

## **ABSTRACT**

Despite mounting evidence regarding efficacious clinical and managerial practices in health care organizations, a large gap exists between evidence and practice. Recent empirical studies estimate that the implementation rate of innovations identified in quality improvement research is less than 50 percent. An extensive body of literature on implementation effectiveness in health care has largely focused on the role of top management teams and physicians. Middle managers have a critical yet poorly understood role in innovation implementation. The purpose of this study is to assess middle managers' role in innovation implementation in health care organizations. Theory suggests that middle managers in organizations that provide job resources may reciprocate with increased commitment to innovation implementation. The first aim of the proposed study is to employ secondary data from a self-administered survey to assess the relationship between (1) middle managers' commitment to innovation implementation and implementation effectiveness and (2) job resources and middle managers' commitment to innovation implementation. The second study aim is to employ semi-structured interviews to broadly explore the mechanisms through which (1) middle managers' commitment to innovation implementation increases implementation effectiveness and (2) job resources increase middle managers' commitment to innovation implementation. Study results will identify high-leverage ways for health care organizations to facilitate the translation of evidence into practice and contribute to a growing body of literature on implementation effectiveness.

## SPECIFIC AIMS

Despite mounting evidence regarding efficacious clinical and managerial practices in health care organizations, a large gap exists between evidence and practice [1, 2]. This gap is evident in persistent statistics showing significant variation in the outcomes of care across health care providers and communities, in the utilization of appropriate care, and in timely access to care [3-5]. In response to the Institute of Medicine's call for a safe, effective, patient-centered, timely, efficient, and equitable health care system [2], health care organizations have increased their efforts to implement efficacious clinical and managerial practices using quality improvement methodology. Despite the growing efforts, recent empirical studies estimate implementation rates of these innovations to be less than 50 percent [6].

Researchers in other industries widely regard middle managers as key players in innovation implementation [7]. Health services researchers, however, have paid little attention to middle managers' role in innovation implementation. Job resources have been found to influence middle managers' commitment to innovation implementation in other industries [8], and job resources can be modified to improve innovation implementation rates in health care organizations. The goal of the proposed study is to understand the role of middle managers in innovation implementation in health care organizations. The proposed study will identify high-leverage ways for health care organizations to facilitate the translation of evidence into practice by elucidating relationships among job resources, middle managers' commitment to innovation implementation, and implementation effectiveness. The aims of the proposed study are as follows:

**Aim 1: To assess the relationships among job resources, middle managers' commitment to innovation implementation, and implementation effectiveness in health care organizations.** This study will use regression analysis to assess relationships between (a) job resources and the commitment of middle managers, and (b) middle managers' commitment and implementation effectiveness. The sample will consist of middle managers who worked in health centers located in the Midwest and West Central regions of the United States and who participated in the implementation of an innovation called the Health Disparities Collaborative (HDC).

**Aim 2: To explore the mechanisms through which (1) job resources increase middle managers' commitment to innovation implementation and (2) middle managers' commitment to innovation implementation increases implementation effectiveness in health care organizations, and to enhance Aim 1 analyses.** This study will conduct semi-structured interviews with sixteen of the middle managers included in Aim 1 to explore moderators and mediators of the relationship between job resources and middle managers' commitment to innovation implementation. Template analysis [9], which identifies some themes a priori from interview questions and allows additional themes to emerge as analysis proceeds, will be used for Aim 2. Another purpose of the semi-structured interviews is to verify and help interpret the findings from the quantitative analysis in Aim 1.

The mixed method sequential design is ideal for testing relationships among job resources, middle managers' commitment to innovation implementation, and implementation effectiveness, and for identifying characteristics of health care organizations that have successfully used job resources to increase middle managers' commitment to implementing innovations.

The proposed research addresses AHRQ's Innovations/Emerging Issues Portfolio of Research. By investigating the poorly understood role of middle managers in innovation implementation in health care, the proposed research has the potential to lead to significant advances in health care. Although researchers have identified several features of effective innovation implementation, the rate of successful implementation of health care innovations is dismal [6]. This suggests that very little of the large body of evidence regarding how to improve quality in health care has been put into practice. Understanding middle managers' role in innovation implementation has the potential to identify high-leverage ways for health care organizations to facilitate the translation of evidence into practice.

## BACKGROUND AND SIGNIFICANCE

### B.1. Extant innovation implementation research largely ignores middle managers.

An extensive body of literature explores antecedents of implementation effectiveness in health care [10-16]. This research has largely focused on the influence of top management teams (TMTs) and physicians on implementation effectiveness [10-14]. Although some (e.g., Dess, 1987; Weiner, Shortell and Alexander, 1997 [17-20]) address the implementation process, many researchers do not acknowledge the role of middle managers—employees who both supervise other employees and are supervised. Even those who acknowledge the influence of middle managers' commitment (e.g., Brodwin and Bourgeois, 1984 [21]) tend to frame middle managers as passive recipients of TMT's strategy. As team work designs become popular in health care organizations [22], and as middle managers increasingly oversee initiatives, middle managers' influence over the implementation process grows [23]. Understanding their role in innovation implementation is critical.

### B.2. Middle managers actively influence innovation implementation.

Other industries widely regard middle managers as key players in innovation implementation [7]. Middle managers' commitment to innovation implementation has been linked to positive organizational outcomes, such as profit growth [24], enhanced competitiveness [25], and overall effectiveness in reaching established goals [26], as well as organizational processes, such as strategy realization [27], efficiency of operations [26], and implementation speed [25]. Conversely, middle managers could significantly hamper innovation implementation through “foot-dragging” or pursuing other priorities [18, 27-32].

A few researchers have speculated that implementation effectiveness in health care organizations depends on middle managers' commitment [10, 15, 26, 29, 33-35], but there is scant empirical evidence of the relationship between middle managers' commitment to implementation and implementation effectiveness in health care organizations. Middle managers' role in innovation implementation in health care organizations may differ from the role of middle managers in other industries. For example, middle managers in health care organizations may assume their role in addition to other clinical and administrative responsibilities. The proposed study fills the gap in extant research by empirically studying middle managers' role in innovation implementation in health care organizations.

### B.3. Job resources may influence middle managers' commitment to innovation implementation.

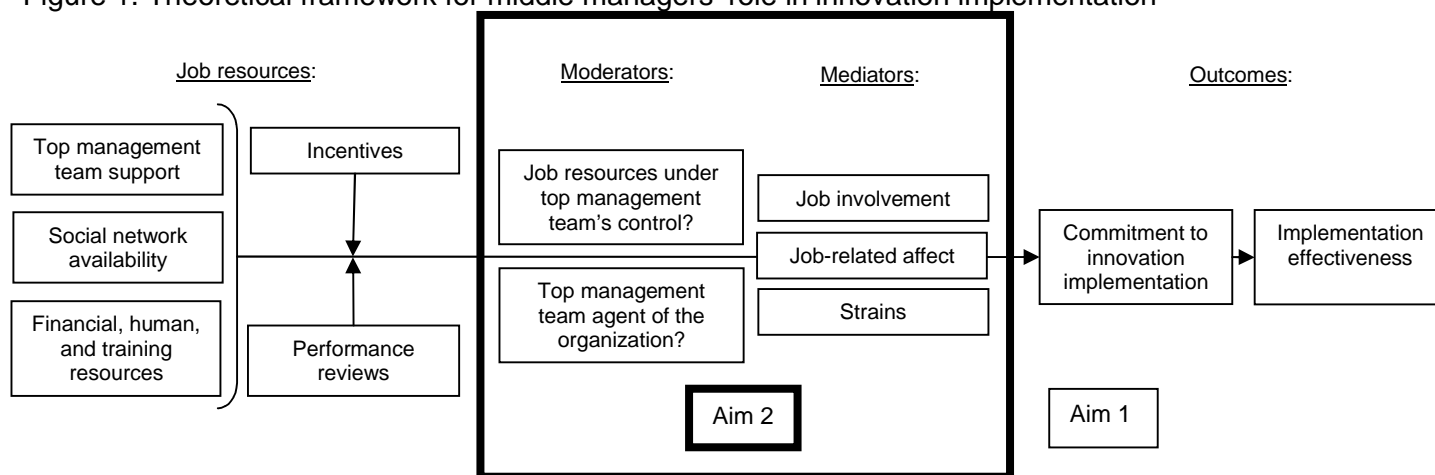
The *theory of perceived organizational support* suggests that employees in organizations that value their contribution and care about their well-being exhibit increased commitment to their organizations [8]. An organization supports its employees by providing job resources. Middle managers who perceive support from their organization may reciprocate with increased job involvement, more positive job-related affect, and decreased strain [36]. These improved states may increase middle managers' commitment to the implementation of innovations that the organization has adopted. In turn, commitment to innovation implementation may increase implementation effectiveness [37].

Outcomes (Figure 1). An innovation is “an idea, practice, or object that is perceived as new by an individual or another unit of adoption” [38]. Implementation is “the transition period during which targeted organizational members ideally become increasingly skillful, consistent, and committed in their use of an innovation” [37]. Innovation implementation, then, refers to the period during which organizational members become proficient in their use of a new practice. *Middle managers' commitment to innovation implementation* is a behavioral manifestation of middle managers' engagement in activities that enable innovation implementation. For example, regular use of a collaborative listserv, virtual classroom, and web page is a behavioral manifestation of middle managers' engagement in a collaborative approach to quality improvement; these are instruments that are intended to promote innovation implementation and provide access to social networks that are necessary for innovation implementation [39]. Middle managers' commitment to innovation implementation may increase implementation effectiveness [37]. *Implementation effectiveness* is a multidimensional construct [40]. In this study, we are particularly interested in the level of integration of an innovation's components into an organization's practices because the level of integration is indicative of an organization's potential to achieve an innovation's intended outcomes [38, 41]. For example, an organization that effectively uses the interrelated components of the chronic care model has the potential to improve chronic illness management [42, 43].

Job resources (Figure 1). *Incentives* are inducements intended to encourage behaviors such as commitment to innovation implementation. Research suggests that incentives serving middle managers' self-interests increase commitment to innovation implementation [27, 44]. The relationship between incentives and middle managers' commitment to innovation implementation is likely to depend on other job resources. Without support from TMT, for example, incentives may have a negative effect on middle managers' commitment to

innovation implementation because middle managers may perceive the incentives as manipulative [45]. The proposed study empirically assesses the effect of the interaction between incentives and other job resources on middle managers' commitment to innovation implementation. *Performance reviews* refer to appraisal of one's actions by a supervisor. Reviews from TMT about implementation-related performance inform middle managers about the adequacy of their commitment to innovation implementation, allowing them to improve and adjust their commitment [46]. The relationship between performance reviews and middle managers' commitment to innovation implementation is likely to depend on other job resources. For example, unless middle managers have access to the resources necessary to commit to innovation implementation, middle managers may be unable to act on feedback regarding their implementation-related performance. The proposed study empirically assesses the effect of the interaction between performance reviews and other job resources on middle managers' commitment to innovation implementation. *TMT support for innovation* refers to effort put forth by TMT to encourage innovation implementation. TMT support for innovation may incite agreeableness toward innovation, openness to change, and the conscientiousness required to commit to innovation implementation [47]. *Social network availability* refers to the proportion of facilities in a middle manager's community that are also engaged in innovation implementation [46, 48]. Middle managers whose facilities are part of a network of facilities participating in innovation implementation may be more likely to commit to innovation implementation; widespread participation in an innovation signals to middle managers the importance of innovation implementation [39, 49]. For example, middle managers attending regional learning sessions for a quality improvement collaborative have the opportunity to interact with middle managers in other facilities, signaling shared value in participating in the quality improvement collaborative. *Access to financial resources* is likely to increase middle managers' commitment to innovation implementation by reducing the amount of time and effort that they would otherwise expend on innovation implementation [50-52]. For example, access to funding may allow middle managers to purchase electronic medical records, automating processes, such as chart audits, that are time-consuming, and allowing middle managers to engage in activities that contribute directly to innovation implementation. *Access to human resources* may increase middle managers' commitment to innovation implementation by redistributing some of the workload away from middle managers, giving them the opportunity to engage in key implementation activities. *Access to training resources* may increase middle managers' commitment to innovation implementation by offering them the declarative knowledge (what to do), compilation knowledge (integration of facts), procedural knowledge (how to do things), conditional or tacit knowledge (when and why to do things) [53], and meta-cognition (mental processes for acquiring knowledge, interpreting feedback, and learning from experience) [54] needed to engage in implementation activities [53].

Figure 1. Theoretical framework for middle managers' role in innovation implementation\*



\*Based on the theory of perceived organizational support [8]. Control variables that will be included in analyses have been omitted from this figure.

#### B.4. Mechanisms underlying the relationship between job resources and middle managers' commitment to innovation implementation are unknown.

Aim 2 explores mechanisms underlying the relationship between job resources and middle managers' commitment to innovation implementation that extant research has identified as potentially important [36]. Potential moderators of the relationship between job resources and middle managers' commitment to innovation implementation include (1) whether job resources are under TMT's control and (2) whether middle managers perceive TMT to be an agent of the organization (Figure 1). For example, if TMT is obligated by law to provide the job resources or is doing so for reasons other than organizational policy, middle managers may

not feel that the favorable treatment warrants reciprocation [36]. Potential mediators of the relationship include (1) job involvement (identification with and interest in the specific work one performs), (2) job-related affect (job satisfaction and general mood), and (3) strain (aversive psychological and psychosomatic reactions) [36] (Figure 1). Understanding the mechanisms underlying the proposed relationships will allow practitioners to promote middle managers' commitment and implementation effectiveness.

#### B.5. Summary and significance

The rate of successful implementation of health care innovations is dismal [6]. Health services researchers have paid little attention to middle managers' role in innovation implementation. The goal of the proposed study is to understand the role of middle managers in innovation implementation in health care organizations. Results of the study will suggest strategies to promote middle managers' commitment to innovation implementation and improve implementation effectiveness.

## PRELIMINARY STUDIES

The principal investigator has valuable experience in researching health care organizations, health care innovations, and middle managers in health care organizations. Her master's thesis assessed the effectiveness of the Asthma Learning Collaborative, an innovation in health care, and she was the project evaluator for Partnerships for Quality, an innovation in health care developed by the Center for Health Care Quality, Cincinnati Children's Hospital. In 2009, the PI published a study regarding the relationship between having a usual source of care—an innovation in health care—and health care costs among children [55]. Currently in press is a paper regarding favorable selection of Medicare-eligible veterans into Medicare managed care on which the principal investigator was second author [56]. The paper critically assesses current practices in health care delivery.

Marshall Chin, MD, MPH, who serves on the PI's dissertation committee, led the University of Chicago team that performed the national evaluation of the Health Resources and Services Administration's Health Disparities Collaboratives initiative to improve care and outcomes in federally-funded community health centers (AHRQ U01 HS13635, AHRQ R01 HS10479). Dr. Chin conducted the self-administered survey that provides data for the proposed study. To date, three papers from the survey have been published in *Health Services Research* and the *Journal of Ambulatory Care Management*. Topics include morale and burnout among staff implementing an innovation in health care organizations [57], perceptions of leaders and staff in sustaining the benefits of innovation in health care organization [58], and the financial impact of innovation in health care organizations [59]. These publications attest to the importance of assessing the role of middle managers in implementing innovations in health care organizations.

## RESEARCH DESIGN AND METHODS

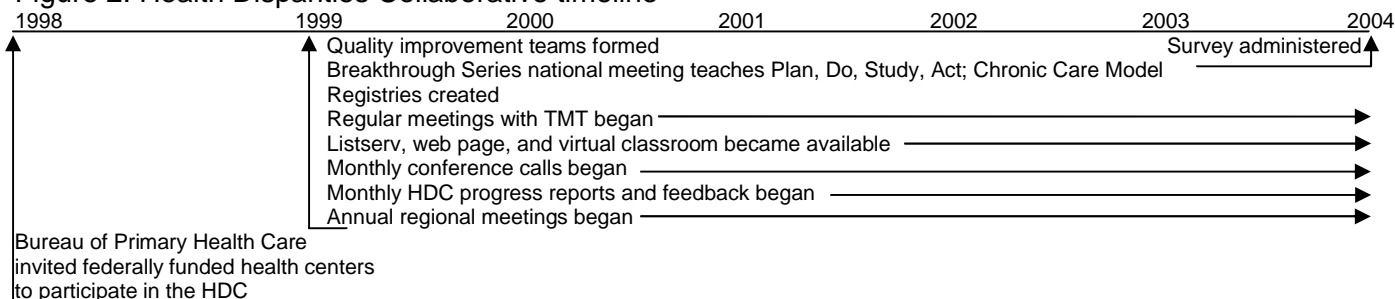
### D.1 Overview and Rationale

The goal of the proposed study is to understand the role of middle managers in innovation implementation in health care organizations. The proposed study will use a mixed method sequential design to triangulate results and minimize mono-method bias [60, 61]. Aim 1 analyses will employ secondary data to assess the relationship between (1) job resources and middle managers' commitment to innovation implementation and (2) middle managers' commitment and implementation effectiveness. Aim 2 analyses will employ semi-structured interviews with 16 of the middle managers included in Aim 1 to explore the mechanisms through which (1) job resources increase middle managers' commitment to innovation implementation and (2) middle managers' commitment to innovation implementation increases implementation effectiveness in health care organizations. The interviews are also designed to verify and help interpret results in Aim 1 analyses.

### D.2 Study Context

The proposed study capitalizes on an ongoing evaluation of the Health Disparities Collaborative (HDC), a six-year initiative that began in 1999 and was specifically designed to reduce health disparities [62]. Innovation is "an idea, practice, or object that is perceived as new by an individual or another unit of adoption" [38]. Consistent with this definition, the HDC is an innovation because the practice was new to health center employees. Although some health center employees may have engaged in quality improvement (QI) initiatives before the HDC, the HDC was a distinct, major initiative that employed strategies unfamiliar to health center employees [62]. In 1998, the Bureau of Primary Health Care invited federally qualified health centers to participate in the HDC. Beginning in 1999, participating health centers were expected to form quality improvement teams that regularly met with health center TMT; create a registry of patients with chronic illnesses to help track clinical care; attend one national and three regional learning sessions where teams learned about the Chronic Care Model [63] and Plan-Do-Study-Act cycles using the Breakthrough Series process [39]; and engage in activities to commit to the implementation of the HDC including the Collaborative listserv, web page, virtual classroom, conference calls, and feedback on monthly HDC progress reports from regional coordinators and staff. Figure 2 contains a timeline of HDC activities.

Figure 2. Health Disparities Collaborative timeline



The HDC is an ideal innovation to study for the proposed study because QI initiatives are particularly vulnerable to poor implementation; they are often given low priority and require substantial financial, human, and training resources [11, 64]. Wide variation has been found in QI initiative implementation [65].

For both Aim 1 and 2 analyses, the study sample will consist of Team Leaders in health centers located in the Midwest and West Central regions of the United States who participated in the HDC for at least one year. Team Leaders were middle managers in the sense that they both supervised team members in their effort to implement the HDC (i.e., facilitated team meetings, resolved conflict among HDC team members, guided and directed HDC team members) and were supervised by health centers' top management teams (TMT). The amount of authority that Team Leaders had depended on the support they received from TMT. Team Leaders were selected to fill the role through a mutual process of volunteering and appointment by CEO/Executive Directors based on leadership skills and personality. Aim 1 analyses will employ data from a self-administered survey that Team Leaders completed in 2004. For Aim 2, the principal investigator will conduct semi-structured interviews with a subset of these Team Leaders (hereafter "middle managers").

### D.3 Data Sources

#### D.3.a. Aim 1

Data for Aim 1 come from a cross-sectional survey of 120 middle managers in 120 health centers (one middle manager per health center) representing 10 Midwestern and West Central states who participated in the HDC. The survey represents an ideal data source for the proposed study and the data are unique because they pertain to an innovation that was simultaneously implemented in multiple health care organizations. Studying multiple organizations improves the generality of results; studying a single innovation permits the use of a single and consistent measure of implementation effectiveness. Secondary data of this kind are scarce

given the novelty of the research topic. The survey fulfills Weiner, Amick, and Lee's (2008) criteria for measuring organizational readiness for change [66]: The survey specifically focused on respondents' attention to HDC implementation, aggregated individual middle managers' appraisals of their health centers' capabilities as a whole, and surveyed multiple organizations.

The survey was conducted between March and December 2004 by the National Opinion Research Center, the University of Chicago, and the MidWest Clinicians Network using the standards of Dillman's Total Design Method [67]. The HDC began in 1999, and the survey was conducted in 2004. As such, the survey allowed sufficient time for middle managers to decide how committed they were to HDC implementation and to act on this decision. The surveys were sent to 149 eligible middle managers. Telephone prompting, up to two additional survey mailings via express delivery, and letters of support from Bureau of Primary Health Care officials were used to increase response. The final overall response rate was 81 percent (N = 120). The study period will be calendar year 2003 through 2004, as survey questions specifically requested responses regarding this period. Surveys were also sent to CEO/Executive Directors, Medical Directors, HDC team members, and health center staff who were unaffiliated with the HDC. Their responses will be used to validate middle managers' responses.

#### *D.3.b. Aim 2*

Semi-structured interviews will be conducted with 16 of the middle managers included in Aim 1. The interviews will shed light on concepts that cannot be captured in surveys and will allow us to explore the underlying reasons for relationships identified in Aim 1 analyses. To ensure variation in the key constructs, we will select middle managers based on their level of commitment to HDC implementation and the effectiveness of HDC implementation in their health centers using the following method: (1) The PI will use a publicly available list of health centers that participated in the HDC to call middle managers. (2) Middle managers who no longer work in the health centers will be excluded from participation in the qualitative study. Bureau of Primary Health Care officials believe that turnover will not prohibit recruitment of a sufficient number of interview participants; however, middle managers who are available for the interview may systematically differ from middle managers who left the health centers. The principal investigator will request consent to identify middle managers' Aim 1 survey responses to assess differences between middle managers who do remain at health centers at the time of the interviews and aggregate statistics of those who do not. (3) The principal investigator will ask middle managers the screening questions listed in Appendix 1. (4) Based on responses from middle managers who remain at the health center, the PI will determine whether middle managers can be classified into one of the following quadrants:

		Commitment to HDC implementation	
		High	Low
Implementation effectiveness	High	4	4
	Low	4	4

Thresholds for "high" and "low" commitment to HDC implementation and implementation effectiveness will be determined based on the distribution of responses. For example, the maximum score for implementation effectiveness is 88 (8 items scored on an 11-point scale). Implementation effectiveness will be classified as "high" for middle managers who score in the top twenty-fifth percentile and "low" for those who score in the bottom twenty-fifth percentile. Once at least 4 middle managers per quadrant have been identified, enrollment will close. Interviewing multiple middle managers will allow us to identify patterns that are robust against idiosyncratic features of any given middle manager's experience, thereby addressing selection and selection-treatment interaction biases [61]. Middle managers who cannot be classified into one of the above quadrants will be excluded from participation in the qualitative study. The screening questions (Appendix 1) and interview guide (Appendix 2) will be approved by the Institutional Review Board at the University of North Carolina at Chapel Hill. In the event that more than 5 middle managers retract their consent after interviewing has begun, additional middle managers will be recruited for the study.

The PI will offer middle managers a \$25 gift card as an inducement to participate in the semi-structured interviews. Sixty- to 90-minute interviews will be conducted via telephone and will be scheduled based on the participant's convenience. The PI will conduct interviews in a private office with a closed door. Interviews will be recorded and transcribed to enhance data reliability. The PI's interviewing training and experience will minimize middle managers' evaluation apprehension and her own expectancies as an interviewer [61].

The PI will follow an interview guide (Appendix 2) based on the theoretical framework (Figure 1). Using the interview guide will help to avoid instrumentation bias [61]. Basing the interview guide on the theoretical model reduces the bias associated with inadequate preoperational explication of constructs to the validity of study findings [61]. Including several questions in the interview guide addresses the threat of mono-operational bias [61]. The PI will conduct pilot interviews with two middle managers in health care organizations that are



unaffiliated with the HDC. The PI's observations and feedback from pilot interview subjects will be used to refine the interview guide. Pilot interview data will not be used in final analyses. During HDC middle manager interviews, questions may be amended and supplemented based on middle managers' responses. If the middle manager agrees, we might contact him or her by phone after the interview to make sure that we correctly understood his or her interview remarks. Organizational charts from middle managers' health centers will also be obtained to contextualize middle managers' role in HDC implementation.

#### D.4 Variable Definitions

##### *D.4.a. Aim 1*

Dependent and independent variables of interest will be operationalized as factor scores of survey items (see Appendix 3). To ensure face validity, the variables were developed in collaboration with Adam Grant, PhD, Associate Professor of Management at The Wharton School, University of Pennsylvania, an expert in job design; Shoou-Yih Daniel Lee, PhD, Associate Professor of Health Policy and Management at the University of North Carolina at Chapel Hill, an expert in health care organization delivery and change; Marshall Chin, MD MPH, Professor of Medicine at the University of Chicago, an expert in care and outcomes improvement among vulnerable patients with chronic disease; and two middle managers who participated in the HDC and completed the survey: Loretta Heuer, PhD RN, Assistant Professor of Nursing at University of North Dakota, and Cynthia Schaefer, RN CS, of the ECHO Health Center in Evansville, Indiana. Factor analyses and Cronbach's alpha will be used to assess variables' psychometric attributes.

A multivariate regression model for the relationship between job resources and middle managers' commitment to HDC implementation will include all job resources hypothesized to influence middle managers' commitment to HDC implementation (note that the mediators and moderators depicted in Figure 1 and described in sections B.4 and B.5 will only be assessed in Aim 2). Middle managers' commitment to innovation implementation will be operationalized as a factor score of survey items that assess how regularly middle managers use a collaborative listserv, virtual classroom, and web page, all of which represent a behavioral manifestation of middle managers' engagement in implementing the HDC [39]. In addition to job resources, the model will include the *size of middle managers' health centers*; health centers that serve a large number of patients are likely to require the kind of infrastructure necessary to offer job resources [34].

A multivariate regression model for the relationship between middle managers' commitment to HDC implementation and implementation effectiveness will control for health center and middle manager factors. The effectiveness of HDC implementation will be operationalized as a factor score of survey items that assess how effectively the health center uses the components of the chronic care model; health centers that effectively use these components of the chronic care model have the potential to improve chronic illness management [42, 43]. The model will also include *job resources* because health centers with the infrastructure necessary to offer job resources are also likely to have the infrastructure necessary to integrate HDC components into health center practices [34].

*Health center factors.* Because implementation effectiveness may improve over time as quality improvement teams become familiar with the HDC, the model will control for the *year in which the middle manager's health center began the HDC*. Including this control variable will also address potential reverse causality by absorbing the effect of the passage of time on implementation effectiveness. The *size of middle managers' health centers* influences implementation effectiveness [34]; integrating HDC components may be more complicated in health centers that serve more patients. *Turnover in middle managers' health centers* may decrease implementation effectiveness [34]; the loss of HDC-related expertise in middle managers' health centers may limit their ability to integrate HDC components into health center practices. The *location of middle managers' health centers* may influence implementation effectiveness because partnerships with community organizations may be more difficult to establish in rural locations due to low population density; aspects of the external environment are thought to influence implementation effectiveness [34].

*Middle manager factors.* *Middle managers' organizational tenure* may influence implementation effectiveness [34]; longer organizational tenure offers middle managers the organizational knowledge that is necessary to integrate HDC components into health center practices. *Middle managers' job tenure* may influence implementation effectiveness [34]; longer job tenure offers middle managers knowledge of how to effectively perform in their role, which enables them to integrate HDC components into health center practices. *Middle managers' occupation* (providers, other clinical staff, administrative staff) may influence implementation effectiveness [34]; middle managers who are patient care providers may be more adept at facilitating the integration of clinical HDC components into health center practices.

## D.5 Data Analysis Plan and Power Analysis

### *D.5.a. Aim 1*

*Missing data management.* One percent of observations are missing data for the TMT support scale; 22 percent for the access to financial resources scale; and 37 percent for the access to human resources scale. Little's (1998) test indicates that data are missing at random [68]. Sensitivity analyses will be conducted to compare the results of three approaches to handling data that are missing at random: (1) Complete case analysis [69], (2) maximum likelihood, and (3) multiple imputation [70]. The optimal (unbiased and efficient) method will be used in final analyses.

*Analysis – main effects.* Bivariate analyses will be used to determine which independent variables will be included in final analyses. Given a sample size of 120, alpha of .05, expected R-squared of .15, power will be .88 with 10 independent variables, .8 with 15, and .73 with 20. Although including all independent variables in the final analyses is unlikely, we recognize the potential limitation of the small sample for Aim 1. The statistical significance of the partial effects of the independent variables on the dependent variables in multivariate regression analyses will be used to test the hypotheses related to Aim 1: (1) Job resources including incentives; performance reviews; social network availability; TMT support; and access to financial, human, and training resources are positively related to middle managers' commitment to innovation implementation. (2) Middle managers' commitment to innovation implementation is positively related to implementation effectiveness.

*Analysis – interaction effects.* The effects of incentives and performance reviews on middle managers' commitment to innovation implementation are likely to depend on other job resources, such as TMT support and middle managers' access to financial, human, and training resources, which are necessary to commit to innovation implementation. The statistical significance of the partial effects of interactions between incentives and other job resources and between performance reviews and other job resources in multivariate regression analyses will be used to test the following hypothesis: The effects of incentives and performance reviews on middle managers' commitment to innovation implementation depend on other job resources.

### *D.5.b. Aim 2*

Aim 2 will employ template analysis, which combines content analysis methods with grounded theory, to identify some themes a priori from interview questions and to allow additional themes to emerge as analysis proceeds [9]. A multifunctional qualitative data analysis software program (Atlas.ti 5.0) will be used to code interview data and to identify emergent themes associated with the mechanisms through which (1) job resources increase middle managers' commitment to innovation implementation and (2) middle managers' commitment to innovation implementation increases implementation effectiveness in health care organizations. Using software to record coding steps and document coding decisions will enhance the reliability of study findings. The text units will be coded using a coding manual with definitions, decision rules, and examples to ensure consistency of data analysis and increase internal validity. The theoretical framework (Figure 1) will provide a starting list of codes, which will be supplemented with emergent codes as the analysis proceeds. Using the coding manual will address potential instrumentation bias [61]. The PI will begin by coding a sample of three transcripts. Based on the results, the PI will sharpen the coding manual's code definitions, decision rules, and examples. The PI will then code the remaining documents, develop additional codes, and generate new propositions. Using ATLAS.ti, reports of all text segments for each code will be generated. The degree to which the construct emerges in the data (its strength), and the degree to which the construct affects strategic responses (its valence) will be assessed. Throughout this process, drafts of codes and analyses will be shared with selected middle managers to correct factual errors, answer remaining questions, and confirm interpretations. Throughout the analysis, we will review organizational charts from the health centers of middle managers who participate in interviews to contextualize middle managers' responses to interview questions. For example, patterns may emerge related to whether CEO/Executive Directors or Medical Directors supervised middle managers. The Aim 1 survey responses of middle managers who participate in interviews will be taken into account to enhance Aim 1 analyses and assess differences between middle managers who remain at health centers at the time of the qualitative study and those who do not.

D.6 Timeline

	May 10	Jun 10	Jul 10	Aug 10	Sep 10	Oct 10	Nov 10	Dec 10	Jan 11	Feb 11	Mar 11	Apr 11
Clean/impute data, aim 1												
Create variables, aim 1												
Preliminary analyses, aim 1												
Update literature review												
Update analysis plan												
Full data analysis, aim 1												
Interviews, aim 2												
Preliminary analysis, aim 2												
Update literature review												
Update analysis plan												
Full data analysis, aim 2												
First draft												
Final analysis												
Revise												
Prepare manuscript												
Defend dissertation												

D.7 Limitations

Please see sections D.1, D.3, and D.5 for tactics we will use in various stages of the research to enhance the validity of the study's findings. Two threats to validity cannot be as easily avoided through sound research design, however: First, study participants include middle managers in relatively small health centers in 10 Midwestern and West Central states. Health centers are an ideal setting for implementation research; the debate around health care reform has emphasized the need for increased focus on primary care, and health centers provide primary care to an ever-increasing proportion of Americans [71]. Nevertheless, health centers differ from other larger health care organizations, such as hospitals and nursing homes, in several respects. As such, conclusions will be carefully drawn. Second, middle managers in this study may be more motivated than other middle managers; whereas other middle managers may have been promoted or appointed, middle managers in this study were selected through a mutual process of volunteering and appointment by their health centers' CEOs/Executive Directors based on leadership skills and personality; however, middle managers with varying levels of commitment to innovation implementation will be represented in the study, limiting the bias associated with a sample of middle managers who may be more motivated than others. Still, study results may not be generalizable to all middle managers, so conclusions will be carefully drawn.

D.8 Dissemination Plans

Study findings will be disseminated through journal publications and conference presentations. At least three manuscripts will be submitted for publication. The first will address the relationship between job resources and middle managers' commitment to innovation implementation. The second will focus on the relationship between middle managers' commitment to innovation implementation and implementation effectiveness. The third will report findings from interviews with middle managers. These contributions to the literature will inform middle manager job design in health care organizations to promote implementation effectiveness.

## HUMAN SUBJECTS RESEARCH

Human Subjects Research is proposed in this application, as defined under the HHS Protection of Human Subjects Regulations (45 CFR Part 46.102(f)). Subjects for the proposed research include middle managers in health centers that participated in the Health Disparities Collaborative from the Bureau of Primary Health Care.

*Potential benefits of the proposed research to human subjects and others and importance of the knowledge gained.* The proposed research is not likely to have any direct benefit to human subjects; however, the proposed research has many benefits to society based on scientific knowledge. It will contribute to gaps in knowledge regarding innovation implementation in health care organizations. An empirical investigation of the effect of job resources on middle managers' commitment will identify high-leverage ways for health care organizations to facilitate the translation of evidence into practice. The minimal risks to human subjects (described in sections E.1 and E.2 below) are reasonable in relation to the anticipated benefits to society and knowledge that will be gained from the proposed research.

### Aim 1

Aim 1 Human Subjects Research falls under Exemption 4; it does not qualify as human subjects research because the research team will not have access to identified data. Thus, an IRB expedited review will be requested. In addition, the research team will ensure all data are securely stored on password-protected computers and any hard copies of raw data will be stored in a locked file cabinet.

*Subject characteristics.* Subjects for the proposed research include 120 middle managers in 120 health centers (one middle manager per health center) that participated in the Health Disparities Collaborative from the Bureau of Primary Health Care.

Eighty-six percent of the subjects for Aim 1 are female; 13 percent are male; and 1 percent did not specify their gender. Nine percent consider themselves to be Hispanic or Latino. Seventy-nine percent are white; 11 percent are black; 2.5 percent are Asian; 1 percent is Pacific Islander/Hawaiian Native; 1.5 percent is American Indian; and 2.5 percent identify their race as "other"; and 2.5 percent did not specify their race. In 2004, when subjects completed the self-administered survey that will be used for Aim 1, middle managers' mean age was 44.5 years (range 24 to 67). All subjects are healthy volunteers.

### Aim 2

*Subject characteristics.* Sixteen subjects for Aim 2 will be identified using a publicly available list of the same health centers that will be included in Aim 1. This list does not identify the gender, race, ethnicity, age, or health status of middle managers in the health centers, so we are unable to describe characteristics of Aim 2 subjects. However, the list that will be used to recruit subjects for Aim 2 is comprised of health centers that completed the survey to be used for Aim 1, so Aim 2 subjects may be similar to Aim 1 subjects.

*Protections against risk.* Identified data including names, telephone numbers, the year in which subjects' health centers began the Health Disparities Collaborative, cities, and email addresses will be accessed for the proposed qualitative study. The primary risk to subjects is a breach of confidentiality through accidental or inappropriate disclosure by study personnel. Several steps will be taken to mitigate the risk of a breach of confidentiality. Middle managers might feel uncomfortable or embarrassed talking about the thoughts and feelings they had, the choices they made, the conversations they had, or the actions they took while implementing the Health Disparities Collaborative. Having the principal investigator of the proposed study, an experienced interviewer, conduct the interviews may mitigate any feelings of discomfort or embarrassment. The principal investigator will remind subjects that they may choose not to answer any questions that they do not wish to answer, and that they may end the interview at any time they choose. All research personnel will sign a written agreement not to divulge, publish, or otherwise make known to unauthorized persons or to the public any information obtained in the course of this study that could identify the people who participated in the study. Information that could be used to identify middle managers will be kept separate from all research information. We will create a file that assigns each middle manager a unique study identification number. This file will be encrypted and password protected. Only the principal investigator will have access to it. We will destroy this file when the study is completed and we have no reason to link middle managers' names to their identification numbers. Middle managers' names will not appear on their interview transcripts, only their unique study identification numbers. Only research team members will have access to the data we collect. Electronic data will be stored in password-protected files on password-protected computers. Written data will be stored in locked filing cabinets in locked offices. Data sharing among research team members will involve only de-identified data. Data sharing will take place by email over secure servers. No one who participates in this study will be identified in any report or publication about this study. Data will be kept only as long as necessary to analyze and report study findings. At that point, all data will be destroyed.

## **INCLUSION OF WOMEN AND MINORITIES**

Subjects for the proposed research include middle managers in health centers that participated in the Health Disparities Collaborative from the Bureau of Primary Health Care.

### Aim 1

Aim 1 will employ data from a self-administered survey that 120 middle managers in 120 health centers (one middle manager per health center) completed in 2004; new/additional data will not be collected. Eighty-six percent of the subjects for Aim 1 are female; 13 percent are male; and 1 percent did not specify their gender. Nine percent consider themselves to be Hispanic or Latino. Seventy-nine percent are white; 11 percent are black; 2.5 percent are Asian; 1 percent is Pacific Islander/Hawaiian Native; 1.5 percent is American Indian; and 2.5 percent identify their race as “other”; and 2.5 percent did not specify their race.

### Aim 2

Subjects for Aim 2 will be identified using a publicly available list of the same health centers that will be included in Aim 1. Because this list does not identify the gender, race, or ethnicity of middle managers in the health centers, we are unable to ensure the inclusion of women and minorities. However, the list is comprised of health centers that completed the survey to be used for Aim 1, and—as noted above—the proportions of women and minorities suggest that they will be represented in Aim 2.

**PLANNED ENROLLMENT TABLE**

According to the AHRQ instructions a Targeted/Planned Enrollment Table is not required.

## **INCLUSION OF CHILDREN**

The subjects for the proposed study include working adults over the age of 21 years; no children will be included in the proposed study.

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PEGGY LEATT, PhD  
*Chair*

LAUREL FILES, PhD, MBA  
*Associate Chair*

Re: Letter in support of Sarah Birken's application

Dear Reviewers:

I offer my strongest support for Sarah Birken's application for the AHRQ Dissertation Grant. I have been Sarah's academic advisor in the PhD program for over three years and am the Chair of her dissertation committee. She has completed the course requirement for the doctoral degree and has successfully defended the dissertation proposal. Over the years, Sarah has assisted me on my research projects on two occasions and we have co-authored two manuscripts. I have complete confidence that Sarah could successfully conduct the dissertation research in a timely fashion and that her research has the potential to make an important contribution to facilitating the implementation of innovations in health care organizations.

Sarah has consistently been one of the top students throughout her tenure in our department. She is highly intelligent. More importantly, her ability to think conceptually and her unwavering desire to learn and excel are two qualities that differentiate her from most other doctoral students. She is also one of the most diligent and focused students I have ever worked with. Everything she does, she does it to her best, and then some more. The very majority of students, for example, would be pleased with a high grade on their course project or paper. Sarah goes the extra mile, and she has turned several of her course papers into publishable manuscripts, all of which either have been published or are under review. To enrich her research experience, she has sought out opportunities to work with faculty and researchers on research projects. One of them is Dr. Matthew Maciejewski, a VA researcher and an adjunct faculty in our department, with whom she co-authored a paper that was recently accepted for publication in *Medical Care*, a premier journal in Health Services Research. Two summers ago, she also worked at the Durham VA Medical Center to gain administrative experience. While at the Durham VA, she witnessed the tremendous pressure the system placed on mid-level managers to implement innovative practices and she observed the "creative" strategies, including shirking, that mid-level managers used in dealing with those constant, and sometimes conflicting, requirements from top administrators. That observation led her to conduct several in-depth interviews with mid-level managers and then to ask the question that she plans to address in her dissertation—namely, the roles of mid-level managers in innovation implementation in health care organizations.

The dissertation research that Sarah proposes is both timely and important. As her application makes clear, there is a pressing need both to assess the contribution of mid-level managers in the process of innovation implementation in health care organizations and to understand the factors that facilitate and impede the commitment of mid-level managers to implement innovative practices. This research is especially timely because of the emphasis on efficacious practices in health care organizations and because of the large gap between evidence and practice. And the research is important because it would help to explain why a gap exists between evidence and practice, and because the study may suggest effective strategies to bridge the gap by creating a work environment that motivates and supports mid-level managers in their implementation of innovative clinical and managerial practices in health care organizations.

To the best of our knowledge, despite an increased recognition of mid-level managers and their critical role in innovation implementation in other non-healthcare industries, Sarah's dissertation is the first comprehensive and empirical examination of the issue in health care organizations. Because the issue has been largely ignored in health care, it took Sarah about a year of intensive search to finally find an appropriate and unique dataset to test her research questions. The lengthy and oftentimes frustrating search process demonstrates, again, her persistence and work ethics. She then worked efficiently to develop a proposal and assembled an outstanding committee, consisting of an organizational behavior theorist, a clinician-researcher familiar with the source of her dissertation data, and several health care organization/health services researchers, to advise on her study. The committee agrees unanimously that the study is innovative and important, that it is solidly built on previous literature, and that the design is guided by a strong theoretical framework.

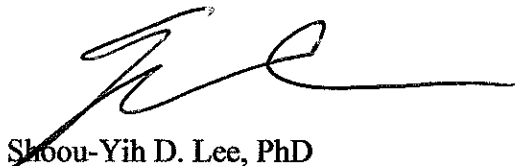
I am prepared to act as Sarah's dissertation chair and to provide her the mentoring and the support that will allow her to successfully complete the study within the specified timeline. We will meet weekly to discuss the progress of the study and to deal with challenges and problems once they surface. We will hold monthly conference calls with at least two of her committee members—Dr. Chin and Dr. Grant—to provide update on her study and to get their feedback.

The environment in our department and at the University of North Carolina at Chapel Hill is conducive to dissertation research. As part of the doctoral degree requirement in our department, doctoral students at the dissertation stage are expected to periodically present their research to the first- and second-year doctoral students, to showcase independent studies by doctoral students and to receive feedback on research. Through the presentation, as well as other presentation opportunities that Sarah will have on campus and elsewhere, Sarah will receive advice from a diverse group of audience and learn to disseminate the findings of her research. Furthermore, the combination of independent research experience, formal and informal advising, and structured opportunities to interact with fellow doctoral students and

experienced faculty and researchers will provide her both the tools and understanding that she will need to become a productive and independent investigator.

In sum, Sarah and her application fully meet the goals of the AHRQ Dissertation Grant Program. I highly recommend her and am fully committed to ensuring her success.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'S. Lee', with a long horizontal flourish extending to the right.

**Shou-Yih D. Lee, PhD**  
**Associate Professor of Health Policy and Management**  
**Research Fellow, Cecil G. Sheps Center for Health Services Research**



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August 24, 2009

Division of Research Education  
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To Whom It May Concern:

I am delighted to support Sarah Birken in her dissertation project that will assess the relationship between middle managers' commitment to innovation implementation and implementation effectiveness and explore job resources that may promote middle managers' commitment to innovation implementation. I have given her access to the proposed dataset and we have signed a data use agreement. I am helping her with the conceptualization of her project and interpretation of results. I am also introducing Sarah to relevant people in the health center and Health Disparities Collaboratives communities who can aid her work. For example, Sarah has already made contact with the Collaboratives' regional cluster coordinators who worked closely with the health centers and who are critical in efforts to contact individual centers.

I led the University of Chicago team that performed the national evaluation of the Health Resources and Services Administration's Health Disparities Collaboratives initiative to improve care and outcomes in federally-funded community health centers (AHRQ U01 HS13635, AHRQ R01 HS10479). As part of the multi-method evaluation, we performed a survey of personnel at approximately 120 health centers which focused on what incentives and assistance participants needed to improve their work in the Health Disparities Collaboratives. To date, we have published three papers from this survey in *Health Services Research* and the *Journal of Ambulatory Care Management*.

About a year ago Sarah emailed me asking if she could use the dataset for her dissertation. We exchanged numerous emails, had a number of phone conversations, and I met her in-person when I was giving a talk at the University of North Carolina. I believe that Sarah's research question evaluating the role of middle managers in innovation implementation is a critical one in the quality improvement field, and it is grossly understudied. I am excited that she will be investigating this question with our data. I have also been extremely impressed by Sarah. She is bright, creative, highly motivated, and enthusiastic. She is a clear thinker and has worked well with the research team. Sarah has a strong mentorship team at the University of North Carolina. I as well as two of our community partners in the MidWest Clinicians' Network of

health centers will also assist her and help ensure that her findings and interpretations are grounded in the practical realities of the initiative.

I am delighted to enthusiastically support Sarah Birken's dissertation proposal. Her research will supply important findings to guide community health centers in their efforts to reduce disparities, and will provide key information to the broader quality improvement field.

Sincerely,



Marshall H. Chin, M.D., M.P.H., F.A.C.P.

Professor of Medicine

Associate Chief and Director of Research, Section of General Internal Medicine

Associate Director, Chicago NIDDK Diabetes Research and Training Center

Co-Director, The John A. Hartford Foundation Center of Excellence in Geriatrics

Director, Robert Wood Johnson Foundation Finding Answers: Disparities Research for Change  
National Program Office



September 22, 2009

Division of Research Education  
Office of Extramural Research, Education and Priority Populations  
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I am writing to enthusiastically recommend Sarah Birken for the AHRQ dissertation grant. Sarah is a doctoral candidate at UNC-Chapel Hill in health policy and administration. I first met her in the fall of 2007, when she took a PhD seminar in organizational behavior that I taught. We have remained in close contact since then; I am a member of her dissertation committee.

Let me be clear in stating that Sarah is a star in every sense of the word. I have simply never had a better doctoral student. Sarah's dissertation research is both fascinating and important, as it promises to break new ground in theory and practice on innovation in health care. She is using a rigorous and powerful combination of qualitative and quantitative methods to advance our understanding of the role that middle managers play in facilitating—and frustrating—the implementation of key innovations. Her research questions and study designs are ambitious, carefully constructed, and inventive. Her research has tremendous potential to make invaluable contributions to both academic and practical knowledge.

It would be difficult to overstate Sarah's many strengths. In my doctoral seminar, she stood out head and shoulders above the other students on every possible dimension: intelligence, work ethic, writing skills, creativity, enthusiasm, and compassion. The quality of Sarah's work consistently exceeded that of her peers, and my own highest expectations, by leaps and bounds. She routinely submitted her assignments days— and oftentimes weeks— ahead of schedule. I have never encountered a brighter, more talented, conscientious, dedicated, or insightful doctoral student. In fact, there was a running commentary in my department that if we could only clone Sarah, we would quickly become the top PhD program in the country.

Although I could write for many pages about Sarah's extraordinary competence as a researcher, I am even more impressed by her character. On countless occasions, I have watched her generously share her knowledge, skills, and wisdom with others. She is an exceptionally caring person who is always the first to offer help to students in need. What is most remarkable about Sarah is that even when she is questioning or challenging the assumptions of others, she does so with the grace and kindness of a seasoned expert. In light of her competence and character, Sarah receives my highest possible recommendation.





These are not statements that I make lightly, as I have interacted with my share of exemplary candidates in the process of selecting applicants from talented pools. I did my undergraduate degree at Harvard, where I supervised the hiring of over 300 employees from a pool of approximately 1,000 student applicants at Let's Go Publications. Since graduating from college, I have served as an interviewer for the Harvard admissions committee, where several of my applicants have been admitted. As a doctoral student and professor at the University of Michigan in the Psychology, Organizational Studies, and Management & Organizations departments, I taught several hundred undergraduate and MBA students. As a professor at UNC, I taught over 300 PhD, MBA, and undergraduate students; I also served on multiple doctoral dissertation committees. At both Michigan and UNC, I served on multiple PhD admissions and faculty hiring committees and supervised numerous honors theses. Since coming to Wharton, I have taught over 300 PhD, MBA, and undergraduate students.

Even among these gifted individuals, Sarah easily stands out in terms of intelligence, engagement, diligence, concern for others, and learning orientation. I cannot imagine a student more deserving of this opportunity. Please do not hesitate to contact me with questions.

Sincerely,

A handwritten signature in black ink that reads "Adam Grant". The signature is written in a cursive, flowing style.

Adam M. Grant, Ph.D.  
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October 16, 2009

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Rockville, MD 20850

To Members of the Dissertation Support Review Panel:

I am eager to pursue the research that I propose in my application for a Health Services Research Award from the Agency for Healthcare Research and Quality. The proposed research will assess middle managers' role in innovation implementation in health care organizations, a critical yet poorly understood issue in quality improvement. My work experience, training, and research interests prepare me to successfully carry out the proposed research.

The importance and challenges of effective health services organization and delivery became clear to me as the quality improvement committee manager at a community health center in Boulder, Colorado. Rising health care costs, growing numbers of uninsured, and increasingly complex administration impeded my efforts to improve quality in a safety net health care organization. I obtained a Masters of Science in Public Health (MSPH) degree at the University of North Carolina at Chapel Hill (UNC) to better prepare myself for those challenges. Throughout the MSPH program, I worked as a program evaluator for the Center for Health Care Quality (CHCQ), a division of Cincinnati Children's Hospital. CHCQ introduced me to evidence-based quality improvement methods. My master's thesis assessed the effectiveness of a CHCQ quality improvement collaborative in improving health services delivery to Medicaid children in North Carolina. Conducting this original research inspired me to become an independent researcher.

As in the MSPH program, I combined classroom training with application in health care organizations during the PhD program. The PhD program provided me with rigorous training in quantitative and qualitative methods, research design, and theory. Simultaneously, I worked as a research assistant at the Durham Veterans Affairs Medical Center's Center for Health Services Research in Primary Care. Seeing the research process from beginning (e.g., developing grant proposals, collecting data through interviews with veterans) to end (e.g., reporting results in manuscripts for publication) has given me the experience necessary to successfully carry out the proposed research.

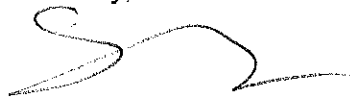
My publication and presentation experience attests to my ability to effectively disseminate research findings. I have published several papers related to health services organization and delivery, innovations in health care, and middle managers' role in the implementation of innovations in health care. I published a study regarding the relationship between having a usual source of care—a relatively new initiative—and health care costs among children. I also presented a poster reporting this research at the AcademyHealth conference and at UNC's University Research Day, at which I won the award for best student poster. Currently in press is a paper regarding favorable selection of Medicare-eligible veterans into Medicare managed care on which I was second author. This research critically assesses current practices in health services delivery.

These publications reflect my interest in researching health services organization and delivery. The opportunity to pursue the proposed research will help me to continue my path toward an academic career in health services researcher and teacher. Further, the opportunity to pursue the proposed research will allow me to study the challenges associated with improving the quality of care in community health centers—the very challenges that encouraged me to seek training in health services research. Health care organization turnaround strategists and quality improvement experts have identified middle managers as critical in the implementation of innovations that are intended to improve health care quality; however, middle managers' role in innovation implementation is poorly understood. The proposed research offers evidence regarding a poorly understood facet of innovation implementation effectiveness in health care. In doing so, it will contribute to a growing body of literature on the implementation effectiveness.

The proposed research addresses AHRQ's Innovations/Emerging Issues Portfolio of Research. By investigating the poorly understood role of middle managers in innovation implementation in health care, the proposed research has the potential to lead to significant advances in health care. Although researchers have identified several features of effective innovation implementation, less than 50 percent of innovations identified in quality improvement research are effectively implemented. This suggests that very little of the large body of evidence regarding how to improve quality in health care has been put into practice. Understanding middle managers' critical role in innovation implementation has the potential to identify high-leverage ways for health care organizations to facilitate the translation of evidence into practice.

Thank you for considering awarding me a grant to pursue this exciting and important research.

Sincerely,



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