organization, has been found to relate to an individual's ability to successfully implement change initiatives in their organization (Battilana, 2011). Time in an organization provides opportunities for learning, and can lead to respect from others and authority (Baron, Davis-Blake, & Bielby, 1986). Respect and authority may be related to resources – as individuals advance in the organizational hierarchy, they gain access to resources and permission to initiate divergent organizational change (Battilana, 2011) – or influence – longer tenure bestows familiarity with tasks and the social networks that influence power and decision-making in the organization (Ferlie et al., 2005; Ng & Feldman, 2010). For example, staff with greater tenure had greater success implementing change initiatives in hospitals part of the National Health Service (Battilana, 2011). Thus, we propose that the creative ideas of staff with longer organizational tenure are more likely to be implemented.

Network centrality, which describes an individual's position within an organization's social networks, has been found to affect the likelihood that staff in an agricultural processing firm could implement their proposed creative ideas (Baer, 2012). Skilled influencers who were central to their work social networks were able to improve their otherwise negative likelihood of their creative ideas being implemented (Baer, 2012). Network centrality enables the diffusion of information and increases an individual's influence (Burt, 2004; Marsden, 2002), because others are willing to listen and be influenced by the individual's perspective (Granovetter, 1973; Ibarra, 1993). Staff with higher network centrality may have more influence and be more able to draw

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attention to their creative ideas, hence increasing the likelihood of the implementation of ideas (Burt, 2004; Marsden, 2002).

Considered together, collaboration, organizational tenure and network centrality indicate the degree to which individuals are embedded in an organization's social relations (Granovetter, 1973). More collaborative relationships enable staff to organize supportive communities, longer organizational tenure enables the accumulation of experience and thus authority and respect in the organization, and network centrality enables the diffusion of information and influence via one's social position. According to Granovetter (1973), this "embeddedness" in an organization's social relations confers legitimacy, i.e., social approval to exercise authority and power. Individuals with greater legitimacy may countervail resistance to actions and thus achieve successful outcomes (e.g., implementation of creative ideas). Prior work has not tested these three staff characteristics in a single study, used methods that do not rely on self-reports of implementation, or studied as many ideas, as we do in the next section to formally test our hypotheses:

> *Hypothesis 3:* Collaboration moderates the relationship between idea creativity and implementation such that creative ideas are more likely to be implemented when proposed by individuals with more collaborative relationships.
>
> *Hypothesis 4:* Organizational tenure moderates the relationship between idea creativity and implementation such that creative ideas are more likely to be implemented when proposed by individuals with longer organizational tenure.

Hypothesis 5: Network centrality moderates the relationship between idea

creativity and implementation such that creative ideas are more likely to be

implemented when proposed by individuals with higher network centrality.

Figure 2.1 depicts the conceptual framework and hypotheses for this study.

Figure 2.1 Conceptual Framework
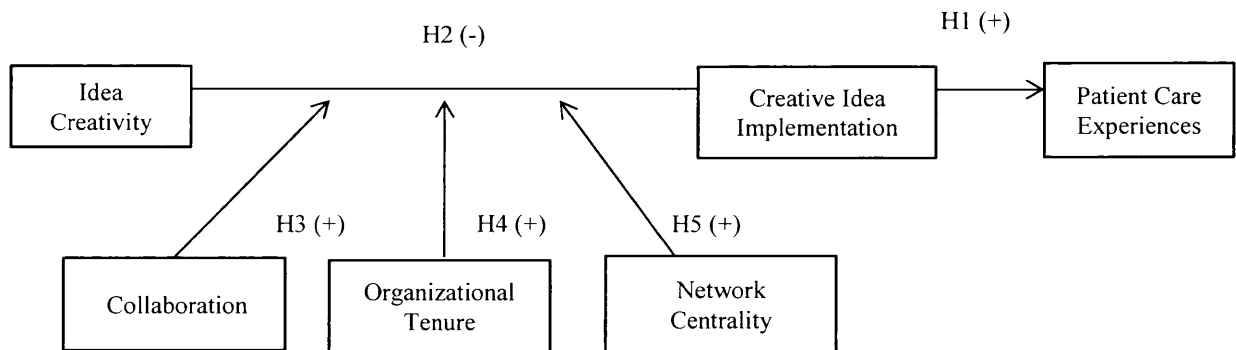
2.4 Methods

2.4.1 Study Setting and Design

This study was conducted in 12 federally qualified community health centers that

are part of a single organization in one state in the United States. These centers provide

comprehensive primary care services to over 130,000 patients a year, and have a special

commitment to serving the uninsured, underinsured, and special populations (e.g.,

patients with chronic mental health issues). The centers were accredited as Patient-

Centered Medical Homes by the National Commission on Quality Assurance (NCQA).

NCQA accreditation means these centers have demonstrated a commitment to patient-

centered care, coordinated care, and access to care (National Committee for Quality

Assurance, 2015). A key quality improvement (QI) strategy for the organization was to engage health care staff in developing health care delivery innovations, making this an ideal setting in which to study the implementation of creative staff ideas. We focused on one QI initiative, in which staff teams met regularly with the specific objective to generate and implement ideas for patient experience improvement.

We conducted a longitudinal, mixed-methods study of 220 improvement ideas generated by 72 improvement team members from the 12 centers over 18 months (September 2013 to March 2015). We also analyzed the experiences of 2,201 patients cared for by these individuals.

2.4.2 Data Sources

We used four sources of data for our study: 1) patient care experiences survey, 2) quality improvement team meeting transcripts, 3) staff work experiences survey and 4) wearable sociometric sensors.

Patient Care Experiences Survey. We assessed patient care experiences using responses to questions in the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey with Patient-Centered Medical Home (PCMH) supplement (Agency for Healthcare Research and Quality, 2016). From November 2014 through February 2015 (varying by county), we invited a random sample of patients that had visited each center in the preceding six months (N=4,661) to complete a survey. Patients were mailed a copy of the survey in English and Spanish, and after approximately two weeks, were sent a thank you/reminder postcard. After another two weeks, another survey was mailed to those who had not responded. If no response was received after two to three more weeks, patients were telephoned. In total, 2,306 patients (49%) answered the survey; 2,101

(91%) confirmed that they had visited the center in the past six months and evaluated their experiences. Characteristics of the patient sample are presented in Table 2.1.

Quality Improvement Team Meeting Transcripts. We identified 220 improvement ideas generated during 216 quality improvement discussions (18 monthly meetings for 12 centers) in team meeting transcripts. In all centers, transcripts contained the following standardized sections and information: Center name, date, time and location of meeting, attendance, and pre-formulated columns for agenda topic, deliverable, outcome measure, staff responsible, notes/discussion and action items (including action, owner and due date). The teams addressed topics related to patient care experiences that were established by the organization's leadership: transition care management, time for care coordination, panel management, community resources, chronic disease patients, and relationship with behavioral health. Teams were encouraged to develop and implement initiatives focused on these topics.

We analyzed meeting transcripts using content analysis techniques to identify ideas for improving patient care experiences and the individual(s) who proposed each idea (Miles & Huberman, 1994; Strauss & Corbin, 1990). Ideas were defined as: *"A different alternative for a possible course of action to approach the task at hand"* (Binnewies, Ohly, & Sonnentag, 2007). A second researcher independently coded ideas in a selection (30%) of transcripts as a check on the process (Yin, 2003).

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Table 2.1   Patient Sample Characteristics (N=2,101)

Characteristic	Number (%)
Age	
18 to 24	31 (1.48%)
25 to 34	157 (7.47%)
35 to 44	282(13.42%)
45 to 54	594 (28.27%)
55 to 64	634 (30.18%)
65 to 74	276 (13.14%)
75 +	97 (4.62%)
Missing	30 (1.43%)
Gender	
Female	1314 (62.54%)
Male	787 (37.45%)
Missing	
Education	
8th grade or less	274 (13.04%)
Some high school	444 (21.13%)
High school grad or GED	698 (33.22%)
Some college/2-yr degree	504 (23.99%)
4-year college graduate	83 (3.95%)
More than 4-year college	39 (1.86%)
Missing	59 (2.81%)
Race/Ethnicity	
White	864 (41.12%)
Hispanic	792 (37.70%)
Black	231 (10.99%)
Asian	27 (1.29%)
Other	142 (6.76%)
Missing	39 (1.86%)
Length of relationship	
< 6 months	148 (7.04%)
≥ 6 months but < 1 year	359 (17.09%)
≥ 1 year but < 3 years	716 (34.08%)
≥ 3 years but < 3 years	309 (14.71%)
≥ 5 years	552 (26.27%)
Missing	17 (0.008%)
Number of office visits	
1	227 (10.80%)
2	422 (20.09%)
3	375 (17.85%)
4	273 (13.00%)
5 to 9	543 (25.84%)
10 or more	233 (11.09%)
Missing	28 (1.33%)
Rating of Overall Health	
Excellent	156 (7.43%)
Very Good	224 (10.66%)
Good	613 (29.18%)
Fair	761 (36.22%)
Poor	305 (14.52%)
Missing	34 (1.62%)
Rating of Overall Mental or Emotional Health	
Excellent	268 (12.76%)
Very Good	341 (16.23%)
Good	583 (27.75%)
Fair	646 (30.75%)
Poor	225 (10.71%)
Missing	38 (1.81%)

Staff Work Experience Surveys. We collected information on staff characteristics using a survey that was part of a related study (Nembhard et al. 2017). We recruited survey participants using emails from center leadership and introductory lunchtime staff meetings with members of the research team, where consent forms were signed. From November 2014 through February 2015 (varying by county), we administered the survey via email or in paper to 188 primary care team members in the 12 centers. Seventy-two of these 188 staff were QI team participants, the sample for this current study. All 72 staff completed the survey (100% participation). All participating staff were full-time employees and the majority were female (79%). The largest group of respondents were nurses (31%), versus primary care providers (27%), medical assistants (23%), and behavioral health providers (19%) and 61% of staff were employed by the organization for more than two years.

Wearable Sociometric Sensors. We collected social network data using wearable sensors, which have been used for studies of workplace interaction patterns in hospitals (Isella, Romano, & Barrat, 2011; Rosen, Dietz, Yang, Priebe, & Provonost, 2015) and non-health settings (Chaffin et al., 2015; Waber, 2013). The sensors were about the size of a deck of cards and were worn around the neck (Olguin Olguin, Gloor, & Pentland, 2009). They recorded each time a staff member spoke with another staff member wearing a sensor, which allowed us to determine an individual's network of interactions at work (Waber, 2013). They measured interactions in a non-obtrusive fashion via several sensors that detected physical proximity, conversational characteristics, face-to-face interactions, and posture and body movement; they did not

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record speech content (Waber, 2013). The validity and reliability of the data collected by such sensors have been established in other studies (Chaffin et al., 2015; Olguin Olguin et al., 2009; Rosen et al., 2015).

Primary care teams at each center (which included the 72 members of the QI team in the current study) wore the sensors for two weeks (Monday-Saturday) at work. In some centers, this time period sometimes coincided with the scheduled QI team meetings, while in others it did not. Past work has found that network characteristics are relatively stable over time (Olguin Olguin et al., 2009; Waber, 2013). Thus, the network measures that we obtained should be applicable for the period of the QI meetings. When we reviewed the data collected by the sensors, we observed that people wore their sensors less in the second week. Because we deemed it important to use the most complete data possible, we used only the sensor data gathered in the first week of the time period.

2.4.3 Measures

Dependent Variable: Patient Care Experiences. We assessed patient care experiences using patients' responses to two constructs in the CAHPS survey with PCMH supplement (Agency for Healthcare Research and Quality, 2016): care coordination and provider rating. Care coordination, the patient experience focus of the team meetings, was measured using the four items listed in Table 2.2.

Table 2.2   Patient Care Experience Survey Items for Care Coordination Measure

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1. In the last 6 months, when this provider ordered a blood test, x-ray or other test for you, how often did someone from this provider's office follow up to give you these results?

2. In the last 6 months, did you get the help you needed from this provider's office to manage these different providers and services?

3. In the last 6 months, how often did the provider named in question 1 seem informed and up to date about the care you got from specialists?

4. In the last 6 months how often did you and anyone in this providers' office talk about all the prescription medicines you were taking

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Three of the items had a four-point response scale (1=never to 4=always). The item, "In the last 6 months, did you get the help you needed from this provider's office to manage these different providers and services?", had a binary response scale (1=yes and 2=no). For each patient, we averaged responses for all four items to create the care coordination measure with a possible range of 1 to 4. For provider rating, our second and summary measure of patient care experiences, we used the response to a single question: "Using any number from 0 to 10, where 0 is the worst provider possible and 10 is the best provider possible, what number would you use to rate this provider?"

Dependent Variable: Idea Implementation. Ideas were tracked over the course of the meetings to assess implementation. For each idea, we noted whether the idea was implemented (coded as 1; otherwise coded as 0) and the time elapsed (in number of meetings) since the idea was first mentioned. Ideas that were not discussed in successive meetings or ideas that were discussed and formally rejected in a meeting were coded as

not implemented. Right censoring occurred for ideas that had no definitive outcome by the end of the study period (Hedeker & Gibbons, 2006). Since the teams disbanded at the end of the study period, those ideas were assigned an outcome of 0.

Independent Variable: Idea Creativity. Ideas were rated for creativity by an expert panel, using the "Consensual Assessment Technique", a reliable and valid creativity assessment technique used in psychological and organizational studies (Amabile, 1982). In this method, experts independently rate a product or object for degree of novelty and usefulness, and these ratings are used to generate a single creativity score (Amabile, 1982). The experts must be familiar with the domain of endeavor (health care management, particularly quality improvement) for which the product (idea) is made (Amabile, 1982).

Five health care executives served as experts for our idea creativity assessment. All worked full-time in health care administration roles (including quality improvement functions) in the United States. The majority were female (60%), all had at least ten years of professional experience in health care delivery settings and graduate degrees in health care administration. The first author recruited each expert independently, and experts were not aware of the others participating in the assessment. Experts were emailed a survey that contained short vignette descriptions (maximum three sentences) of the ideas and were asked to rate each idea (N=220) for level of novelty (1=least novel to 5=most novel) and level of usefulness (1=least useful to 5=most useful) (Amabile, 1982; Amabile et al., 1996). The order of ideas was randomized for each rater to prevent order effects.

Given the definition of creativity as novel and useful, for each idea, its novelty and usefulness scores were multiplied together to generate an overall score ranging from

5 to 25. These overall scores were divided by 5 to generate a final creativity score out of

5 (1=least creative to 5=most creative) (Amabile, 1982). Finally, we averaged across the

five experts' scores to generate one average creativity score for each idea. To estimate

inter-expert reliability for the creativity ratings, an intra-class correlation (ICC) was

calculated between the experts (Plucker, 2010). This statistic ($ICC_{1,k}=0.79$) indicated a

moderately high degree of consistency between experts that is considered acceptable for

assessments of creativity (Amabile, 1982). Table 2.3 presents examples of ideas with

their creativity score and implementation outcome.

Table 2.3   Examples of Improvement Ideas

Implementation Outcome/ Level of Creativity	Low Creativity (score <3)	High Creativity (score ≥ 3)
Idea Implemented	Identify local community partners and develop a resource with contact details	Set up iPad in waiting rooms with tutorial on patient portal to increase adoption of patient portal at home
Idea Not Implemented	Schedule weekly meeting between medical assistant and primary care provider	Staff create a podcast to educate patients about managing their hypertension

While hypotheses 2 through 5 used this idea-level measure of idea creativity,

hypothesis 1 used a center-level measure of idea creativity: the proportion of high-

creativity, implemented ideas per center. Consistent with the Consensual Assessment

Technique, high-creativity ideas were operationalized as having a creativity score of 3 or

greater out of 5 (Amabile, 1982). The proportion of high-creativity, implemented ideas

per center was calculated by dividing the number of ideas that were both high-creativity and implemented, by the total number of ideas in the center.

Moderating Variable: Collaboration. Collaboration was coded as present if more than one staff was associated with the idea in the meeting transcript. When that was the case, we coded collaboration as 1; otherwise, we coded as 0. Evidence for collaboration was identified either in the meeting discussion itself (staff associated with each idea were detailed) or in the "action item" section of the transcripts, where each item was associated with staff.

Moderating Variable: Organizational Tenure. Organizational tenure was measured by responses to the staff survey question: "How long have you been employed by [organization name]?" The six response categories ranged from 1 = "Less than 6 months" to 6 = "10 or more years".

Moderating Variable: Network Centrality. Network centrality was measured using the betweenness centrality index, an established social network measure, which was calculated using data from the sociometric sensors. Betweenness centrality is calculated by identifying the number of times an individual acts as a bridge along the shortest path between the two other individuals, based on communication flow, and conceptually describes how an individual has potential control over information flows and resources in a network (Waber, 2013; Wasserman & Faust, 1994). Formally, it is calculated as:

$$C_B(n_i) = \sum_{j<k} \frac{g_{jk}(n_i)}{g_{jk}}$$

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where g_{jk} is the total number of shortest paths connecting any two actors jk, and $g_{jk}(n_i)$ is the number that actor i, the focal node, is on, and ranges from 0 to 1 (Wasserman & Faust, 1994). A score of 0 indicates that the staff member is on the periphery of the social network and does not act as a bridge for others and a score of 1 indicates that the staff member is central to the network (Isella et al., 2011).

Covariates. For the patient care experiences analyses, we included patient-level covariates that have been shown to be related to reports about health care experiences: age, gender, education, race/ethnicity, length of relationship with provider, number of visits, general health status, and mental health status (Anhang Price, Elliott, Zaslavsky, et al., 2014). These were all categorical variables. We also included the following center characteristics: percent of patients uninsured, percent of patients with Medicare, and patient visits per full-time employee (an indicator of patient volume) to capture differences in patient profile and a workload, which could affect care delivered, the total number of ideas in each center to account for variation in the number of ideas across centers, and psychological safety, a staff survey measure of the shared belief that the team is safe for interpersonal risk taking (Edmondson, 1999)

For the idea implementation analyses, we included staff-level covariates that may influence implementation success: professional role of staff (primary care provider, nurse, medical assistant or behavioral health provider) and gender (male or female) (Damschroder et al., 2009).

2.4.4 Analyses

We first calculated bivariate correlations to assess the unadjusted associations of key variables with the dependent variables and assess multicollinearity. We then

performed a series of analyses to test our hypotheses. To test Hypothesis 1, that there is a

positive association between the implementation of staff's creative ideas and patient care

experiences, we used multivariate mixed models. The independent variable (proportion of

high-creativity, implemented ideas per center) was tested with two measures of patient

care experiences as dependent variables (care coordination and provider rating). We

estimated the impact of creative implemented ideas on patient care experiences using the

MIXED procedure in SAS, which accounted for the multi-level structure of the data

(patients associated with providers, associated with centers) as well as repeated

observations of creative ideas per center (Littell, Stroup, Milliken, Wolfinger, &

Schabenberger, 2006). We estimated standard errors accounting for clustering at the

center and provider-level. We assessed the robustness of the results by including a

version of the independent variable that measured the generation of creative ideas: the

proportion of high-creativity ideas per center. This analysis was done to ensure that

creativity was important to results, in addition to idea implementation.

To test Hypotheses 2 through 5, that there is a negative association between idea

creativity and implementation, and that collaboration, organizational tenure, and network

centrality serve as positive moderators to this relationship, we used multivariate Cox

Proportional Hazards models. We use the Cox model and its hazard ratios instead of

logistic regression and its odds ratios because the Cox model utilizes information on

length of time-to-idea-implementation (Hedeker & Gibbons, 2006). In order to check the

proportional hazards assumption associated with the Cox model (i.e., that variables do

not vary over time), we conducted likelihood ratio tests for each variable under

consideration (creativity of ideas and all moderating variables); these tests indicated

support for this assumption (Lin & Wei, 1989). We conducted analyses using the PHREG

procedure in SAS, and clustered standard errors at the center and staff-level to account

for the multi-level structure of the data (ideas associated with staff located in centers)

(Lin & Wei, 1989; Littell et al., 2006).

We first tested the impact of idea creativity alone, then together with the

moderating impact of collaboration, organizational tenure, and network centrality, on the

hazard of idea implementation, resulting in 4 models. Interaction terms were used to

assess the moderating effects on the idea creativity and implementation relationship. The

collaboration interaction term was created by multiplying idea creativity (out of 5) by the

indicator of collaboration. Five organizational tenure interaction terms were created by

multiplying idea creativity by the response categories to the organizational tenure survey

question, with "less than 6 months" left out as a reference category. The network

centrality interaction term was created by multiplying idea creativity by the betweenness

centrality index. The 4 Cox models produced hazard ratios, which are interpreted as the

relative risk of idea implementation occurring at time t, as a function of the model

covariates.

Hazard ratios were the exponentiated regression coefficients associated with the

variable of interest. Since two moderating variables (organizational tenure and

collaboration) had multiple categorical levels, hazard ratios for these variables required

using the parameter estimates (βs) associated with the generalized model to calculate

hazard ratios for each level of the interaction:

$$h_i(t, x_i) = h_0(t) \exp(\beta_1 \; creativity + \beta_2 \; moderator + \beta_3 \; creativity \; x \; moderator)$$

2.5   Results

Most of the bivariate correlations among the variables used in the patient care experiences analyses did not exceed 0.40 (Table 2.4). There were two exceptions: the correlations between the percentage of patients who were White and the number of ideas per center (r=0.63) and the percentage of patients uninsured and the number of ideas per center (r=0.43). Both dependent variables were significantly associated with patient-level covariates such as the length of the relationship and rating of overall health, consistent with past CG-CAHPS studies (Anhang Price, Elliott, Zaslavsky, et al., 2014). However, the variance inflation factors associated with each variable in the analyses (VIFs) were all below 10, indicating that multicollinearity was not a problem.

The analyses testing the relationship between the implementation of creative ideas and patient care experiences supported hypothesis 1, that the implementation of creative ideas is positively associated with better patient care experiences (Table 2.5). The implementation of staffs' creative ideas was positively and significantly associated with both measures of patient care experiences (care coordination and provider rating). Robustness checks showed that the generation of staffs' creative ideas (proportion of high creative ideas per center) was also significant (at the <0.05 level) with both measures of patient care experiences.

Table 2.4   Correlations of Variables in Patient Care Experiences Analysis (N=2,101)

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Care Coordination	3.19	1.32															
2. Provider Rating	6.97	2.30	0.37**														
3. Percentage of high-creativity implemented ideas	0.32	0.14	0.23 **	0.09**													
4. Length of relationship	3.21	1.35	0.07 **	0.10**	0.04												
5. Number of office visits	3.21	1.84	-0.09 **	-0.05**	0.03	-0.01											
6. Rating of overall health	3.56	1.16	-0.11 **	-0.13**	-0.01	0.01	0.13										
7. Rating of overall mental or emotional health	3.23	1.35	-0.04	-0.11**	0.01	-0.03	0.12*	0.53*									
8. Age	4.29	1.38	0.04	0.01	0.05*	0.08*	-0.06*	0.14*	0.10*								
9. Gender	1.61	0.49	-0.03	-0.05*	-0.02	0.01	0.08*	0.02	0.02	-0.10*							
10. Education	3.22	1.44	-0.01	0.04	-0.03	0.05*	-0.03*	-0.01	0.02	0.02	0.06*						
11. Race	1.43	0.97	-0.05	-0.04	0.03	-0.03*	-0.01*	0.12*	0.17*	0.15*	0.01	0.23*					
12. Percent patients white	0.37	0.15	-0.10 **	-0.02	-0.52*	0.09	-0.06	0.01	-0.01	-0.01	0.02	0.12*	-0.06*				
13. Percent patients uninsured	0.07	0.05	0.04	0.07**	0.19**	-0.02	0.06	-0.07*	-0.02	-0.03*	0.03	0.02	-0.03	-0.08*			
14. Number of visits per FTE	417.36	81.55	0.14**	-0.04	0.22**	-0.03	0.03	0.003	-0.04	-0.08	0.01	0.01	-0.05*	-0.02*	0.28*		
15. Number of ideas per center	18.76	3.93	0.05*	0.02	0.15**	-0.06	0.04	-0.03	0.01	-0.01	0.05	-0.08	0.01	-0.63**	0.43**	0.03*	
16. Psychological Safety	2.83	0.75	0.13**	0.03	0.60**	0.01	-0.02	-0.01	0.03	0.03	0.03	0.02	0.01	0.20	-0.02	0.01	0.1**

*p<0.05, **p<0.01*

Table 2.5 Multivariate Mixed Models on Idea Creativity and Patient Care Experiences (N=2,101)

	Dependent Variable	
	Care Coordination (out of 4)	Provider Rating (out of 10)
	β (SE)	β (SE)
Independent Variables		
Proportion of high-creativity, implemented ideas per center	1.31 (0.61) **	1.94 (0.84) **
Patient-level Covariates		
Length of relationship		
Six months	-reference-	-reference-
Year	-0.43 (0.09) **	1.23 (0.24) **
Three	-0.38 (0.10) **	1.43 (0.28) **
Five	-0.34 (0.09) **	1.18 (0.27) **
Number of office visits		
One	-reference-	-reference-
Two	-0.56 (0.08) **	0.14 (0.23)
Three	-0.63 (0.08) **	0.28 (0.24)
Four	-0.57 (0.09) **	0.10 (0.26)
Five	-0.55 (0.08) **	-0.02 (0.23)
Ten	-0.67 (0.09) **	-0.25 (0.29)
Rating of overall health	0.06 (0.02) **	0.20 (0.07) **
Rating of overall mental or emotional health	0.003 (0.02)	0.10 (0.06)
Age		
18 to 24	-reference-	-reference-
25 to 34	-0.04 (0.20)	0.02 (0.50)
35 to 44	0.16 (0.20)	0.23 (0.65)
45 to 54	0.21 (0.19)	0.22 (0.48)
55 to 64	0.26 (0.19)	-0.13 (0.48)
65 to 74	0.20 (0.20)	0.22 (0.50)
75 or older	0.45 (0.22) **	0.49 (0.59)
Gender (1=female)	0.03 (0.05)	0.30 (0.14) **
Education		
8th grade or less	-reference-	-reference-
Some high school, but did not graduate	0.02 (0.08)	-0.15 (0.27)
High school graduate or GED	-0.03 (0.08)	0.03 (0.26)
Some college or 2-year degree	-0.03 (0.08)	0.05 (0.26)
4-year college graduate	-0.22 (0.12)	0.20 (0.37)
More than 4-year college graduate	0.08 (0.17)	0.47 (0.51)
Race		
White	-reference-	-reference-
Black or African American	0.02 (0.07)	- 0.198 (0.22)
Hispanic	- 0.06 (0.06)	- 0.39 (0.18) **

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Table 2.5 continued....	Care Coordination (out of 4)	Provider Rating (out of 10)
Asian	0.25 (0.14)	0.53 (0.42)
Native Hawaiian or Other Pacific Islander	- 0.30 (0.17)	0.47 (0.27)
American Indian or Alaskan Native	- 0.02 (0.10)	0.25 (0.27)
Center-level Covariates		
Percentage patients White	0.42 (0.60)	0.65 (1.10)
Percentage patients Uninsured	-1.53 (1.32)	3.31 (2.44)
Number of visits per FTE	-0.01 (0.02)	- 0.03 (0.01) **
Number of ideas per center	0.03 (0.02)	-0.01 (0.04)
Psychological Safety	0.01 (0.02)	0.13 (0.18)

*p<0.05, **p<0.01*

Most of the bivariate correlations among the variables used in the idea

implementation analyses did not exceed 0.4, except for the correlations between idea

creativity and implementation (r=0.57), idea creativity and collaboration (r=0.46) and

collaboration with idea implementation (r=0.71) (Table 2.6). Several variables had

statistically significant correlations with one another, however, the variance inflation

factors associated with each variable in the analyses (VIFs) were all below 10, indicating

that multicollinearity was not a problem.

All four analyses testing the relationship between idea creativity and

implementation (hypothesis 2) as well as moderators of this relationship (hypotheses 3-5)

supported their respective hypotheses, as shown in Table 2.7. Model 1 in Table 2.7

provides support for hypothesis 2, that idea creativity is negatively associated with

implementation. A one-unit increase in idea creativity (e.g., from a creativity score of 4 to

5) significantly reduces the hazard ratio of idea implementation by a factor of 0.40.

Model 2 supports hypothesis 3, that collaboration moderates the relationship between

idea creativity and implementation; creative ideas are more likely to be implemented

when proposed by individuals with more collaborative relationships. Figure 2.2a

illustrates the hazard ratio for the different levels of collaboration. For highly creative

ideas (e.g., creativity score of 5), individuals who collaborate have an idea

implementation hazard ratio of 1.13 compared to approximately 0.00 for individuals who

do not collaborate.

Model 3 supports the hypothesis that organizational tenure moderates the

relationship between idea creativity and implementation; creative ideas are more likely to

be implemented when proposed by individuals with longer organizational tenure.

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Table 2.6 Correlations of Key Variables: Idea Creativity and Implementation Analyses

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. Idea Implementation	0.64	0.48									
2. Idea Creativity	2.47	1.65	-0.57**								
3. Collaboration	0.58	0.49	0.71**	-0.46**							
4. Org. Tenure	4.02	1.14	0.10*	-0.23**	0.10						
5. Network Centrality	0.17	0.19	-0.16*	-0.05	-0.12	0.04					
6. Center	4.57	2.54	0.01	-0.32*	0.20**	0.09	0.27**				
7. Gender	0.80	0.40	0.04	0.10	-0.03	0.26**	-0.21**	-0.09			
8. Behavioral Health Provider	0.13	0.33	0.11	-0.07	0.06	-0.03	0.03	-0.04	-0.06		
9. Medical Assistant	0.21	0.41	-0.16**	0.01	-0.10	0.09	0.03	0.09	-0.02	-0.19**	
10. Primary Care Provider	0.23	0.43	0.30**	-0.11	0.18**	-0.04	-0.11	-0.05	0.03	-0.20**	-0.28**

*$p<0.05$, **$p<0.001$

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Table 2.7   Cox Proportional Hazards Models of Idea Creativity and Implementation (N=220 ideas)

	Dependent Variable: Idea Implementation			
	Idea Creativity and Idea Implementation (H2)	Collaboration as Moderating Variable (H3)	Organizational Tenure as Moderating Variable (H4)	Network Centrality as Moderating Variable (H5)
Independent Variables	Hazard Ratio (CI)	Hazard Ratio (CI)	Hazard Ratio (CI)	Hazard Ratio (CI)
Idea Creativity	0.40 (0.28-0.55) **	0.20 (0.09-0.44) **	0.22 (0.14-0.33) **	0.36 (0.25-0.52) **
Collaboration (ref=no collaboration)		1.39 (0.84-2.28)		
Creativity X Collaboration		3.09 (1.26-7.60) **		
Organizational Tenure				
Less than 6 months			-reference-	
6 or more months			1.40 (0.50-4.08)	
1 or more years			1.38 (0.47-4.05)	
2 or more years			0.28 (0.11-0.71)**	
5 or more years			0.24 (0.09 – 0.68)**	
10 or more years			0.02 (0.03-0.14)**	
Creativity x Org. Tenure				
Less than 6 months			-reference-	
6 or more months			1.98 (1.09-2.98)**	
1 or more years			2.06 (1.19-3.56) **	
2 or more years			3.89 (2.50-6.08) **	
5 or more years			3.31 (1.92-5.71)**	
10 or more years			32.36 (8.35-52.69)**	
Network Centrality				0.91 (0.65-1.27)
Creativity x Network Centrality				2.31 (1.56-3.18)**
Covariates – individual				
Gender (1=male)	0.80 (0.54-1.20)	0.86 (0.57-1.28)	0.58 (0.38-0.91) **	0.79 (0.53-1.18)
Professional Role				
Nurse	-reference-	-reference-	-reference-	-reference-
Behavioral Health Provider	1.07 (0.74-1.54)	0.98 (0.69-1.39)	1.04 (0.71-1.54)	1.06 (0.73-1.53)
Medical Assistant	0.84 (0.55-1.28)	0.94 (0.63-1.40)	0.88 (0.58-1.33)	0.84 (0.55-1.28)
Primary Care Provider	1.02 (0.71-1.45)	0.98 (0.68-1.40)	1.04 (0.74-1.47)	1.02 (0.72-1.45)
Covariates – site level				
Center	0.93 (0.89-0.99) **	0.91 (0.86-0.96) **	0.91 (0.86-0.97) **	0.93 (0.88-0.98) **
AIC (smaller is better)	1243.33	1240.14	1217.79	1241.09

*p<0.05, **p<0.0

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Figures 2.2 a,b,c Impact of Moderating Variables on the Idea Creativity and Implementation Relationship (N=220 ideas)

Figure 2a.

Collaboration as Moderating Variable

Figure 2b.

Organizational Tenure as Moderating Variable

Figure 2c.

Network Centrality (out of 1) as Moderating Variable
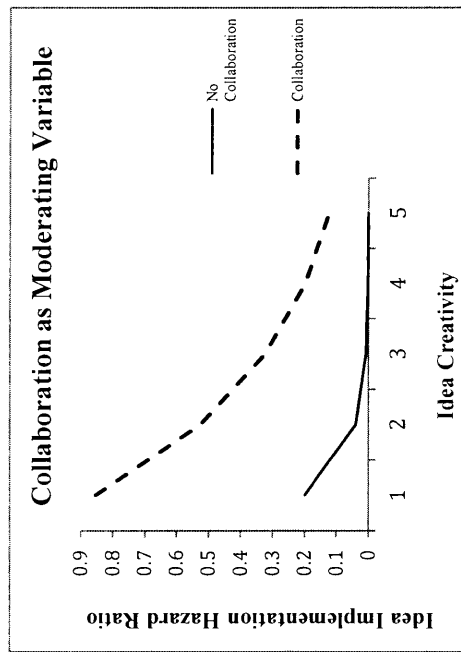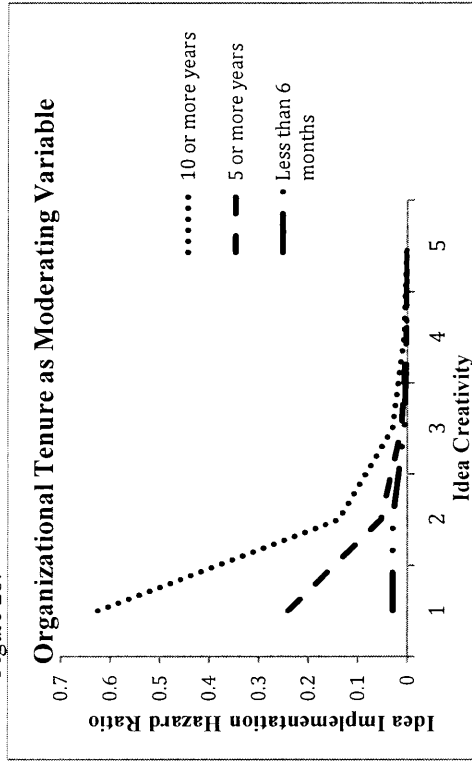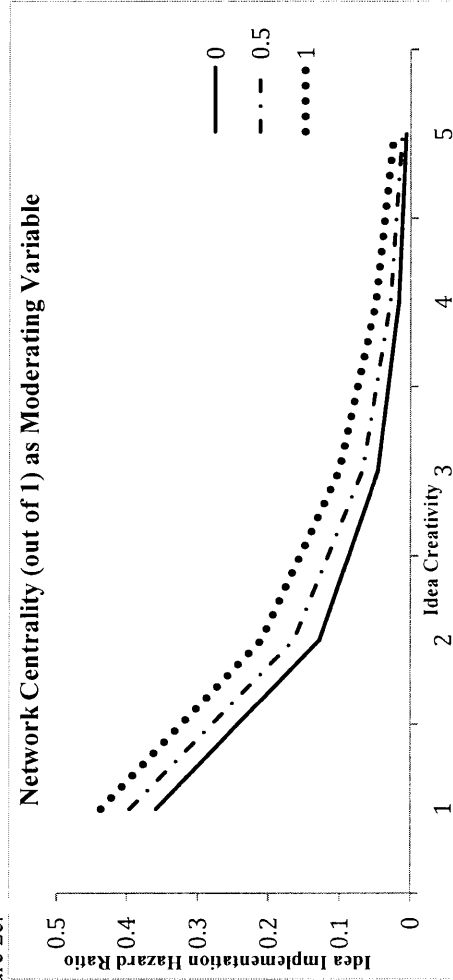
Figure 2.2b illustrates the hazard ratios for different levels of organizational tenure. For high-creativity ideas (e.g., creativity score of 5), individuals with the longest tenure (10 or more years) have an idea implementation hazard ratio of 0.02 compared to approximately 0 for individuals with the shortest tenure (less than 6 months).

Model 4 supports the hypothesis that network centrality moderates the relationship between the idea creativity and implementation; creative ideas are more likely to be implemented when proposed by individuals with higher network centrality. Figure 2.2c illustrates the hazard ratios for different values of network centrality. For high-creativity ideas (e.g., creativity score of 5), network centrality moderates the relationship between the idea creativity and implementation; individuals with the highest network centrality (1) have an idea implementation hazard ratio of 0.03 compared to approximately 0 for individuals with the lowest network centrality (0).

2.6   Discussion

To our knowledge, this is the first study to empirically assess 1) the impact of implementation of creative ideas on patient care experiences; 2) the relationship between idea creativity and implementation; and 3) moderators of this relationship. Our results show that the implementation of creative ideas is positively associated with better patient care experiences, idea creativity is negatively associated with implementation, and collaboration, organizational tenure and network centrality serve as positive moderators in this relationship.

The findings that the implementation of creative ideas is positively associated with better patient care experiences, yet idea creativity is negatively associated with implementation – suggests a paradox of creative idea implementation in health care. Although the low likelihood of creative idea implementation suggests that this approach may require effort and persistence as an improvement strategy, the positive association between creative idea implementation and better patient care experiences also suggests that such efforts are worthwhile. Creative idea implementation was positively associated with patient care experiences across multiple models, suggesting that this relationship is robust.

The resistance to creative idea implementation in health care suggested in this study is similar to findings from other industries. Past research in other industries has found that creative ideas often meet resistance to implementation, despite organizations' claims that they value creativity, as creative ideas are perceived to promote uncertainty and variation (Anderson & Gasteiger, 2007; Baer, 2012; Mueller et al., 2012). Our finding is consistent with this research and extends the prior findings to health care organizations. In health care, while creativity and innovation may be supported, the pervading culture of risk avoidance and the pursuit of standardization may impede the implementation of creative ideas. This suggests that the health care context presents barriers to change; in particular, change associated with creative ideas (Ferlie et al., 2005; Greenhalgh et al., 2004).

Our findings also suggest that resistance to divergent ideas can be moderated. Three staff characteristics – more collaborative relationships, longer organizational tenure and high network centrality – can help overcome barriers to idea implementation. These

characteristics have been identified in other studies of organizational change and are related to one another. They each reflect embeddedness in an organization, which confers legitimacy to the individual (Baer, 2012; Battilana, 2011; Ferlie et al., 2005). Individuals with greater legitimacy may countervail resistance to idea implementation and achieve successful implementation of creative ideas (Granovetter, 1973).

This study has several potential limitations. While we find an association between idea creativity and patient care experiences, we cannot conclude a causal relationship or know if specific ideas had a direct impact on patient experiences. Additionally, these findings may not generalize to all primary care clinics because of differences between the focal clinics and other primary care clinics. They also may not generalize to other health care organizations, for example hospitals, engaging in similar staff-led patient experience improvement initiatives (e.g., hackathons or innovation tournaments) (Terwiesch et al., 2013). Finally, the study does not take into account intra-organizational factors that may influence implementation, notably fit or feasibility with the context (Damschroder et al., 2009; Kitson et al., 2008). While we try to address center-level resource differences via the covariates, and the measure itself accounts for usefulness (in the context), we do not account for the fit of the creative idea to the context, which is key to prevailing implementation frameworks in health services research (Damschroder et al., 2009; Kitson et al., 2008).

Nevertheless, this research offers new insights into the impact of implementation of staff's creative ideas on patient care experiences, the relationship between idea creativity and implementation, and moderators of this relationship. This work contributes to health services research by suggesting that staff may play a key role in patient

experience improvement, and that implementation science frameworks may need to consider idea creativity. This study also contributes to organizational research by showing that creativity in health care has similarities with other industries, and that there is a greater need to study legitimizing factors associated with idea implementation. Overall, this research contributes to our understanding of why creativity matters, and why it should matter to health care.

2.7   Implications for Practice

This study shows the value and the challenges of fostering creative idea implementation to improve patient care experiences in health care organizations. The implementation of staff's creative ideas was positively associated with better patient care experiences, which suggests that there is value in encouraging staff creativity as a quality improvement approach. Specifically, organizations and managers should consider focusing some of their efforts on promoting high-creativity ideas for implementation, despite the potential for these ideas to create conflict and disruption once implemented (Mueller et al., 2012). Popular creativity-focused strategies for patient experience improvement - such as the quality improvement teams described in this study, as well as others not covered in this study such as innovation tournaments, hackathons and suggestion boxes - may enable the generation of high-creativity ideas, addressing one concern for QI. Generation is not implementation, however, the second concern and requirement for improvement. Our results suggest the importance of managers, improvement leaders, and teams ensuring that high-creativity ideas are not hastily dismissed for implementation. How to facilitate the implementation of ideas should be

considered when designing quality improvement initiatives (e.g., checklist to ensure high-creativity ideas are not prematurely dismissed) as well as promoted in discussions, to counter potential resistance and inertia.

Additionally, our results indicate that organizations and managers should establish a systematic approach to addressing the staff-level characteristics associated with improved likelihood of creative idea implementation. To promote more collaborative relationships, managers may want to focus their efforts on providing individuals who have fewer collaborative relationships more structured opportunities, such as mentoring or networking initiatives, to connect with others who could support their implementation efforts. While increasing organizational tenure is not a practical strategy for individuals seeking to implement their creative ideas, managers may want to link staff who are newer to the organization with more established staff. Individuals with longer organizational tenure can serve as "champions" for the creative idea implementation of the junior colleagues, and may promote the emulation of certain behaviors that confer respect and authority in the organization. To promote a more central position in the organization's social network, managers may want to provide opportunities for individuals to develop their networking skills, such as assigning talented individuals who are central to their work network as mentors to provide developmental feedback at regular time intervals. Finally, an enhanced prioritization of the implementation of high-creativity ideas across the organization may facilitate a work environment where staff are motivated to push for creative idea implementation and attend to the contributions of all individuals who may hold promising high-creativity ideas, not solely those with the three characteristics specified in these findings.

In conclusion, this research informs managerial strategies to encourage creative idea implementation to improve patient care experiences. Understanding that creative ideas relate to patient care experiences, and identifying the factors that facilitate implementation should advance quality improvement efforts in health care.

Chapter 3

Who Generates Creative Ideas for Quality Improvement?

The Relationship Between Health Care Staff Characteristics and Idea Creativity

3.1 Abstract

Objective: To test the association between three staff characteristics (job satisfaction, professional role, and organizational tenure) and the creativity of ideas for quality improvement.

Data Sources/Study Setting: Data from 216 quality improvement team meeting transcripts collected over 18 months from 12 federally qualified community health centers in one system in the United States, and data from staff work experience surveys administered at the start of the study period to 72 staff serving on improvement teams at the same centers.

Study Design: Prospective panel analysis of 220 improvement ideas generated by improvement team members (nurses, primary care providers, medical assistants, and behavioral health providers). We used multivariate multi-level regression models to estimate the association between staff characteristics (job satisfaction, professional role, and organizational tenure), covariates, and idea creativity.

Data Collection/Extraction Methods: We analyzed meeting transcripts to identify quality improvement ideas. Ideas were rated for creativity by an expert panel using a reliable and validated assessment technique. We collected information on staff characteristics using a survey administered in-person and by email.

Principal Findings: Job satisfaction and organizational tenure were negatively associated with idea creativity. Professional role had an association too, with the

professional roles of behavioral health provider and medical assistant being more

positively associated with idea creativity than primary care providers. Nurse creativity

was not significantly different than primary care providers.

Conclusions: The finding that job dissatisfaction, shorter organizational tenure and

professional roles affect the generation of creative ideas is important because these results

suggest how health care organizations can identify individuals who are most likely to

generate creative ideas. Thus, they may be able to increase the likelihood that groups

will generate creative ideas by planning carefully the groups' composition.

3.2   Introduction

The U.S. health care system currently provides sub-optimal quality of care, and there is a need for creative approaches to close the gap between current performance and the delivery of consistent high-quality care (Institute of Medicine, 2012). Creativity, defined as the generation of novel and useful ideas (Amabile, 1988), is required for innovation, which refers to an idea, practice, policy or technology that is new to the context (Rogers, 2003). Staff creativity is considered an essential resource for many organizations striving to adapt to new problems and changing circumstances (Anderson et al., 2014; Puccio, 2010). In health care organizations, there is growing interest in engaging health care staff (e.g., primary care providers, nurses, and medical assistants) to generate creative ideas that might lead to improvements in care quality (Asch et al., 2014). For example, recent quality improvement initiatives such as "Your Big Idea" at the University of Pennsylvania Health System involved crowdsourcing ideas from staff, while "Transforming Care at the Bedside" from the Robert Wood Johnson Foundation involved staff generating, testing and implementing ideas (Needleman et al., 2016; Terwiesch et al., 2013). As the quality improvement imperative grows more urgent, with quality measures now used for performance-based compensation, practice recognition, and public reporting (Anhang Price, Elliott, Zaslavsky, et al., 2014; Chatterjee et al., 2015), it is critical to understand how staff creativity operates in health care.

Past research (Chapter 2) has found that the implementation of creative ideas was positively associated with better patient care experiences, an important aspect of care quality. Understanding the relationship between staff characteristics and the implementation of creative ideas is important as health care organizations seek to identify

individuals most likely to spur change and foster innovation with their high-creativity ideas (Asch et al., 2014). However, the relationship between staff characteristics and creativity is an unexplored area (George, 2007). Prior research on the antecedents of creativity have focused on individual creative traits, work environments and/or team design factors such as group size (George, 2007; Shalley et al., 2004). We propose that staff characteristics may matter to creativity in health care, as health care delivery is a multi-disciplinary task and the experience of work (theorized to influence staff creativity) varies in ways related to an individual's role and relationship to the organization (Amabile et al., 1996; Starr, 1982).

Three important health care staff characteristics are: an individual's attitude towards work, their professional role, and their experience in the organization (Johns, 2006; O'Reilly, 1991; Staw, 1984). First, an individual's attitude towards work can motivate action, for example, job satisfaction can promote organizational citizenship and dissatisfaction can promote exit and turnover (Staw, 1984). In health care, the barriers to creative idea generation seem high: demanding workloads, a culture focused on risk reduction and standardization, and a status hierarchy that reduces the propensity to speak up for low status staff (Nembhard & Edmondson, 2006; Parker et al., 2008; Starr, 1982). Thus, a strong positive or negative attitude towards work might be needed to overcome these barriers and generate creative ideas. Second, an individual's professional role is important, as it determines responsibilities and their place in health care 's status hierarchy (physicians are higher status than behavioral health providers, nurses, medical assistants, respectively) (Freidson, 1970a). Creativity researchers call for more work into how professional roles shape creativity, arguing that creative potential may reside in the

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job itself and its tasks. While George (2007) writes that creativity may vary across industry occupations –e.g., teachers, secretaries, chefs, etc. – we argue that creativity may vary across professional roles even within health care (e.g., primary care provider, nurse, etc.). Finally, health care expertise is often assumed to accumulate with familiarity with the organization, conferring authority and respect for ideas proposed by longer tenured individuals (Parker, De Pillis, Altschuler, Rubenstein, & Meredith, 2007). It is unclear whether a longer tenured individual who is familiar with existing practices would propose more creative ideas than a new hire with a detached and fresh perspective. Management research has found that longer organizational tenure is often associated with better job performance (Staw, 1984), yet new hires are often solicited for their fresh perspective on problems (Baron et al., 1986). Ambiguity on how each of these staff characteristics relate to health care staff creativity motivates the current study.

In this study, we assess the association of job satisfaction, professional role, and organizational tenure with the creativity of staff ideas for quality improvement. Knowing staff characteristics associated with creativity may enhance scholars and practitioners understanding of what fosters creativity in health care, and thus which individuals are more likely to spur desirable change for quality improvement.

3.3   Methods

3.3.1   Study Design

We tested the association of staff characteristics and the creativity of their proposed ideas with a prospective panel analysis of 220 improvement ideas generated by 72 clinical staff serving on quality improvement teams in 12 federally qualified

community health centers over 18 months (September 2013 to March 2015). The clinical care roles of the staff included primary care provider, nurse, medical assistant and behavioral health provider.

The 12 community health centers were part of a single organization in one state in the United States. These centers provide comprehensive primary care services to over 130,000 patients a year, and have a special commitment to serving the uninsured, underinsured, and special populations (e.g., patients with chronic mental health issues). A key quality improvement strategy for the organization was to engage health care staff in developing health care delivery innovations, making this an ideal setting in which to study the factors associated with the creativity of staff ideas.

3.3.2 Data Sources

Two sources of data for were used in this study: quality improvement team meeting transcripts and a staff work experience survey.

Quality Improvement Team Meeting Transcripts. Quality improvement discussions were documented in 216 team meeting transcripts (18 monthly meetings for 12 centers). In all centers, transcripts contained the following standardized sections and information: center name, date, time and location of meeting, attendance, and pre-formulated columns for agenda topic, deliverable, outcome measure, staff responsible, notes/discussion and action items (including action, owner and due date). Teams were tasked with developing and implementing quality improvement initiatives focused on care coordination.

We analyzed meeting transcripts using content analysis techniques (Miles & Huberman, 1994; Strauss & Corbin, 1990) to identify ideas for quality improvement and

the individual(s) who proposed each idea. Ideas were defined as: *"A different alternative for a possible course of action to approach the task at hand"* (Binnewies, Ohly, & Sonnentag, 2007). A second researcher independently coded ideas in a selection of transcripts (30%) as a check on the process (Yin, 2003), with 83% agreement between raters on idea identification, which is within the intercoder reliability range of 70 percent to 94 percent considered "acceptable" to "exceptional" (Campbell, Quincy, Osserman, & Pedersen, 2013). We identified 220 improvement ideas from these transcripts.

Staff Work Experience Surveys. We collected information on staff characteristics using a survey that was part of a related study (Nembhard et al. 2017). We recruited survey participants using emails from center leadership and introductory lunchtime staff meetings with members of the research team, where consent forms were signed. From November 2014 through February 2015 (varying by county), we administered the survey via email or paper to 188 primary care team members in the 12 centers. Seventy-two of these 188 staff were quality improvement team participants, the sample for this current study. All 72 staff completed the survey (100% participation). All participating staff were full-time employees and the majority were female (79%). The largest group of respondents were nurses (31%), versus primary care providers (27%), medical assistants (23%), and behavioral health providers (19%) and 61% of staff were employed by the organization for more than two years.

3.3.3 Measures

Dependent Variable: Idea Creativity. Ideas were rated for creativity by an expert panel using the "Consensual Assessment Technique", a reliable and valid creativity assessment technique used in psychological and organizational studies

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(Amabile, 1982). In this method, experts independently rate an idea, product or object for degree of novelty and usefulness, and these ratings are used to generate a single creativity score (Amabile, 1982). The experts must be familiar with the domain of endeavor for which the product (idea) is made (in this study, quality improvement in health care).

Five health care executives served as experts for our idea creativity assessment. All worked full-time in health care administration roles (including quality improvement functions) in the United States. The majority were female (60%), all had at least ten years of professional experience in health care delivery settings and graduate degrees in health care administration. The first author recruited each expert independently, and experts were not aware of the others participating in the assessment (Amabile, 1982). Experts were emailed a survey that contained short vignette descriptions (maximum three sentences) of the ideas and were asked to rate each idea (N=220) for level of novelty (1=least novel to 5=most novel) and level of usefulness (1=least useful to 5=most useful) (Amabile, 1982; Amabile et al., 1996). The order of ideas was randomized for each rater to prevent order effects.

Given the definition of a creative idea as one that is novel and useful, for each idea, its novelty and usefulness scores were multiplied together to generate an overall score ranging from 5 to 25. These overall scores were divided by 5 to generate a final creativity score out of 5 (1=least creative to 5=most creative) (Amabile, 1982). Finally, we averaged across the five experts' scores to generate one average creativity score for each idea. To estimate inter-expert reliability for the creativity ratings, an intra-class correlation (ICC) was calculated between the experts (Plucker, 2010). This statistic

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($ICC_{1,k}=0.79$) indicated a moderately high degree of consistency between experts that is considered acceptable for assessments of creativity (Amabile, 1982).

Independent Variable: Job Satisfaction. Job satisfaction was measured by responses to the staff survey question: "Overall I am satisfied as an employee of [organization name]". This four response categories ranged from 1="Strongly disagree" to 4="Strongly agree". Similar measures of job satisfaction have been used in previous studies testing the link between job satisfaction and other outcome variables (Staw, 1984; Zhou & George, 2001).

Independent Variable: Professional Role. Professional role was measured by responses to the staff survey question: "Please select the job title which best describes your position." This item had a four-category response scale (1=Primary Care Provider, 2=Behavioral Health Provider, 3=Nurse, 4=Medical Assistant). Since each of these roles had distinct responsibilities and professional training/certifications, they were mutually exclusive categories. Individual "dummy" variables for three roles (behavioral health provider, nurse and medical assistant) were created; the primary care provider role served as a reference category.

Independent Variable: Organizational Tenure. Organizational tenure was measured using responses to the staff survey question: "How long have you been employed by [organization name]?" The six response categories ranged from 1 = "Less than 6 months" to 6 = "10 or more years".

Covariates. We included gender as another staff characteristic that may influence their creativity of ideas (George, 2007). We included the following center characteristics to capture differences in patient profile and workload: percent of patients uninsured and

number of visits per full-time employee. We also included a center-level measure of the cultural construct psychological safety, which refers to the shared belief that the setting is safe for interpersonal risk taking (Edmondson, 1999), a belief previously found to influence employee creativity (Kessel et al., 2012). We measured psychological safety using staff survey responses to four validated items, for example "In this team, if you make a mistake, it is often held against you" (Edmondson, 1999). Finally, a time dummy variable was included to account for the month (out of 18 months) during which each idea was generated.

3.3.4 Analyses

We first calculated bivariate correlations to assess the unadjusted associations of key variables with the dependent variables and assess multicollinearity. We then performed a series of multivariate multi-level regression models to estimate the associations between the staff characteristics, covariates, and idea creativity. We used the GLIMMIX procedure in SAS, which accounted for the multi-level structure of the data (ideas associated with staff, located in centers), multiple creative ideas per staff (Littell et al., 2006), and a continuous outcome variable. We estimated standard errors accounting for clustering at the staff and center-level.

In the first three models, we assessed the association between each staff characteristic and idea creativity separately, while controlling for staff and center covariates. In the final model, we assessed the robustness of the results and ascertained the relative importance of these factors after controlling for staff and center characteristics by including all staff characteristics in the model. We examined standardized coefficients and p-values to evaluate the significance of each variable, and

to facilitate interpretation of the relative importance of variables as they each were measured in different units (Littell et al., 2006). All analyses were conducted in SAS version 9.4.

3.4   Results

As reported in Table 3.1, the average creativity of the improvement ideas was 2.47 out of 5 (S.D.=1.64). Correlations between staff characteristics were significant (p-values < .05), however, variance inflation factors were all less than 6 (under the standard threshold of 10), indicating that multicollinearity was not a major concern (Neter, Wassermann, & Kutner, 1989).

Table 3.2 presents the results of the multivariate mixed model analyses. Model 1 shows that job satisfaction was negatively associated with idea creativity. A one-standard deviation increase in job satisfaction was associated with a 0.13- standard deviation decrease in idea creativity. Model 2 results indicate that compared to the primary care provider, the professional roles of behavioral health provider and the medical assistant were positively associated with idea creativity. Compared to the primary care provider, the behavioral health provider was associated with a 0.72-standard deviation increase in idea creativity. Compared to the primary care provider, the medical assistant was associated with a 0.51-standard deviation increase in idea creativity. There was not a significant association between the role of nurse relative to primary care provider and idea creativity. Model 3 shows that organizational tenure was negatively associated with idea creativity. A one-standard deviation increase in organizational tenure was associated with a 0.22-standard deviation decrease in idea creativity. When all independent variables

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were placed in Model 4 (of Table 3.2), the results from prior models were sustained. For organizational tenure, a one-standard deviation increase in organizational tenure was associated with a 0.18-standard deviation decrease in idea creativity. Of the three independent variables tested, professional role had the strongest association with idea creativity. Compared to the primary care provider, the behavioral health provider was associated with 0.48-standard deviation increase in idea creativity. Compared to the primary care provider, the medical assistant was associated with a 0.37-standard deviation increase in idea creativity. For job satisfaction, a one-standard deviation increase in job satisfaction was associated with a 0.09-standard deviation decrease in idea creativity. The p-values associated with job satisfaction, medical assistant role, and organizational tenure remained statistically significant, although they increased from <0.001 to <0.05. Figure 3.1 presents the standardized coefficients associated with the staff characteristics and idea creativity in a visual format.

Psychological safety, a site-level covariate, was statistically significant at the <0.001 level across all models. The AIC goodness-of-fit statistic decreased in magnitude with all independent variables in the model, suggesting the best fit was associated with this model.

Table 3.1   Correlations of Key Variables in Analyses (N=220 ideas)

	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. Idea Creativity	2.47	1.65									
2. Job Satisfaction	2.74	1.33	-0.39**								
3. Behavioral Health	0.25	0.33	0.41**	-0.14**							
4. Nurse	0.45	0.50	-0.23*	-0.23**	-0.38**						
5. Medical Assistant	0.21	0.41	0.25**	-0.18**	-0.16	-0.30*					
6. Organizational Tenure	4.02	1.14	-0.50**	0.19**	-0.33	0.14	-0.13				
7. Gender	0.80	0.40	0.06	-0.27**	-0.05	0.12	-0.17	0.05			
8. Percent patients uninsured	0.07	0.05	-0.08	0.01	0.09	-0.05	0.05	-0.09	0.07		
9. Number of visits per staff	417.36	81.55	0.05	-0.13*	0.05	-0.10	0.05	-0.30	0.17	0.05	
10. Psychological Safety	2.83	0.75	0.56**	0.32*	0.27*	-0.18	0.21	-0.32	0.06	-0.22**	-0.03

*p<0.05, **p<0.001

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Table 3.2   Multivariate Mixed Models of Idea Creativity Analyses (N=220 ideas)

Independent Variables	Dependent Variable: Idea Creativity			
	Job Satisfaction and Idea Creativity	Professional Role and Idea Creativity	Organizational Tenure and Idea Creativity	All Independent Variables
	β (SE)	β (SE)	β (SE)	β (SE)
Independent Variables				
Job Satisfaction	-0.13 (0.04) **	-	-	-0.09 (0.03) *
Professional Role	-		-	
Primary Care Provider		-reference-		-reference-
Behavioral Health Provider		0.72 (0.13) **		0.48 (0.13) **
Nurse		0.11 (0.11)		0.05 (0.11)
Medical Assistant		0.51 (0.16) **		0.37 (0.15) *
Organizational Tenure	-	-	-0.22 (0.03) **	-0.18 (0.03) *
Covariates – individual				
Gender (1=male)	-0.12 (0.13)	-0.06 (0.14)	-0.13 (0.15)	-0.02 (0.14)
Covariates – site level				
Percentage patients Uninsured	1.08 (0.66)	1.13 (0.74)	0.28 (0.81)	0.50 (0.71)
Number of visits per FTE	0.09 (0.01)	0.07 (0.01)	0.06 (0.01)	0.07 (0.01)
Psychological Safety	0.84 (0.06) **	0.88 (0.06) **	0.86 (0.06) **	0.74 (0.06) **
Time	0.08 (0.05)	0.07 (0.05)	0.09 (0.06)	0.07 (0.05)
AIC (smaller is better)	421.18	400.93	390.22	370.12

β is standardized regression coefficient; *p<0.05, **p<0.001

Figure 3.1 Association between Staff Characteristics and Idea Creativity (N=220 ideas)
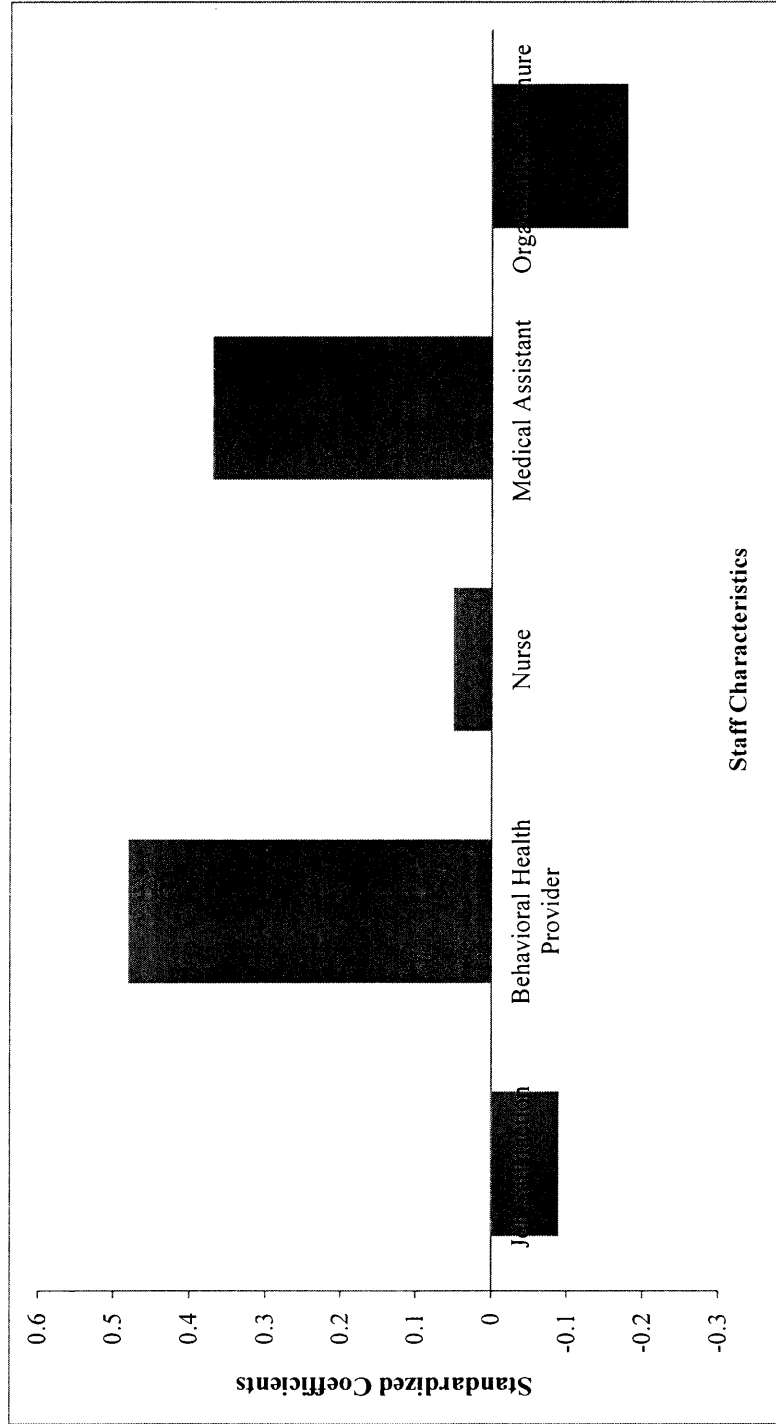
* Y-axis represents the number of standard deviations increase (or decrease) in Idea Creativity associated with either a one-standard deviation increase in job satisfaction or organizational tenure, or a comparison to the primary care provider for the three professional role.

3.5   Discussion

Our findings indicate that staff characteristics are associated with the creativity of staff's ideas that are raised in the health care quality improvement groups studied. There was a negative association between job satisfaction and idea creativity, which is consistent with other research showing that staff frustration with current practice can spur action to engage in quality improvement (Greenhalgh et al., 2004; Needleman et al., 2016; Parker et al., 2007). Our finding extends this prior research by suggesting that lower job satisfaction is associated with more creative ideas. In the organizational behavior literature, job dissatisfaction has been shown to lead to undesirable outcomes like exit or turnover (O'Reilly, 1991; Staw, 1984), but constructs related to job satisfaction such as positive affect and intrinsic motivation have been linked to creativity at work (George & Zhou, 2002; Zhou & George, 2001). Staff who are dissatisfied with their jobs are, in essence, discontented with the status quo at work, which may serve as a trigger for change to generate new ways to improve current conditions (Zhou & George, 2001), with job-induced frustration heightening motivation to allocate time and effort to problems which may lead to breakthroughs (Amabile, Barsade, Mueller, & Staw, 2005). Such a mechanism seems possible in health care: dissatisfaction may foster time and effort on quality improvement in the face of competing demands, which enables the divergent thinking and generation of novel and useful ideas necessary for breakthroughs (Fleming, 2007). Two alternative explanations for this result include that creative individuals may be less satisfied in general, or that job satisfaction may motivate a different kind of idea. Exploring these mechanisms is important for future research examining the role of job satisfaction and creativity in health care.

To our knowledge, the finding that the behavioral health provider and medical assistant roles are positively associated with idea creativity (relative to primary care providers) is the first to empirically link staff's professional role to their idea creativity. That providers in these two roles were significantly more creative than the primary care providers, who did not differ in creativity from nurses, suggests that these roles may facilitate exposure to perspectives or information that informs creativity. Social networks researchers have theorized that staff who are routinely exposed to novel, non-redundant information from diverse social circles are more likely to be exposed to ideas and perspectives that contribute to their own creativity (Perry-Smith & Shalley, 2003). In health care teams, it is possible that both behavioral health providers and medical assistants share a unique vantage point of being both team members, and on the periphery. Behavioral health providers, for example, are integrated into activities of the core primary care team (primary care provider, nurse and medical assistant) only when consults on behavioral health problems are needed (Pincus, Houtsinger, Bachman, & Keyser, 2005). Medical assistants take an observational and supporting role with the nurse or primary care provider (Nelson, Pitaro, Tzellas, & Lum, 2010), yet may also have unique opportunities to observe the patient and work processes as they are the patient's first point of contact (e.g., taking vital signs). The vantage point shared by behavioral health providers and medical assistants may inform their improvement ideas. Primary care providers and nurses, although higher on the professional medical hierarchy (Freidson, 1970a), may have relatively lower creativity ideas on average, because while their central patient care role confers expertise, it may not provide the peripheral perspective that might facilitate generating creative ideas.

Our findings suggest that a shorter time spent in the organization may have creativity advantages. Less time spent with work processes might enable staff to see problems with an objective perspective, and prevent their viewing processes as fixed and unchangeable (Anderson & Gasteiger, 2007). This logic is supported by management researchers who suggest managers should listen to the perspectives of new recruits (Baron et al., 1986; Moorman & Miner, 1997). A shorter organizational tenure might also be accompanied by staff enthusiasm to learn and optimize their new roles, a finding supported by creativity researchers who found a relationship between creativity and staff surveyed as eager to learn new domains, which was correlated with a shorter organizational tenure (Hirst, Knippenberg, & Zhou, 2009). Our findings suggest that those with fresh perspectives are more likely to be creative than their more established colleagues.

Although the current study provides several insights on staff creativity, it has limitations. While we find an association between the three staff characteristics and idea creativity, we cannot conclude a causal relationship. Future qualitative interviews with staff and/or multi-period examination of characteristics such as job satisfaction might uncover if these variables determine or predict creativity, or whether some variables occur simultaneously or as a consequence of creativity; it is possible that the associations we describe might operate in different directions. We do not explicitly survey staff on creativity-focused constructs such as creative traits or thinking styles, which are common individual-level factors tested in creativity research (Amabile, 1988). Additionally, these findings may not generalize to other types of health care organizations nor to all primary

care clinics because of differences between the focal clinics and other primary care clinics.

Nevertheless, this research offers health services researchers empirical evidence that health care staff idea creativity may vary according to how satisfied they are in their job, their professional role, and how long they have been at the organization. Understanding this variation is important because creativity is valued as a quality improvement approach, and past work has found that the implementation of high-creativity ideas is associated with valued outcomes such as better patient experiences (Chapter 2). These findings also offer creativity researchers additional potentially interesting correlates – while job satisfaction and creativity research is thriving, little is known about how organizational tenure and professional role affects creativity in other industries (Anderson et al., 2014).

3.6   Practice Implications

For organizations and managers using the approach of soliciting staff creative ideas for quality improvement, this study offers various implications for practice. Understanding that idea creativity varies with staff characteristics may be helpful for the design of improvement strategies: managers might want to target their efforts to staff who are likely to generate high-creativity ideas.

Several targeting strategies exist. First, managers might be able to channel staff dissatisfaction into creativity, in which the production of novel and useful ideas might help eliminate the sources of dissatisfaction and result in enhanced effectiveness of quality improvement initiatives, and hence organizational effectiveness. We do not

advocate that managers encourage job dissatisfaction to promote creativity; organizational behavior research suggests staff are bound to be dissatisfied with their jobs at one time or another (Staw, 1984). Instead, managers might view staff who are discontented with the status quo as a valuable resource for instigating change and overcoming the inertia of not engaging in quality improvement. Managers will need to ensure that the organizational climate supports creativity, and view dissatisfaction as an opportunity for encouraging creative ideas rather than view it as a problem or a nuisance. The indirect consequences of these managerial actions might be to improve the well-being of staff and promote meaningful change at the organizational level.

Second, managers might consider focusing on the contributions of behavioral health providers and medical assistants, especially since these roles are historically less active in quality improvement (nurses and physicians are the most active participants) (Needleman et al., 2016). Behavioral health providers and medical assistants and other allied health professionals could be invited and encouraged to participate in quality improvement innovation development; they might not otherwise assume that their participation is expected or valuable.

Third, managers might especially attend to the contributions of staff with a shorter organizational tenure, i.e., staff who are relatively new to the organization. As these staff might feel hesitant to speak up with creative ideas, especially in the presence of more established co-workers, managers might benefit from explicitly displaying inclusiveness and inviting participation via their words and actions (Nembhard & Edmondson, 2006).

3.7 Conclusion

Although staff creativity does not always lead to successful implementation, it provides the raw material for innovation (Amabile, 1988). We know that the implementation of high-creativity ideas is associated with better patient care experiences (Chapter 2), and this work extends these findings to suggest that staff characteristics may be important for idea creativity. This finding contributes to creativity research, where less is known about the relationship of staff characteristics to creativity at work, and also to health services research, where scholars and practitioners seek to understand how organizations can improve health care delivery. Understanding that job dissatisfaction, shorter organizational tenure and professional roles matter to idea creativity is important as health care organizations seek to increase the likelihood that groups will generate creative ideas by carefully planning the groups' composition.

Chapter 4

How Leader Tactics Foster Idea Creativity, Evolution and Implementation

4.1   Abstract

Objective: To test the association between leader tactics and idea creativity, evolution and implementation.

Data Sources/Study Setting: Transcripts of 216 quality improvement team meetings over 18 months in 12 federally qualified community health centers in one U.S. system.

Study Design: Longitudinal analysis of 220 improvement ideas generated by 12 improvement teams. We used multivariate, multi-level regression models to estimate the associations between leader tactics, covariates, and idea creativity, evolution and implementation.

Data Collection/Extraction Methods: We analyzed the content of meeting transcripts to identify leader tactics, quality improvement ideas, types of idea evolution (based on speed of implementation, and level of engagement), and implementation outcome. Ideas were rated for creativity by an expert panel using a validated assessment method.

Results: Compared to groups in which the leader did not use a specific leadership tactic, groups in which the leader used brainstorming generated more creative ideas, and idea evolution that was characterized by rapidly implemented, low-engagement ideas. Compared to no specific leader tactic, group reflection on process was not significantly associated with idea creativity, but was positively associated with idea evolution that was characterized by slowly implemented, high-engagement ideas, as well as idea

implementation. Compared to no specific leader tactic, meeting ground rules was not significantly associated with idea creativity, evolution, or implementation.

Conclusion: The findings suggest that two leader tactics – brainstorming and reflection – are helpful approaches depending on the leaders' goals. Brainstorming may aide leaders seeking disruptive change via more creative, rapidly implemented, low-engagement ideas, while group reflection on process may not foster idea creativity, but may aide leaders seeking well-considered and deliberated solutions via slower implemented, high-engagement ideas.

4.2   Introduction

Creativity, the generation of novel and useful ideas (Amabile, 1988), is important for organizations seeking improvement and competitive advantage, yet facilitating creativity in organizations can be challenging (Anderson & Gasteiger, 2007; Puccio, 2010). In contrast to the popular belief that creativity occurs as a sudden insight, fostering creativity in organizations requires focused, concerted effort. Staff often hesitate to generate creative ideas perceived to diverge from standard practice (Mueller et al., 2012) and are less likely to implement high-creativity ideas (see Chapter 2). Leadership is often required to foster creativity, and leaders are often responsible for maximizing the likelihood that creative ideas are generated and implemented in their organizations (George, 2007; Shalley et al., 2004).

Scholars have identified three leadership factors that may stimulate and support staff creativity: leader behaviors, styles, and tactics. Extensive research has been conducted on leader behavior and styles, but relatively little is known about leader tactics. The research on leader behaviors, i.e., words and deeds that leaders display during every day work interactions, has found that several behaviors are positively associated with staff creativity (Boulgarides & Cohen, 2001; George, 2007), including supporting staff's actions, providing constructive feedback, regular contact, and soliciting staff ideas and opinions (Amabile et al., 2004; Deci, Connell, & Ryan, 1989; Frese, Teng, & Wijnen, 1999). The research on leader styles, i.e., a consistent pattern of work behaviors that forms an overall style of leadership, has found that charismatic styles and transformational, organizational change-focused styles are positively associated with staff creativity (Boulgarides & Cohen, 2001; Jung, Chow, & Wu, 2003; Shin & Zhou, 2007).

Less is known about the relationship between leader tactics and creativity. Leader tactics are specific and deliberate approaches leaders can take to address a specific goal (Boulgarides & Cohen, 2001). To increase the probability of creative thinking, many leaders use standard management practices and methods to help staff engage in the idea generation process; they do not leave creativity to chance (Puccio, 2010). Examples of leader tactics include brainstorming (rapid generation of ideas spontaneously contributed by group members), setting ground rules for group meetings, and facilitating reflection on group process to optimize group functioning (Puccio, 2010; Sawyer, 2010). While several empirical studies have tested the association of brainstorming and creative performance in organizations (Scott, Leritz, & Mumford, 2004; Sutton & Hargadon, 1996), less work has been conducted on other methods, nor has there been a single study that tests the relative effectiveness of leader tactics on the generation of creative ideas (Puccio, 2010; Scott et al., 2004).

Research has shown that idea generation and implementation are different processes, and that leader characteristics associated with idea generation are different from those related to implementation (see Chapters 2 and 3). Most prior leadership research has focused on the role of leaders and creative idea generation, often the volume of ideas generated (Jung, 2001; Shin & Zhou, 2007) and idea implementation (Baer, 2012). Idea evolution, that is, what happens to creative ideas after they are generated and prior to implementation may be a different process, although this has not been explored empirically (Anderson et al., 2014). A popular belief about ideas in organizations is that their evolution is random and unpredictable (Sawyer, 2012), however, some scholars have suggested that ideas may evolve in systematic ways, perhaps according to speed of

implementation, or degree of engagement in idea discussion (Anderson et al., 2014). Examining if idea evolution varies systematically with certain characteristics is critical to our understanding of the life of ideas in organizations (Anderson et al., 2014). If idea evolution is predictable, as opposed to random, then these insights may inform leaders' ability to foster idea evolution types that fits their goals.

The objective of this study was to test the association between leader tactics, idea creativity, evolution, and implementation. It was important to examine if leader tactics have differential effects on these outcomes, as certain tactics may be more appropriate for particular kinds of organizational challenges and may be more effective under certain circumstances. Thus, this work should inform the selection of tactics leaders employ to achieve their organizational goals for idea creativity, evolution, and implementation.

4.3   Methods

4.3.1   Study Design

In this study, we analyzed 220 improvement ideas generated over 18 months by 12 improvement teams, associated with 12 federally qualified community health centers in one U.S. health care system. The study centers provide comprehensive primary care services to over 130,000 patients a year, and have a special commitment to serving the uninsured, underinsured, and special populations. They engage multi-disciplinary health care teams (e.g., primary care providers, nurses and medical assistants) to develop quality improvement initiatives, and the health care system assigns leaders from its quality improvement institute to lead each team. Leaders were trained in quality improvement and meeting facilitation methodologies, and were encouraged to elicit

creative ideas from teams using tactics from best practices taught at the institute (e.g., setting meeting ground rules).

We used two approaches to the study of leader tactics in this setting. The first was qualitative data analysis to identify leader tactics (four tactics were identified), ideas generated by teams (N=220 ideas), and ideas' creativity and implementation outcomes, as well as describe patterns of the discussion and adoption of ideas. A second approach was to analyze the quantitative relationships between leader tactics and idea creativity, evolution, and implementation.

4.3.2 Data Sources and Collection/Extraction Methods

Quality Improvement Team Meeting Transcripts. We analyzed the transcripts of 216 quality improvement team meetings (18 monthly meetings at 12 centers). In all centers, transcripts contained the following standardized sections and information: Center name, date, time and location of meeting, attendance, and pre-formulated columns for agenda topic, deliverable, outcome measure, staff responsible, notes/discussion and action items (including action, owner and due date). Teams were encouraged to develop and implement quality improvement initiatives focused on care coordination.

We analyzed the meeting transcripts using content analysis (Miles & Huberman, 1994; Strauss & Corbin, 1990). First, we identified the leader tactics employed across the 12 centers. While three of the team leaders did not appear to employ any specific tactic to guide discussions, we identified three specific tactics used by the other nine leaders, described in detail below. Second, we identified and coded ideas for quality improvement and the individual(s) who proposed each idea. Ideas were defined as: *"A different alternative for a possible course of action to approach the task at hand"* (Binnewies,

Ohly, & Sonnentag, 2007). A second researcher independently coded ideas in a random 30% of the transcripts to assess reliability of the identification of ideas (Yin, 2003). There was an 83% agreement between raters, which as intercoder reliability is considered to be between "acceptable" (70%) and "exceptional" (94%) (Campbell et al., 2013). We identified 220 improvement ideas in the transcripts. Finally, we identified patterns of idea evolution for the 220 ideas by tracking the trajectory of each idea over time.

Staff Work Experience Surveys. We collected data on staff characteristics (professional role, organizational tenure, and gender) and center characteristics (psychological safety) using a staff survey that was part of a related study (Nembhard et al. 2017). We recruited survey participants using emails from center leadership and introductory lunchtime staff meetings with members of the research team, where consent forms were signed. From November 2014 through February 2015 (varying by county), we administered the survey via email or paper to 188 primary care team members in the 12 centers. Seventy-two of these 188 staff were quality improvement team participants, the sample for this current study. All 72 of those staff completed the survey. All were full-time employees and the majority were female (79%). The largest group of respondents were nurses (31%), versus primary care providers (27%), medical assistants (23%), and behavioral health providers (19%) and 61% of staff were employed by the organization for more than two years.

4.3.3 Measures

Dependent Variable: Idea Creativity. Ideas were rated for creativity by an expert panel using the "Consensual Assessment Technique", a reliable and valid creativity assessment method used in psychological and organizational studies (Amabile,

1982). In that method, experts independently rate an idea, product or object for degree of novelty and usefulness, and these ratings are used to generate a single creativity score (Amabile, 1982). The experts must be familiar with the domain of endeavor for which the idea is proposed (in this study, improvement of health care quality).

Five health care executives served as experts who assessed idea creativity. All worked full-time in health care administration roles (including quality improvement functions) in the United States. The majority were female (60%), all had at least ten years of professional experience in health care delivery settings and graduate degrees in health care administration. The first author recruited each expert independently, and experts were not aware of the others participating in the assessment (Amabile, 1982). Experts were emailed a survey that contained short vignette descriptions (maximum three sentences) of the ideas and were asked to rate each idea (N=220) for level of novelty (1=least novel to 5=most novel) and level of usefulness (1=least useful to 5=most useful) (Amabile, 1982; Amabile et al., 1996). The order of ideas was randomized for each rater to prevent order effects (Amabile, 1982).

The definition of a creative idea as one that is novel and useful, so for each idea, its novelty and usefulness scores were multiplied together to generate an overall score ranging from 5 to 25. These overall scores were divided by 5 to generate a final creativity score ranging from 1 (least creative) to 5 (most creative) (Amabile, 1982). Finally, we averaged the five experts' scores to generate one score for each idea. To estimate inter-expert reliability for the creativity ratings, an intra-class correlation (ICC) was calculated between the experts (Plucker, 2010). This statistic ($ICC_{1,k}$=0.79) indicated a moderately

high degree of consistency between experts that is considered acceptable for assessments of creativity (Amabile, 1982).

Dependent Variable: Idea Evolution. The evolution of creative ideas over the 18 months of the study tended to follow four distinct patterns. The first pattern, which we labeled "Failure to Launch", describes shared ideas that were not implemented by the end of the study period. The second pattern, which we labeled "Plug and Play", describes ideas that were implemented in two meetings or less, and were associated with low engagement on idea content. We coded an idea as having low-engagement if the logistics of idea implementation were only discussed, and the characteristics of the idea were not discussed by the group. We did not identify any ideas that were implemented in two meetings or less that were subject to high engagement on idea content. The third pattern, which we labeled "Slow Burn", describes ideas that were implemented in three meetings or more, and were associated with low engagement on idea content. The fourth pattern, which we labeled "Iterate and Generate", describes ideas that were implemented in three meetings or more, and were associated with high engagement on idea content. We coded the idea as having high-engagement if the characteristics of the idea (not solely the logistics of implementation) were discussed by the group. We used a threshold of three meetings for the third and fourth patterns because our analysis indicated that three weeks after first mention was when high-engagement first occurred. Table 4.1 gives examples from the transcripts of the four patterns used to characterize all 220 ideas.

Table 4.1 Four Types to Describe Idea Evolution

Type	Idea Evolution	Implementation	Speed of Implementation	Engagement on idea content	Example of idea
Failure To Launch Idea is not implemented during the study period	*(graph: Implementation vs. Time)*	No	N/A	Low to high	Create a podcast to educate patients about managing hypertension
Plug and Play Idea takes two or less meetings to be implemented. Low engagement on idea content.	*(graph: Implementation vs. Time)*	Yes	Fast	Low	Schedule weekly Nurse/PCP care coordination meeting
Slow Burn Idea takes three or more meetings to be implemented. Low engagement on idea content.	*(graph: Implementation vs. Time)*	Yes	Slow	Low	Create a resource list of community partner organizations
Iterate and Generate Idea takes three or more meetings to be implemented. High engagement on idea content.	*(graph: Implementation vs. Time)*	Yes	Slow	High	Integrate behavioral health into care coordination workflow

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For the analysis, we created categorical/dummy variables for three of the patterns, with "Failure to Launch" as the reference group.

Dependent Variable: Idea Implementation. Ideas were tracked over the course of the meetings to assess implementation. For each idea, we noted whether the idea was implemented (coded as 1; otherwise coded as 0) and the time elapsed (in number of meetings) since the idea was first mentioned. Ideas that were not discussed in successive meetings or ideas that were discussed and formally rejected in a meeting were coded as not implemented. Right censoring occurred for ideas that had no definitive outcome by the end of the study period (Hedeker & Gibbons, 2006). Since the teams disbanded at the end of the study period, those ideas were assigned an outcome of 0.

Independent Variable: Leader Tactic. The first leader tactic was meeting ground rules, which were mutually agreed-upon rules for the team about meeting process, participation and respecting each others' opinions. Ground rules were established during initial team formation. We coded the leader as using this tactic if there was a discussion of ground rules in the transcripts. The second leader tactic was brainstorming time, in which leaders provided dedicated time for the team to generate ideas on a certain topic. We coded a leader as using this tactic when brainstorming time was noted in transcripts. The final leader tactic was group reflection on process, which involved leaders dedicating time at the end of each meeting to reflect as a group on the process of the team meeting. This took a structured form where team members assigned a score out of 10 to the meeting and discussed what they could do to improve. We coded a leader as using this tactic when transcripts indicated these discussions and scores. When no tactic was observed in transcripts, we coded the leader tactic as "no leader tactic"; this category

served as our reference category in analyses. Table 4.2 displays these four tactics with examples of text selected from the transcripts. One leadership tactic was identified for all 12 centers.

Table 4.2   Four Leader Tactics to Solicit Creativity from Staff

Leader Tactic	Example
No Leader Tactic (n=3)	No evidence of leader tactics used in transcripts
Meeting Ground Rules (n=3)	"Ground rules: Participate. No talking over each other. There's no such thing as a stupid idea." – Center 2
Brainstorming Time (n=3)	"Let's now take 20 minutes of brainstorming to discuss alternative ideas for patient education" (topics changed for every meeting) – Center 8
Group Reflection on Process (n=3)	"Meeting process evaluation. Person 1: Team rating of 9 – team worked efficiently through all tasks but X was very quiet, would like to hear more from her – she knows a lot about this topic" – Center 10

Covariates. In our regression model, we included gender, professional role and organizational tenure as staff characteristics that might influence creativity (George, 2007). We also included the percent of patients who were uninsured and the number of patient visits per full-time employee to capture differences in patient profile and workload. We also included a center-level measure of the psychological safety, which refers to the shared belief that the setting is safe for interpersonal risk taking

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(Edmondson, 1999), a belief previously found to influence employee creativity (Kessel et al., 2012). We measured psychological safety using staff survey responses to four validated items, for example "In this team, if you make a mistake, it is often held against you" (Edmondson, 1999).

4.3.4 Analyses

We first calculated bivariate correlations to assess the associations of key variables with the dependent variables and assess multicollinearity. We then estimated a series of multivariate multi-level regression models to assess the associations between the leader tactics, covariates, and the dependent variables of idea creativity, evolution, and implementation.

For the first analysis, we assessed the association between leader tactics and idea creativity, controlling for staff and center covariates and accounting for the multi-level structure of the data (ideas associated with staff, located in centers). We used the GLIMMIX procedure in SAS, to account for the multi-level data structure and a continuous outcome variable (Littell et al., 2006). We estimated standard errors accounting for clustering at the staff and center-level. We examined standardized coefficients and p-values to evaluate the significance of each variable and to facilitate interpretation of the relative importance of each leader tactic on idea creativity (Littell et al., 2006).

For the second analysis, we assessed the association of leader tactics and idea evolution, while controlling for staff and center covariates, and accounting for the multi-level data structure. We used the GENMOD procedure in SAS to perform a mixed model analysis for a binary outcome variable, with clustered standard errors at the center and

staff-level (Lin & Wei, 1989; Littell et al., 2006). We examined odds ratios and 95%
confidence internals to evaluate the likelihood that an idea associated with a leader tactic
would be associated with a certain idea evolution typology.

For the analysis of the association between leader tactic and idea implementation,
we used a multivariate Cox Proportional Hazards model, which incorporated time to idea
implementation (Hedeker & Gibbons, 2006). To check the proportional hazards
assumption associated with the Cox model (i.e., that the independent variables do not
vary over time), we conducted likelihood ratio tests for each variable under
consideration; these tests indicated support for this assumption (Lin & Wei, 1989). We
conducted analyses using the PHREG procedure in SAS, and clustered standard errors at
the center and staff-level to account for the multi-level structure of the data (Lin & Wei,
1989; Littell et al., 2006). We examined hazard ratios and 95% confidence intervals to
evaluate the likelihood that an idea associated with a leader tactic would be implemented
over time.

4.4   Results

The correlations between leader tactics (Table 4.3) were significant (p-values <
.05) but the variance inflation factors were all less than 6 (under the standard threshold of
10), indicating that multicollinearity was not a major problem (Neter et al., 1989). The
results of the leader tactic and idea creativity analyses are presented in Table 4.4.
Compared to no leader tactic, brainstorming was associated with a 0.19 standard
deviation increase in idea creativity. Compared to no leader tactic, meeting ground rules
and group reflection on process were each not significantly associated with idea

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creativity.

The results of the leader tactic and idea evolution-type analyses are presented in Table 4.5. Model 1 shows that brainstorming was positively associated with "Plug and Play" idea evolution. Compared to no leader tactics, brainstorming increased the odds ratio of "Plug and Play" idea evolution by a factor of 1.24. Model 2 shows that compared to no leader tactics, brainstorming, meeting ground rules, and group reflection on process were each not significantly associated with "Slow Burn" idea evolution. Model 3 shows that, compared to no leader tactics, group reflection on process was positively associated with the "Iterate and Generate" idea evolution typology. Compared to no leader tactics, group reflection on process significantly increased the odds ratio of the "Iterate and Generate" typology by a factor of 1.73.

Table 4.3   Correlations of Key Variables (N=220 ideas)

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Idea Creativity	2.47	1.65													
2. Plug and Play Typology	0.21	0.41	0.40												
3. Slow Burn Typology	0.23	0.42	0.20	0.28*											
4. Iterate and Generate Typology	0.14	0.34	0.41	0.21*	0.20*										
5. Idea Implementation	0.64	0.48	-0.57**	0.20**	0.42**	0.30**									
6. Ground Rules Tactic	0.24	0.43	0.07	0.05	0.03	0.10	0.34								
7. Brainstorming Time Tactic	0.30	0.47	0.54*	0.48*	0.03	0.21	0.19	0.36*							
8. Group Reflection on Process Tactic	0.31	0.46	0.23	0.12	0.13	0.57**	0.49*	0.34**	0.42**						
9. Staff Professional Role	2.08	0.63	0.14	0.15	0.12	0.07	0.09	0.14	0.08	0.20					
10. Staff Organizational Tenure	4.02	1.14	-0.50**	0.07	0.16	0.13	0.08	0.17	0.05	0.01	0.17				
11. Staff Gender	0.80	0.40	0.06	0.17	0.16	0.06	0.05	0.48	0.04	0.32	0.21	0.05			
12. Percentage of Patients Uninsured	0.07	0.05	-0.08	0.10	0.04	0.14	0.04	0.02	0.04	0.36	0.11	0.10	0.08		
13. Number of visits per FTE	417.36	81.55	0.05	0.15	0.23	0.04	0.07	0.50	0.38	0.12	0.01	0.30	0.17	0.05	
14. Psychological Safety	2.83	0.75	0.56*	0.09	0.07	0.17	0.09	0.30	0.41	0.42	0.07	0.31	0.07	0.22	0.03

*$p<0.05$, **$p<0.001$

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Table 4.4   Multi-level Regression Analysis of Leader Tactics on Idea Creativity (N=220 ideas)

Dependent Variable: Idea Creativity	
Independent Variables	β (S.E.)
No Leader Tactics	-reference-
Meeting Ground Rules	0.10 (0.19)
Brainstorming Time	0.19 (0.03) *
Group Reflection on Process	0.03 (0.17)
Covariates – individual	
Professional Role	0.09 (0.07) *
Organizational Tenure	-0.21 (0.04) **
Gender	-0.03 (0.18)
Covariates – center level	
Percentage patients Uninsured	-0.92 (0.89)
Number of visits per FTE	-0.01 (0.01)
Psychological Safety	0.64 (0.07) **
AIC statistic (goodness-of-fit)	252.23

*$p<0.05$, **$p<0.001$

Table 4.5   Cox Proportional Hazards Models of Leader Tactics and Idea Evolution (N=220 ideas)

Dependent Variable: Idea Evolution Typology			
	Plug and Play	Slow Burn	Iterate and Generate
Independent Variables	Odds Ratio (CI)	Odds Ratio (CI)	Odds Ratio (CI)
No Leader Tactics	-reference-	-reference-	-reference-
Meeting Ground Rules	0.97 (0.25-2.18)	0.49 (0.33-1.73)	0.67 (0.54-1.59)
Brainstorming Time	1.24 (1.12-1.46) *	0.66 (0.44-1.18)	0.98 (0.83-1.94)
Group Reflection on Process	0.71 (0.24-1.25)	0.73 (0.49-1.21)	1.73 (1.27-1.96) *
Covariates – individual			
Professional Role	0.46 (0.18-0.75)	0.84 (0.67-1.05)	0.91 (0.28-1.94)
Organizational Tenure	1.14 (0.88-1.47)	1.04 (0.89-1.13)	1.78 (1.23-2.54) **
Gender	0.27 (0.07-0.96)*	1.16 (0.76-1.77)	0.08 (0.32-1.54)
Covariates – center level			
Percentage patients Uninsured	0.02 (0.01-1.54)	0.01 (0.00-0.02) *	0.12 (0.09-1.01)
Number of visits per FTE	1.02 (1.01-1.20) **	1.01 (0.87-1.02) *	0.86 (0.74-1.01)
Psychological Safety	0.88 (0.50-1.54)	0.63 (0.71-1.3)	1.19 (0.74-2.95)
AIC statistic (goodness-of-fit)	268.11	149.51	131.88

*$p<0.05$, **$p<0.001$

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The results of the analyses of the association between leader tactic and idea implementation are presented in Table 4.6. Group reflection on process was positively associated with idea implementation. Compared to no leader tactics, group reflection on process significantly increased the hazard ratio of idea implementation by a factor of 1.89. Compared to no leader tactics, brainstorming and meeting ground rules were each not significantly associated with idea implementation.

Table 4.6   Cox Proportional Hazards Model of Leader Tactics and Idea Implementation (N=220 ideas)

Dependent Variable: Idea Implementation	
Independent Variables	Hazard Ratio (CI)
No Leader Tactics	-reference-
Meeting Ground Rules	0.76 (0.41-1.43)
Brainstorming Time	1.09 (0.66-1.82)
Group Reflection on Process	1.89 (1.01-2.16) *
Covariates – staff level	
Professional Role	0.68 (0.49-0.95) *
Organizational Tenure	1.14 (1.01-1.28) **
Gender	0.80 (0.54-1.20)
Covariates – center level	
Percentage patients Uninsured	0.06 (0.02-1.85)
Number of visits per FTE	1.10 (1.00-1.14) **
Psychological Safety	1.04 (1.01-1.39) *
AIC statistic (goodness-of-fit)	248.67

*$p<0.05$, **$p<0.001$

4.5   Discussion

Our findings suggest that leader tactics are associated with the creativity, evolution and implementation of ideas generated in a quality improvement group. Furthermore, they suggest that the tactics studied have different effects on idea creativity, evolution, and implementation. Certain tactics may be more appropriate for particular kinds of challenges, and may be more effective under certain circumstances. We discuss these potential trade-offs below.

The finding that brainstorming was positively associated with idea creativity and "Plug and Play" idea evolution suggests that this tactic promotes more creative, quickly implemented, low-engagement ideas. The association with idea creativity is consistent with several empirical studies that link brainstorming with high creative performance in organizations (Sutton & Hargadon, 1996; Taggar, 2002), and extends past research by showing that this tactic is relatively more effective than other tactics in promoting idea creativity. Our idea evolution and implementation results show that more creative ideas may also be implemented quickly, and with low-engagement on the idea's content, but with a focus on the logistics of implementation. This result contrasts with our finding in Chapter 2 that on average, high-creativity ideas are less likely to be implemented. The current finding suggests that brainstorming may aide in "protecting" more creative ideas, and facilitating their implementation.

Brainstorming may promote more creative, quickly implemented, low-engagement ideas for a few reasons. First, the brainstorming directive to generate creative ideas rapidly may promote the expansive, divergent thinking needed for idea creativity (Sutton & Hargadon, 1996). Second, the rapid-fire nature of voicing ideas during

brainstorming, and the suspension of criticism and judgment (Taggar, 2002), may protect high-creativity ideas, and promote rapid implementation. Finally, the fast-paced rhythm of participation in brainstorming may favor rapid decision making and discussions on logistics (Puccio, 2010), as opposed to the more reflective conversations that may favor the engaged evaluation of an idea's characteristics.

Group reflection on process was positively associated with idea implementation, and "Iterate and Generate" idea evolution, which promotes slower implemented, high-engagement ideas, but not idea creativity. We could find no empirical study that tests the effect of this tactic on our dependent variables. However, we found many examples of existing theory that suggests that groups that deliberately focus and reflect on their process may generate incrementally creative ideas, longer periods of discussion, and more discussion of the idea itself. Sawyer (2010) suggests that incremental creativity may occur in these groups when the emphasis is on collaborative identity, equal dialogue, and joint output; incremental creativity promotes group stability. Fleming et al. (2007) theorizes that less creative ideas may sustain more discussion over time as they are less likely to be criticized or judged as unrealistic. Finally, Terwiesch and Xu (2008) suggests that a key benefit of involving groups in creativity is high-engagement, and the resulting buy-in that may occur during the process, rather than the creativity of the ideas themselves. Our work extends this past work by providing evidence of these proposed theoretical effects, and in a single study.

We conjecture that group reflection on process does not promote idea creativity (compared to no leader tactics), but may promote slower implemented, high-engagement ideas for a number of reasons. Group reflection on process is the highest intensity leader

tactic, requiring self-awareness from individuals, commitment to sharing feedback on group members, and dedication to a shared group identity, over an 18-month period (Harvey, 2014). This intense effort and awareness of "group-ness" may promote prolonged discussion (facilitating slower implementation), and the critical thinking required to evaluate and discuss an idea's characteristics (facilitating high-engagement on idea content) (Sawyer, 2010). Slower idea implementation and high-engagement on idea content may favor a more analytical approach from the group; which may promote the thinking and effort required for successful idea implementation, but may also quash ideas deemed too creative from being implemented (Harvey & Kou, 2013). It is possible that many organizational problems do not need creative solutions to be effectively addressed; that is, certain problems may be more suited to longer term, committed problem solving with ideas with other characteristics (e.g., feasible, useful, fit with external environment, etc.) (Harvey, 2014; Harvey & Kou, 2013).

There was not a significant association between meeting ground rules and idea creativity, evolution, or implementation (compared to no leader tactics) Establishing ground rules in a meeting may have other functions, however. They may create a sense of inclusivity in the team, and may foster psychological safety, which has been shown to be related to creative performance in teams (Harvey & Kou, 2013; Puccio, 2010). Meeting ground rules may be especially useful in settings where the status of participating professional staff varies and members would benefit from the reassurance that their contribution are valuable (Sawyer, 2010). It is possible that since the ground rules were established in the first meeting and the study period was 18 months long, that any effects of meeting ground rules dissipated over the course of the study.

Although this study found a relationship between leader tactics and staff creativity, we cannot determine whether the relationship was causal. It is possible that these leader tactics are indicative of center-level cultural dynamics. We tried to address this possibility by controlling for center characteristics but we may not have captured important confounding factors. Further, although only one leader tactic was listed in the meeting transcripts per center, it is possible that leaders used other tactics that were not recorded in the meeting transcripts. Additionally, these findings might not generalize to other types of health care organizations nor to all primary care clinics because of differences between the focal clinics and other primary care clinics.

Nevertheless, this study suggests that group leaders might wish to modify their leadership tactics, depending on their priorities for the group. Our results also suggest that in addition to studying idea generation and implementation, assessing the evolution of ideas may provide further insights into group process (Anderson et al., 2014). Specifically, that implemented ideas evolve according to their speed of implementation and engagement on idea content provides creativity scholars with characteristics to describe what has previously been referred to as an "unknowable" phase between idea generation and implementation (Harvey, 2014). Knowing ideas evolve according to specific types is also helpful for leaders who seek certain group outcomes yet do not know how time and engagement affect their likelihood. Leaders who seek creative ideas, for example, may be best served by rapidly implemented and low-engagement idea evolution, whereas leaders who seek useful solutions to complex problems may be best served by slow implemented and high-engagement idea evolution (Greenhalgh et al., 2004). Overall, this work suggests that the micro-processes of leadership (i.e., leader

tactics) are an important factor to consider when researching multiple outcomes associated with staff creativity – their idea creativity, evolution and implementation.

4.6   Practice Implications

Our results suggest that brainstorming and group reflection are associated with idea creativity, evolution, and implementation. Since the value of these different outcomes may vary in different groups, we discuss below the implications of our results for the selection of leader tactics.

For some organizational challenges, the creativity imperative is urgent: existing approaches are insufficient to address the challenge, and rapidly implemented, creative ideas may be necessary for improvement (Amabile et al., 2004). In such cases, preventing disruption to the status-quo and the stability of groups in the organization may be less important than the need for change (Gilson et al., 2005). Under these circumstances, leaders in the organization might consider employing brainstorming as a tactic. Our results suggest that brainstorming promotes high-creativity ideas that are also rapidly implemented, which may be desirable if the leader is results-driven, but less attractive to the leader who values engagement with and evaluation of the ideas themselves (Harvey & Kou, 2013).

Not all organizational challenges require creative solutions, however. Many challenges may benefit from incremental changes rather than more dramatic, creative solutions, and may be better addressed with deliberate problem solving over a longer period of time (Perry-Smith & Shalley, 2003; Unsworth, 2001). In such cases, promoting commitment over longer periods of time for idea implementation, and fostering

engagement, discussion and evaluation of the idea itself may be more important than the need for swift change (Unsworth, 2001; Van de Van et al., 1999). Under these circumstances, leaders in the organization might consider employing group reflection on process as a tactic. This tactic tends to emphasize group process over rapid, disruptive change, which may be desirable for leaders facing challenges that require a more analytical approach (West, 2002).

4.7   Conclusion

This study contributes to our understanding of how leaders in organizations can facilitate change in organizations that strive to be more creative (Amabile et al., 2004). As the leader tactics studied were not identical in terms of their effects on idea creativity, evolution and implementation, our findings suggest that certain tactics may be more appropriate for particular kinds of challenges, and may be more effective under certain circumstances. Specifically, brainstorming may aide leaders seeking more creative, rapidly implemented, low-engagement ideas, while group reflection on process may not foster idea creativity, but may promote slowly implemented, high-engagement ideas. This work suggests that leaders should employ the tactic most appropriate to their organizational goals for idea creativity, evolution, and implementation.

Chapter 5

Conclusion

Eliciting and evaluating new ideas to improve the quality of health care are important processes for health care organizations, as current approaches to quality improvement are insufficient to close the gap between current and expected performance (Agency for Healthcare Research and Quality, 2015; Institute of Medicine, 2001). Health care staff (e.g., primary care providers, nurses and medical assistants) can be an important source of creative (i.e., novel and useful) ideas (Asch et al., 2014), yet I know of no published empirical work on creativity in this context.

This dissertation comprises three papers. The first part addressed questions about creativity, the generation of novel and useful ideas: first, how the implementation of creative ideas affects patient health care experiences, the relationship between idea creativity and implementation, and the staff characteristics that moderate this relationship. The second part examined the antecedents of staff creativity. The third part assessed which tactics used by quality improvement leaders are associated with idea creativity, evolution, and implementation in their groups.

I found that the implementation of creative ideas is positively associated with better patient care experiences, that idea creativity is negatively associated with idea implementation, and that staff with more collaborative relationships, longer organizational tenure, and a more central position in the organization's social network have increased odds that their creative ideas are implemented. I also found that job dissatisfaction, shorter organizational tenure, and allied health professional roles (behavioral health provider and medical assistant, each compared to primary care

provider) are associated with expressing more creative ideas in quality improvement groups. Finally, the leader tactic of brainstorming is associated with groups having more creative, rapidly implemented, low-engagement ideas. Thus, brainstorming might be an effective tactic for leaders seeking disruptive change, while the tactic of group reflection on process is associated with slower implemented, high-engagement ideas, which might help leaders elicit well-considered and deliberated solutions.

I develop a conceptual framework for understanding creativity in health care organizations based on these findings (Figure 5.1). Staff dynamics are key to this framework: staff factors serve as antecedents to idea creativity and moderators to idea implementation, and leader tactics affect idea creativity, evolution, and implementation. Staff experiences of work and care delivery are also key, as they inform the content of ideas, which were frequently focused on improving routine care activities. The potential benefits of creative ideas for stimulating improvements in the quality of health care have been discussed in the quality improvement literature, but there are relatively few empirical studies about the development and impact of creative ideas (Asch et al., 2014; Plsek, 1999). The conceptual framework that emerged from these studies may help scholars and health care professionals improve their understanding of health care innovation and how better to facilitate the expression and implementation of creative ideas.

Figure 5.1 Conceptual Framework
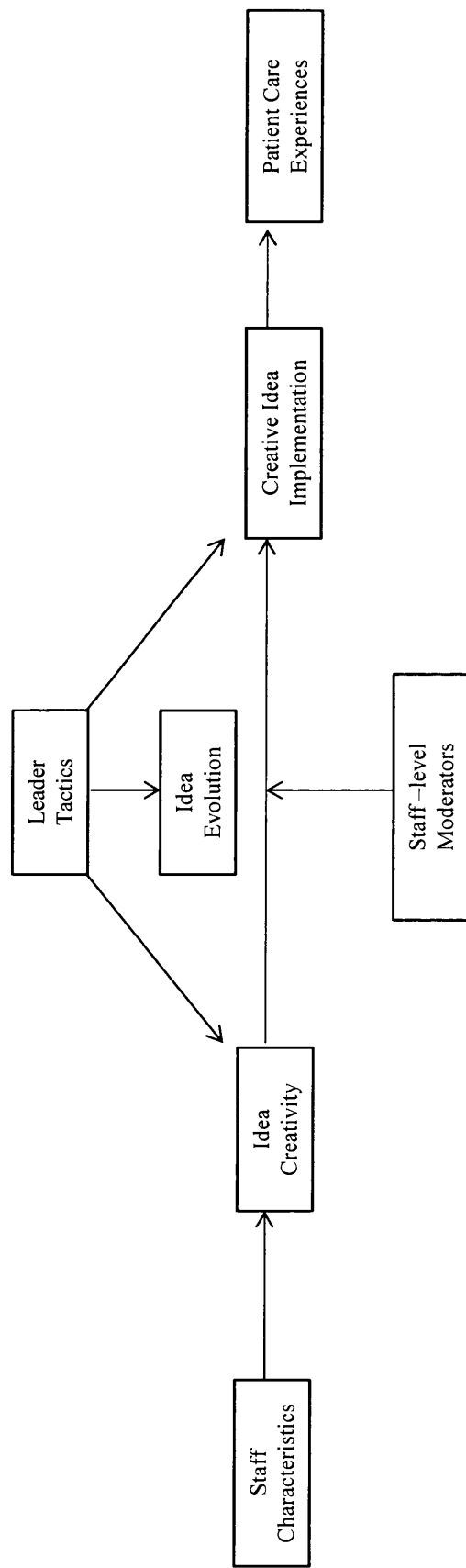
The findings of the first two parts of this research (Chapters 2 and 3) shows that the generation and implementation of creative ideas are different processes, with each process affected by different staff characteristics and behaviors. Creative idea generation is associated with job dissatisfaction, shorter organizational tenure, and the allied health professional roles. These characteristics describe staff who have been historically less active in quality improvement, and who might not otherwise assume that their participation is expected or valuable (Needleman et al., 2016). It is possible that the perspective of such individuals that they do not have a central role in the organization bolsters their idea creativity. In contrast, the likelihood of creative ideas being implemented is enhanced by more collaborative relationships, longer organizational tenure, and a more centralized position in the organization's social network. These characteristics describe staff with more legitimacy in the organization, and who might be more active in quality improvement (Ferlie et al., 2005). As health care organizations strive to maximize creative idea generation and implementation, planning quality improvement groups' that include staff with both types of characteristics could help them better meet their goals.

A consistent theme across all findings is that fostering creativity in health care organizations requires focused, concerted effort, often in the face of countervailing pressures. Potential barriers to creative idea generation in health care include demanding workloads, a culture focused on risk reduction and standardization, and a status hierarchy that reduces the propensity to speak up for low status staff (Freidson, 1970b; Starr, 1982). We found a negative association between job satisfaction and idea creativity, which suggests that job-induced frustration may heighten motivation to allocate time and effort

to problems that may in turn lead to breakthroughs (Amabile et al., 2005). We also found that legitimizing staff characteristics are needed to moderate the low likelihood of creative idea implementation. This suggests that ensuring legitimization of creative idea implementation is important for quality improvement efforts. I found that tactics leaders use in quality improvement groups outperform not using any leader tactic for every aspect of the creative process. Organizations that strive to be more creative should therefore invest in focused efforts to support all aspects of the creative process.

Finally, while these findings all suggest that the implementation of creative ideas can lead to improvements in patient care experiences in primary care settings, there may be quality improvement problems that benefit from less creative ideas. The third paper revealed a pattern of idea evolution of slower implemented, high-engagement ideas, which may be appropriate for problems that benefit from well-considered, deliberated solutions rather than the rapidly implemented, low-engagement, high-creativity ideas that support disruptive change. Promoting creativity also has trade-offs of disruptions and potential risks of failure, so it is important to consider when a quality improvement problem is best addressed by high-creativity ideas or when lower creativity ideas are more desirable (Harvey & Kou, 2013).

Understanding how creative ideas may improve the organization and delivery of care could inform ongoing efforts to discover and evaluate new ideas to improve the quality of health care provided (Plsek, 1999). This dissertation contributes to health services and organizational research by elucidating how creativity in health care organizations is fostered and facilitated, and how it affects health care quality.

References

Agency for Healthcare Research and Quality. (2015). *The CAHPS Ambulatory Care Improvement Guide: Practical Strategies for Improving Patient Experience.* Retrieved from Rockville, MD: http://www.ahrq.gov/cahps/quality-improvement/improvement-guide/improvement-guide.html

Agency for Healthcare Research and Quality. (2016, March 2016). Clinician & Group. Retrieved from http://www.ahrq.gov/cahps/surveys-guidance/cg/index.html

Amabile, T. (1982). Social-Psychology of Creativity - a Consensual Assessment Technique. *Journal of Personality and Social Psychology, 43*(5), 997-1013. doi:Doi 10.1037/0022-3514.43.5.997

Amabile, T. (1988). A Model of Creativity and Innovation in Organizations. *Research in Organizational Behavior, 10*, 123-167.

Amabile, T., Barsade, S. G., Mueller, J. S., & Staw, B. M. (2005). Affect and Creativity at Work. *Administrative Science Quarterly, 50*, 367-403.

Amabile, T., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *Academy of Management Journal, 39*(5), 1154-1184.

Amabile, T., Schatzel, E., Moneta, G., & Kramer, S. (2004). Leader behaviors and the work environment for creativity: Perceived leader support. *The Leadership Quarterly, 15*(1), 5-32.

Anderson, N., & Gasteiger, R. M. (2007). Helping creativity and innovation thrive in organizations: functional and dysfunctional perspectives. *Research Companion to the Dysfunctional Workplace: Management Challenges and Symptoms*, 422-440.

Anderson, N., Potocnik, K., & Zhou, J. (2014). Innovation and Creativity in Organizations: A State-of-the-Science Review, Prospective Commentary, and Guiding Framework. *Journal of Management, 40*(5), 1297-1333. doi:Doi 10.1177/0149206314527128

Anhang Price, R., Elliott, M. N., Cleary, P. D., Zaslavsky, A. M., & Hays, R. D. (2014). Should Health Care Providers Be Accountable for Patients' Care Experiences? *Journal of general internal medicine, 30*(2), 253-256.

Anhang Price, R., Elliott, M. N., Zaslavsky, A. M., Hays, R. D., Lehrman, W. G., Rybowski, L., . . . Cleary, P. D. (2014). Examining the role of patient experience surveys in measuring health care quality. *Medical care research and review : MCRR, 71*(5), 522-554.

Asch, D., Terwiesch, C., Mahoney, K., & Rosin, R. (2014). Insourcing Health Care Innovation. *The New England journal of medicine, 370*(19).

Axtell, C. M., Holman, D. J., Unsworth, K. L., Wall, T. D., & Waterson, P. E. (2000). Shopfloor innovation: Facilitating the suggestion and implementation of ideas. *Journal of Occupational and Organizational Psychology, 73*, 265-285.

Baer, M. (2012). Putting Creativity to Work: The Implementation of Creative Ideas in Organizations. *Academy of Management Journal, 55*(5), 1102-1119. doi:Doi 10.5465/Amj.2009.0470

Baron, J. N., Davis-Blake, A., & Bielby, W. T. (1986). The structure of opportunity: How promotion ladders vary within and among organizations. *Administrative Science Quarterly, 31*, 248-273.

Batalden, P. B., & Davidoff, F. (2007). What is "quality improvement" and how can it transform healthcare? *Qual Saf Health Care, 16*, 2-3.

Bates, D. W., Sheikh, A., & Asch, D. A. (2017). Innovative Environments in Health Care: Where and How New Approaches to Care Are Succeeding *Health Affairs, 3*(3), 400-407.

Battilana, J. (2011). The Enabling Role of Social Position in Diverging from the Institutional Status Quo: Evidence from the UK National Health Service. *Organization Science, 22*(4), 817-834.

Berg, J. (2016). Balancing on the Creative Highwire: Forecasting the Success of Novel Ideas in Organizations. *Administrative Science Quarterly, March 25*.

Binnewies, C., Ohly, S., & Sonnentag, S. (2007). Taking personal initiative and communicating about ideas: Why its important for the creative process and idea creativity. *European Journal of Work and Organizational Psychology, 16*(4), 432-455.

Boulgarides, J., & Cohen, W. (2001). Leadership Style vs. Leadership Tactics. *The Journal of Applied Management and Entrepreneurship, 6*(1), 59-73.

Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology, 110*(2), 349-399. doi:Doi 10.1086/421787

Campbell, J., Quincy, C., Osserman, J., & Pedersen, O. (2013). Coding In-depth Semistructured Interviews: Problems of Unitization and Intercoder Reliability and Agreement. *Sociological Methods & Research, 42*(3), 294-320.

Chaffin, D. R., Heidl, J. R., Hollenbeck, M., Howe, A., Yu, C., & Voorhees, R. (2015). The Promise and Perils of Wearable Sensors in Organizational Research. *Organizational Research Methods.*

Chassin, M., & Loeb, J. (2011). The Ongoing Quality Improvement Journey: Next Stop, High Reliability. *Health Affairs, 30*(4), 559-568.

Chatterjee, P., Tsai, T. C., & Jha, A. K. (2015). Delivering Value by Focusing on Patient Experience. *American Journal of Managed Care, 21*(10), 735-737.

Chuang, E., Jason, K., & Morgan, J. C. (2011). Implementing complex innovations: Factors influencing middle manager support. *Health Care Management Review, October-December*, 369-379.

Cleary, P. D. (2016). Evolving Concepts of Patient-Centered Care and the Assessment of Patient Care Experiences: Optimism and Opposition. *Journal of Health Politics, Policy and Law, 41*(4), 675-696.

Cosgrove, D. M., Fisher, M., Gabow, P., Gottlieb, G., Halvorson, G. C., & James, B. C. (2013). Ten strategies to lower costs, improve quality, and engage patients: the view from leading health system CEOs. *Health Affairs, 32*(2), 321-217.

Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci, 4*, 50. doi:10.1186/1748-5908-4-50

Darby, C., Crofton, C., & Clancy, C. M. (2006). Consumer Assessment of Health Providers and Systems (CAHPS): evolving to meet stakeholder needs. *American journal of medical quality : the official journal of the American College of Medical Quality, 21*(2), 144-147.

Davis, K., Stremikis, K., Squires, D., & Schoen, C. (2014). *Mirror, Mirror on the Wall: How the Performance of the U.S. Health Care System Compares Internationally, 2014 Update*. Retrieved from

Deci, E., Connell, J., & Ryan, R. (1989). Self-Determination in a Work Organization. *Journal of Applied Psychology, 74*(4), 580-590.

Doyle, C., Lennox, L., & Bell, D. (2013). A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. *BMJ open, 3*(1).

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*(2), 350-383. doi:Doi 10.2307/2666999

Emanuel, E. (2014). *Reinventing American Health Care: How the Affordable Care Act Will Improve Our Terribly Complex, Grossly Inefficient, Error Prone System* New York: PublicAffairs.

Ferlie, E., Fitzgerald, L., Wood, M., & Hawkins, C. (2005). The nonspread of innovations: The mediating role of professionals. *Academy of Management Journal, 48*(1), 117-134.

Fleming, L., Mingo, S., Chen, D. . (2007). Collaborative brokerage, generative creativity and creative success *Administrative Science Quarterly, 52*(3), 32.

Freidson, E. (1970a). *Profession of medicine: a study of the sociology of applied knowledge*. New York Harper and Row

Freidson, E. (1970b). *Professional Dominance: The Social Structure of Medical Care*. New York: Atherton.

Frese, M., Teng, E., & Wijnen, C. (1999). Helping to improve suggestion systems: predictors of making suggestions in companies. *Journal of Organizational Behavior, 20*(1139-1155).

Gautam, K. (2001). Conceptual blockbusters: creative idea generation techniques for health administrators. *Hospital topics, 79*(4), 19-25. doi:10.1080/00185860109597914

George, J. M. (2007). Chapter 9: Creativity in Organizations *The Academy of Management Annals* (Vol. 1, pp. 439-477).

George, J. M., & Zhou, J. (2002). Understanding when bad moods foster creativity and good ones don't: The role of context and clarity of feelings. *Journal of Applied Psychology, 87*(687-697).

Gilmartin, M. (1999). Creativity: The Fuel of Innovation. *Nurs Adm Q, 23*(2), 1-8.

Gilson, L. L., Mathieu, J. E., Shalley, S. E., & Ruddy, T. M. (2005). Creativity and Standardization: Complementary or Conflicting Drivers of Team Effectiveness? *The Academy of Management Journal, 48*(3), 521-531.

Gleeson, H., Calderon, A., Swami, V., Deighton, J., Wolpert, M., & Edbrooke-Childs, J. (2016). Systematic review of approaches to using patient experience data for quality improvement in healthcare settings. *BMJ open, 6*, 1-11.

Granovetter, M. S. (1973). The Strength of Weak Ties. *American Journal of Sociology, 78*(6), 1360-1380.

Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *Milbank Quarterly, 82*(4), 581-629.

Harvey, S. (2014). Creative Synthesis: Exploring the process of extraordinary group creativity. *Academy of Management Review, 39*(3), 324-343.

Harvey, S., & Kou, C.-Y. (2013). Collective Engagement in Creative Tasks: The Role of Evaluation in the Creative Process in Groups. *Administrative Science Quarterly, 58*(3), 346-386.

Hedeker, D., & Gibbons, R. (2006). *Longitudinal Data Analysis* New Jersey: John Wiley and Sons, Inc. .

Hirst, G., Knippenberg, D., & Zhou, J. (2009). A Cross-Level Perspective on Employee Creativity: Goal Orientation, Team Learning Behavior, and Individual Creativity. *The Academy of Management Journal, 52*(2), 280-293.

Ibarra, H. (1993). Network Centrality, Power, and Innovation Involvement: Determinants of Technical and Administrative Roles. *Academy of Management Journal, 36*(3), 471-501.

Institute of Medicine. (2001). *Crossing the Quality Chasm: A New Health System for the 21st Century* Washington DC New Academy Press

Institute of Medicine. (2012). *Best care at lower cost: the path to continuously learning health care in America.* Washington (DC): National Academies Press.

Isella, L., Romano, M., & Barrat, A. (2011). Close encounters in a pediatric ward: Measuring face-to-face proximity and mixing patterns with wearable sensors. *PLoS One, 6.*

Johns, G. (2006). The essential impact of context on organizational behavior. *Academy of Management Review, 31*(2), 386-408.

Jung, D. (2001). Transformational and Transactional Leadership and Their Effects on Creativity in Groups. *Creativity Research Journal, 13*(2), 185-195.

Jung, D., Chow, C., & Wu, A. (2003). The role of transformational leadership in enhancing organizational information: Hypotheses and some preliminary findings. *The Leadership Quarterly, 14*, 525-544.

Kenagy, J. W., Berwick, D. M., & Shore, M. F. (1999). Service quality in health care. *JAMA, 281*(7), 661-665.

Kessel, M., Kratzer, J., & Schultz, C. (2012). Psychological Safety, Knowledge Sharing, and Creative Performance in Healthcare Teams. *Creativity and Innovation Management, 21*(2), 147-157. doi:Doi 10.1111/J.1467-8691.2012.00635.X

Kitson, A. L., Rycroft-Malone, J., Harvey, G., McCormack, B., Seers, K., & Titchen, A. (2008). Evaluating the successful implementation of evidence into practice using the PARiHS framework: theoretical and practical challenges *Implementation Science, 3*(1), 1-12.

Klein, K., & Knight, A. P. (2005). Innovation implementation: Overcoming the challenge. *Current Directions in Psychological Science, 14*(5), 243-246.

Klein, K., & Sorra, J. (1996). The challenge of implementaiton *Academy of Management Review, 21*, 1055-1080.

Klein, K., Ziegert, J., Knight, A., & Xiao, Y. (2006). Dynamic delegation: Hierarchical, shared and deindividualized leadership in extreme action teams. *Administrative Science Quarterly, 51*(4), 590-621.

Lazarus, I. R., & Fell, D. (2011). Innovation or stagnation? Crossing the creativity gap in healthcare. *Journal of healthcare management / American College of Healthcare Executives, 56*(6), 363-367.

100

Licuanan, B. F., Dailey, L. R., & Mumford, M. D. (2007). Idea evaluation: Error in evaluating highly original ideas. *Journal of Creative Behavior, 41*(1), 1-27.

Lin, D. Y., & Wei, L. J. (1989). The Robust Inference for the Cox Proportional Hazards Model. *Journal of the American Statistical Association, 84*(408), 1074-1078.

Littell, R., Stroup, W., Milliken, G., Wolfinger, R., & Schabenberger, O. (2006). *SAS for Mixed Models, Second Edition*

Marsden, P. V. (2002). Egocentric and sociocentric measures of network centrality. *Social Networks, 24*(4), 407-422.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis*. London: Sage Publications.

Millar, R. (2013). Framing quality improvement tools and techniques in healthcare the case of improvement leaders' guides. *Journal of health organization and management, 27*(2), 209-224.

Moorman, C., & Miner, A. (1997). The Impact of Organizational Memory on New Product Performance and Creativity. *Journal of Marketing Research, 34*(1), 91-106.

Mueller, J. S., Melwani, S., & Gonzalo, J. C. (2012). The bias against creativity: Why people desire but reject creative ideas. *Psychological Science, 23*, 13-17.

National Committee for Quality Assurance. (2015). Patient-Centered Medical Home Recognition Retrieved from http://www.ncqa.org/programs/recognition/practices/patient-centered-medical-home-pcmh

Needleman, J., Pearson, M. L., Upenieks, V. V., Yee, T., Wolstein, J., & Parkerton, M. (2016). Engaging Frontline Staff in Performance Improvement: The American Organization of Nurse Executives Implementation of Transforming Care at the Bedside Collaborative. *The Joint Commission Journal on Quality and Patient Safety, 42*(2), 61-74.

Nelson, K., Pitaro, M., Tzellas, A., & Lum, A. (2010). Transforming The Role of Medical Assistants in Chronic Disease Management. *Health Affairs, 29*(5), 963-965.

101

Nembhard, I., Buta, E., Lee, Y.S.H, Anderson, D., Zlateva, I., and Cleary, P.D. 2017, The Effect of a Nurse Care Coordination Program on Patient Care Experience. Manuscript submitted for publication.

Nembhard, I. M., & Edmondson, A. C. (2006). Making It Safe: The Effects of Leader Inclusiveness and Professional Status on Psychological Safety and Improvement Efforts in Health Care Teams. *Journal of Organizational Behavior, 27*, 941-966. doi:Doi 10.1007/978-90-481-2605-7_5

Neter, J., Wassermann, W., & Kutner, M. (1989). *Applied Linear Regression Models* New York: Wiley.

Ng, T. W. H., & Feldman, D. C. (2010). Organizational Tenure and Job Performance. *Journal of Management, 36*(5), 1220-1250.

O'Reilly, C. A. (1991). Organizational Behavior: Where we've been, where we are going. *Annual Review of Psychology, 42*, 427-458.

Olguin Olguin, D., Gloor, P., & Pentland, A. P. (2009). *Capturing Individual and Group Behavior with Wearable Sensors* AAAI Spring Symposium on Human Behavior Modeling

Parker, L., Kirchner, J., Bonner, L., Fickel, J., Ritchie, M., Simons, C., & Yano, E. (2008). Creating a quality-improvement dialogue: Utilizing knowledge from frontline staff, managers, and experts to foster health care quality improvement. *Quality Health Research, OnlineFirst*

Parker, L. E., De Pillis, E., Altschuler, A., Rubenstein, L. V., & Meredith, L. S. (2007). Balancing Participation and Expertise: A Comparison of Locally and Centrally Managed Health Care Quality Improvement Within Primary Care Practices. *Qualitative Health Research, 17*(9), 1268-1279.

Perry-Smith, J. E., & Shalley, C. E. (2003). The social side of creativity: A static and dynamic social network perspective. *Academy of Management Review, 28*(1), 89-106.

Pincus, H., Houtsinger, J., Bachman, J., & Keyser, D. (2005). Depression in Primary Care: Bringing Behavioral Health Care Into The Mainstream. *Health Affairs, 24*(1), 271-276.

Plsek, P. (1999). Innovating thinking for the improvement of medical systems. *Annals of internal medicine, 131*(6), 438-444.

Plsek, P., & Greenhalgh, T. (2001). The challenge of complexity in health care. *British Medical Journal, 323*, 625-628.

Plucker, J. a. M., Matthew. (2010). Assessment of Creativity. In J. a. S. Kaufman, R. (Ed.), *The Cambridge Handbook of Creativity*: Cambridge University Press

Provonost, P., Needham, D., Berenholtz, S., Sinopoli, D., Chu, H., Cosgrove, S., . . . Goeschel, C. (2006). An intervention to decrease catheter-related bloodstream infections in the ICU. *New England Journal of Medicine, 355*(26), 2725-2732.

Puccio, G. a. C., J. . (2010). Organizational Creativity: A Systems Approach. In J. a. S. Kaufman, R. (Ed.), *The Cambridge Handbook of Creativity*: Cambridge University Press

Rogers, E. (2003). *Diffusion of innovations*. New York: Free Press.

Rosen, M. A., Dietz, A. S., Yang, T., Priebe, C., & Provonost, P. (2015). An integrative framework for sensor-based measurement of teamwork in healthcare. *J Am Med Inform Assoc, 22*, 11-18.

Sawyer, R. (2010). Individual and Group Creativity. In J. a. S. Kaufman, R. (Ed.), *The Cambridge Handbook of Creativity*: Cambridge Unviersity Press

Sawyer, R. K. (2012). *Explaining Creativity* (Second Edition ed. Vol. Second Edition). New York: Oxford University Press.

Schultz, C., Schreyoegg, J., & von Reitzenstein, C. (2013). The moderating role of internal and external resources on the performance effect of multitasking: Evidence from the R&D performance of surgeons. *Research Policy, 42*(8), 1356-1365.

Scott, E. L., Shu, P., & Lubynsky, R. (2015). *Are "Better" Ideas More Likely to Succeed? An Empirical Analysis of Startup Evaluation* Harvard Business School Harvard Business School Working Papers

Scott, G., Leritz, L., & Mumford, M. (2004). The effectiveness of creativity training: A quantitative review. *Creative Research Journal, 16*(4), 361-388.

Shaller, D. (2012). *Forces driving implementation of the CAHPS Clinician & Group Survey*. Retrieved from Washington, DC:

Shalley, C. E., & Perry-Smith, J. E. (2008). The Emergence of Team Creative Cognition: The Role of Diverse Outside Ties, Sociocognitive Network Centrality, and Team Evolution. *Strategic Entrepreneurship Journal, 2*(1), 23-41. doi:Doi 10.1002/Sej.40

Shalley, C. E., Zhou, J., & Oldham, G. R. (2004). The effects of personal and contextual characteristics on creativity: Where should we go from here? *Journal of Management, 30*(6), 933-958. doi:Doi 10.1016/J.Jm.2004.06.007

Shin, S., & Zhou, J. (2007). When is educational specialization heterogeneity related to creativity in research and development teams? Transformational leadership as a moderator. *Journal of Applied Psychology, 92*(6), 1709-1721.

Shortell, S. M., Bennett, C., & Byck, G. (1998). Assessing the impact of continuous quality improvement on clinical practice: What it will take to accelerate progress. *Milbank Quarterly, 76*(4), 593-624.

Starr, P. (1982). *The Social Transformation of American Medicine* New York.

Staw, B. M. (1984). Organizational Behavior: A Review and Reformulations of the Field's Outcome Variables. *Annual Review of Psychology, 35*, 627-666.

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Techniques and procedures for developing grounded theory*: Sage Publications.

Sutton, R. I., & Hargadon, A. B. (1996). Brainstorming Groups in Context: Effectiveness in a Product Design Firm. *Administrative Science Quarterly, 41*(4), 685-718.

Taggar, S. (2002). Individual creativity and group ability to utilize individual creative resources: A multilevel model. *Academy of Management Journal, 45*(2), 315-330.

Tefera, L., Lehrman, W. G., & Conway, P. (2016). Measurement of the Patient Experience: Clarifying Facts, Myths, and Approaches. *JAMA, 315*(20), 2167-2168.

Terwiesch, C., Mehta, S., & Volpp, K. (2013). Innovating in health delivery: The Penn medicine innovation tournament *Healthcare, 1*, 37-41.

Terwiesch, C., & Xu, Y. (2008). Innovation Contests, Open Innovation, and Multiagent Problem Solving. *Management Science, 54*(9), 1529-1543.

Unsworth, K. (2001). Unpacking Creativity. *Academy of Management Review, 26*(2), 289-297-297. doi:10.5465/amr.2001.4378025

Van de Van, A. H., Polley, D. E., Garud, R., & Venkataraman, S. (1999). *The innovation journey*. Oxford: Oxford University Press.

Waber, B. (2013). *People Analytics: How Sensing Technology Will Transform Business and What It Tells Us About the New World of Work* London.

Wang, C., Rodan, S., Fruin, M., & Xu, X. (2013). Knowledge Networks, Collaboration Networks, and Exploratory Innovation. *Academy of Management Journal, 57*(2), 484-514.

Wasserman, S., & Faust, K. (1994). *Social Network Analysis: Methods and Applications Vol. 25*: Cambridge University Press.

West, M. (2002). Sparkling Fountains or Stagnant Ponds: An Integrative Model of Creativity and Innovation Implementation in Work Groups. *Applied Psychology: An International Review, 50*(3), 355-424.

West, M., & Wallace, M. (1991). Innovation in Health-Care Teams. *European Journal of Social Psychology, 21*(4), 303-315. doi:Doi 10.1002/Ejsp.2420210404

Wolf, J., Niederhauser, V., Marshburn, D. and LaVela, S. . (2014). Defining Patient Experience. *Patient Experience Journal, 1*(1), 12.

Ye, J., Marinova, D., & Singh, J. (2012). Bottom-up learning in marketing frontlines: conceptualization, processes, and consequences. *J. of the Acad. Mark. Sci., 40*, 821-844.

Yin, R. K. (2003). *Case study research: Design and methods*. Thousand Oaks, CA: Sage Publication.

Zhou, J., & George, J. (2001). When job dissatisfaction leads to creativity: Encouraging the expression of voice. *Academy of Management Journal, 44*(4), 682-696.