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Change is Inevitable but Compliance is Optional: Coworker Social Influence and Behavioral Work-arounds in the EHR Implementation of Healthcare Organizations

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by

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Dedication

I dedicate this dissertation to my parents and their unyielding love and support, to my patient and gracious advisors and mentors who have been so kind to share their wisdom with me throughout the past six years, and finally, to all of the friends who I have shared this path with and who have helped me navigate my way through this degree.

Acknowledgements

When I was younger, I remember watching my father, a trial lawyer, effortlessly spread his passion through use of crafty rhetoric in the courtroom. With each cleverly phrased sentence and grandiose gesture, he demanded attention and, in doing so, steadily guided his audience members to adopt his perspective as their own. For a while, I tricked myself into thinking that my passion for his passion served as an intelligible sign that I too should build a career in law. That sentiment quickly dissipated when I sat in on a contracts class at a well-known law school in Texas. My flare to achieve a courtroom persona dimmed when I realized that the path to this alter ego was full of technical skills that seemingly left little to individual interpretation. After some reflection, I soon realized that it was the communication element of my father's occupation that heightened my curiosity and captured my respect. I soon enrolled in graduate school for my Master's and afterward completing that degree proceeded directly into my Ph.D. program at UT-Austin. I've rarely looked back to second-guess my decision. The field of communication studies is rich and my fascination with its many complexities is constantly evolving.

In fact, when I studied leadership in my Master's program, one wise professor once told me that our goal as leaders should not be to tell others exactly what to do, but rather to help others figure out how to do the work themselves using their own unique capacities. I've had a great deal of help—selfless, encouraging, and merciful help—from those who have sat close to me at some point during this lengthy journey of graduate school. This acknowledgments section does little to repay these individuals for their endless support and guidance. But it's a start.

First and foremost, my family serves as the backbone to this project. Without them, I could not have accomplished this challenging feat. My mother, Kem, and father, Roy, have taught me what unyielding love means. They have given me every opportunity and also insisted that my decisions remain my own. Watching them as examples, I grew up being inspired by my father's professional success and ever-expanding network, but also by my mom's tenacity for life and everything social and outdoors. Their joint compassion for my goals was overwhelming at times, especially with my dad's daily to-do lists distributed around the morning breakfast table, but never underappreciated. My sisters, Buffy and Sarah, have been there with me to celebrate my successes and comfort me during the more trying periods of graduate work. They often had no idea what I was talking about as I drowned them in scholarly lingo, but their hearts were always open, even if their ears occasionally took a break. Finally I must thank my most profound writing partner and thoughtful and patient colleague, Gracie Bell. Oftentimes, as I sat on my couch completely immersed in writing the current chapter of the dissertation, I would look up only to catch her eyes peering over the top of my laptop from where she lay on my living room rug, steadily watching me. Gracie was constantly there to help me brainstorm, regain focus, and remind me to take a walking break. She was the only thing that stood in-between me engaging in an intelligent conversation and me simply talking to myself.

In addition to family, I must thank my advisor, Keri Stephens, and her diligence in pushing me to never settle for mediocrity. The role of a Ph.D. advisor is undoubtedly a multi-faceted one, and one that I hope to fulfill one day myself. Keri has always been hands-on and has truly cared about my progression as a teacher and scholar. Whether it was sitting behind her office chair as she input data into SPSS or enjoying a late night dinner at Kerby Lane after a long writing session, Keri openly shared so much of her

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Change is Inevitable but Compliance is Optional: Coworker Social Influence and Behavioral Work-arounds in the EHR Implementation of Healthcare Organizations

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The University of Texas at Austin, 2015

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The implementation of planned organizational change is ultimately a communication-related phenomenon, and as such, it is imperative that organizational communication scholars examine the interactions surrounding EHR implementation and understand how users (e.g. healthcare practitioners) utilize, evaluate, and deliberate this new technological innovation. Previous research on planned organizational change has called for researchers to adopt a more dynamic perspective that emphasizes the active agency of organizational members throughout implementation processes and focuses on informal implementers and change reinvention (work-arounds) as individuals actively reinterpret and personalize their work roles during implementation socialization. This dissertation seeks to fill this gap in research by demonstrating how communication between doctors, nurses, and other health professionals affects the adoption, maintenance, alternation, modification, or rejection of EHR systems within health care organizations

To delve into these inquiries and examine the intersecting domains of medical informatics and organizational communication research, this dissertation proceeds in the following manner: First, a literature review, capitalizing on Laurie Lewis's work in planned organizational change and social constructionist views of technology use in organizations, outlines the assumptions that undergird this research. Next, this dissertation builds a model that predicts the communicative and structural antecedents of the study outcome variables, which include 1) organizational resistance to EHR implementation, 2) employees' perception of EHR implementation success, 3) levels of change reinvention—or work-arounds—due to change initiatives and activities, and 4) employees' perceptions of the quality of the organizational communication surrounding the change. Hypotheses guiding the model specification are provided and are followed by a description of the empirical methods and procedures that were utilized to explore the variable relationships.

Results of the SEM model suggest that work-arounds could play a mediating role governing the relationship between informal social influence and the outcome variables in the study. In addition, one-way ANOVAs and multiple regression analyses reveal that physicians are the most resistant to EHR implementation and perceived change communication quality positively predicts perceived EHR implementation success and perceived relative advantage of EHR and negatively predicts employee resistance. A discussion of the expected and unexpected results is offered in addition to study limitation and future directions.

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Chapter 1: Introduction

> Tomorrow (Nov 12) our clinic converts to a new software system for our practice management (billing/collections/scheduling/document management) as well as electronic health record...We have prepared and trained for weeks.
>
> There are two reasons we have to make this change: 1. Ongoing and changing government requirements. 2. My clinic is a part of a national network which has decided to use the same system everywhere.
>
> There are two things I won't enjoy with this change: 1. Additional inconvenience and less access for patients for a while. 2. Exhaustion and exasperation while I (and many others) have to work hard to learn a new system.
>
> There are two things we will not change: 1. We will provide excellent, skillful, knowledgeable, comprehensive medical care. 2. We will care about each individual that comes through our doors.
>
> But for a while, there will be some waits (as we fill out new charts for everyone), there will be less appointments available (as we see less patients daily while learning), there will be some repetition (I'm aware your address and insurance may not have changed for years, but we still have to record it again).
>
> So there are two things I will pledge to you: 1. I will learn this system so well that I will offer you better service and access than ever, and my focus will be all the more on you and your concerns (the computer won't come between you and me). 2. While we do this transition, we will understand how hard it is on you as well. If we can manage things by phone, if we can make anything easier for you, if we can be patient with your frustration, we will.

The above quote was taken directly from the public Facebook page of a primary care physician I interviewed for this dissertation in 2014. As the quote demonstrates, the challenges that stem from organizational change initiatives are complex. They are potentially packed with several long-term benefits, but can be immediately time-consuming, disorienting, and occasionally disconcerting for employees. Indeed, scholars, practitioners, and consultants have long analyzed and debated the strategic dynamics of organizational change implementation and the critical role people play in achieving successful change (Elving, 2005; Smith, 2005, 2006, 2011). Yet change is quickly becoming even more commonplace, perpetual, and pervasive than ever before. Today,

organizational members must deal with the repercussions and learning curves that stem from increasingly frequent governmental mandates, technological advancements, growth in markets and competition, and rapid product turnover. Healthcare organizations are especially feeling the tension and dissonance that are products of planned change implementation in the health information technologies (HITs) that ground them.

Recent reports from practitioners and academics alike predict that HITs will be responsible for successful healthcare reform including improved health outcomes and reduced costs (Ahern, Woods, Lightowler, Finley, & Houston, 2011; Ruxwana, Herselman, & Conradie, 2010; Stacy, Schwartz, Ershoff, & Shreve, 2009). Introduced into hospitals and private physician offices during the last few years, these new interactive and database technologies are encouraging patients to become more proactive, informed, and engaged in their own care. In addition, they insist that clinician record-keeping practices become standardized (Ahern et. al, 2011). This movement is likely a fruition of our society's transition into the *information age* and the rise of the *network social order* in which not only the rhythms and pace of life have become faster, but so has the rate of change (Castells, 2011; Wajcman, 2008). These sophisticated technologies can minimize common communication-based errors that produce medical mistakes during vulnerable processes such as handoffs and patient admissions (Eisenberg, Murphy, Sutcliffe, Wears, Schenkel, Shawna, & Venderhoef, 2005). Branded as "the glue for the future of healthcare," these technological advancements have been celebrated for their potential to sustain the continuity in the patient-doctor relationship—both after a doctor leaves a room and a patient leaves the hospital (Ahern et. al, 2011; Herman, 2012, p. 1).

Government officials are primary players in this digital revolution that is permeating the healthcare industry. They are responsible for implementing the substantial organizational changes brought about by communication technology and the information age. The HITECH (Health Information Technology for Economic and Clinical Health) enactment of The American Recovery and Reinvestment Act serves as one fairly recent example. Seeking to shift the health industry into the digital age, the U.S. government passed this act in 2009. Since it was signed into law, this economic stimulus package has provided up to $44,000 in Medicare incentive payments to eligible healthcare professionals who implement an EHR system in a way that demonstrates "meaningful use". The government has also mandated that all healthcare facilities adopt certified EHR systems by the deadline of 2015. Furthermore, physicians must receive six to eight months of training to be considered a "meaningful" EMR (electronic medical records) or EHR user. There are several implications of this seemingly top-down, imposing organizational change, and this dissertation unearths some of these implications through a lens of *end user perception*. My approach shifts attention from the leaders of healthcare organizations to the front lines of healthcare. I will emphasize the perspective of the people who implement these changes every day on a firsthand basis. Specifically, this research centralizes the informal work-arounds that materialize during EHR implementation and use as well as their communicative antecedents and repercussions for organizational change. Examples of such work-arounds include physicians using scribes to input patient data into the EHR system, employees retaining paper records for certain

types of information, and turning off built-in alert systems that warn employees of redundancies in medication prescription or prescription amounts that are abnormal.

STUDY RATIONALE AND THEORETICAL CONTRIBUTIONS

Several nuances underpin this type of organizational change, which position this dissertation within a fertile area of scholarly conversation for the study of organizational and health communication. Underneath the canopy of planned organizational change research, previous studies have demonstrated that information and communication technology (ICT) implementation in organizations can strategically enhance the structure of work by standardizing repetitive information transactions (Paivarinta, Salminen, & Peltola, 2001), providing instantaneous and multi-location access to information, offering smart search functions, and integrating data stored in geographically dispersed locations (Berg & Toussaint, 2003; Sproull & Kiesler, 1991). Yet organizational change in the form of new ICTs and their diffusion can also have paradoxical consequences.

While new technologies can expedite information transfer and diminish corresponding work delays, they can also increase employee and managerial time investments; in some cases they can even *increase* work interruptions (Kotter & Schlesinger, 1979; Rennecker & Godwin, 2005). Previous scholars have acknowledged the implementation process as difficult and erratic (Tornatzky & Johnson, 1982). Some assertively claim that human communication and organizational factors are the culprits sabotaging organizational change efforts with acts of resistance (Miller, Johnson, & Grau,

1994). Technical problems, they insist, only account for less than 10% of implementation failures (Mankin, Bikson & Gutek, 1984).

Thus, it is conceivable that the implementation of planned organizational change is ultimately a communication-related phenomenon (Lewis & Seibold, 1998). As such, it is imperative that organizational communication scholars examine the interactions surrounding EHR implementation and understand how the end users exploit, evaluate, and deliberate this newly mandated technological innovation. Previous research on planned organizational change has called for researchers to "adopt a more dynamic perspective that highlights the active agency of all organizational members in implementation activities" (Lewis & Seibold, 1998, p. 126). This call centralizes the informal implementer and change reinvention as individuals actively reinterpret and modify their work roles during implementation socialization. This dissertation seeks to fill this gap in existing research by unveiling how the cognitive and communicative involvement of physicians, nurses, administrators and other health professionals in the implementation process are indicative of an EHR system's adoption, maintenance, alteration, or rejection in healthcare organizations.

Health communication scholars also have a great deal to learn from EHR implementation. Previous health informatics scholarship has started to question the negative impact an EHR mandate potentially has on doctor-patient communication throughout the "medical interview," or consultation process, during which doctors make their diagnostic assessments (Bates, Ebell, Gotlieb, Zapp, & Mullins, 2003; McGrath, Arar, & Pugh, 2007). In addition, EHR record-keeping also disrupts the temporal

sequence in patient-doctor interactions, as doctors switch their focus from the patient to the computer screen; the broken eye contact and indirect facial orientation that follows has notably been linked to reduced patient disclosure (Duggan & Parrott, 2001). These reasons could impact healthcare employees' perceptions of the *relative advantage* offered by this new, somewhat cumbersome technology.

While some of these issues have been considered in medical and health informatics literature, communication scholars have yet to explore the communicative issues surrounding EHR implementations, specifically at the organizational level. Essentially, the balancing act a physician (or other health employee) encounters in their bifurcated attempt to fill out EHR information comprehensively and effectively listen to and observe patients, is an issue that can be better understood through a lens of organizational communication. EHR protocols limit physicians' idiosyncratic preferences in keeping records and necessitate translating their patient stories into computerized lists. Thus, physicians must standardize both their and their patients' individual modes of communicating to comply with organizational communication policies. Moreover, faced with unbending governmental demands for assimilation, health professionals are required to use EHR systems by 2015. While some EHR vendors are attempting to incorporate health professionals' preferences into the systems, losses of autonomy are still being felt throughout an industry that thrives on confidence and self-governing private practices. Given these conditions, technological work-arounds have created and will continue to create new avenues for heath care communication.

To provide clarity, such work-arounds include using an EHR system in a way other than it was originally designed to be used, or in some instances, bypassing EHR use altogether. Working around EHR has been considerably documented since HITECH was passed in 2009 (Flanagan, Saleem, Millitello, Russ, & Doebbeling, 2013; Friedman, et al., 2013; Ser, Robertson, & Sheikh, 2014). Saving time, aiding memory, and creating states of awareness have all been cited as causes of these deviating behaviors as well as trust issues, poor technology skills, and faulty EHR design (Ser et al., 2014). Work-arounds can take the form of employees retaining paper records even after EHR implementation out of concern for patient privacy and distrust of technology, physicians dictating notes and leaving data entry for other administrative staff, or health professionals entering information in an inappropriate entry field in the EHR system because the system does not designate an appropriate place for such information. For example, one study found that nurses commonly used optional free-text comments in EHR to provide interpretation of data entry and to communicate significant or abnormal events to physicians. These unsolicited comments were the equivalent of placing an asterisk by material in paper records (Collins, Fred, Wilcox, & Vawdrey, 2012).

In addition to an appropriate place not existing in an EHR platform and other insufficient interface issues, health professionals have also enacted work-arounds because an appropriate place did not exist for the technology in the medical examination room. Because the physical layout of these rooms are often not designed for EHR technology, many professionals find themselves with laptops in their laps, on surfaces too low to comfortably accommodate typing, or perched on edges of counters that contain sinks

(Flanagan et al., 2013). One oncologist interviewed in the pilot survey of this dissertation reported leaving the laptop out of the medical examination room altogether because she felt it created a barrier between her and her patients. This was especially debilitating for her practice because conversations surrounding cancer are often ripe with vulnerability. Anything distracting her attention is potentially viewed as a threat to patient safety and quality care. While delaying the computerized documentation enhanced interpersonal communication, it created 30% more work for her after normal operating hours. She cut into her leisure time to retroactively record patients' symptoms into the EHR system using her mind and handwritten notes. Even still, this is a time-consuming work-around she continues to willingly embrace.

Research developed by the RAND Corporation in cooperation with Kaiser Permanente of Colorado and the AHIMA Foundation validates this physician's concerns, claiming that health professionals on a national scale have strong preferences for paper. Consequently, paper-based work-arounds are very common (Jones, Koppel, Ridgely, Palen, Wu, & Harrison, 2011). Collectively, all of these studies construct an argument that work-arounds are developed to alter communication practices required by EHR protocols that are perceived to be problematic, time consuming, or otherwise insufficient. This dissertation adds to organizational communication research by first investigating the informal organizational communication practices that encourage the development of work-arounds—which I depict as socially constructed in organizations. Secondly, this study explores the impact of these work-arounds on organizational change outcomes as discussed in the following paragraph.

The secondary objective of this study is to discover whether healthcare employees' propensities to engage in work-arounds, or change reinvention, is related to their level of resistance, their perceptions of change success, their perception of the relative advantage of the EHR system, and finally, their perceptions of the quality of communication surrounding the EHR-induced change and protocols. Understanding how EHR implementation modifies vital communicative procedures and how employees socially react to and cope with these changes—potential work-arounds—has fundamental practical and theoretical implications. Most notably, this knowledge can comprehensively enhance the quality of healthcare services. Past studies have discovered that enhanced patient-provider interactions are perpetually linked to improved health outcomes such as increased adherence to medical recommendations and patient behavioral change (Mazur & Hickman, 1997), patient satisfaction (Cegala, Bahnson, Clinton, David, Gong, Monk, Nag & Pohar, 2008), and recall of treatment recommendations (Dillon, 2012).

In building a model to help predict and explain the fluctuating presence of specific outcome variables tied to organizational change, this dissertation ultimately finds that work-arounds decrease worker resistance while enhancing perceptions of change success. While these findings appear to be positive on the surface, they also indicate that EHR work-arounds are allowing employees to avoid certain, potentially vital, elements of the change. In addition, employees' perceptions of what constitutes successful EHR implementation might not mirror the government's "meaningful use" standards. This research also breaks ground by depicting the work-around as an intervening variable, mediating the relationship between coworker social influence—feedback and social

support—and the EHR's perceived relative advantage. In other words, the best fitting model constructed and examined in this study does not contain a direct relationship between coworker social influence and perceptions of relative advantage of the EHR system; instead work-arounds governed the nature of this relationship. Specifically, the more influenced employees were by their peers in using the technology, the more likely they were to engage in work-arounds; and furthermore, the more they engaged in work-arounds, the more they regarded the technology as advantageous to their work tasks. By interpreting work-arounds as technological appropriations and assessing their capacity to alleviate the pangs of change initiatives, the scholarly conversations in this dissertation will make new, meaningful contributions to the organizational change literature.

DISSERTATION OUTLINE

To delve into the intersecting domains of organizational and health communication research as well as medical informatics, this dissertation proceeds in the following manner: After this preliminary chapter, I review the literature in Chapter 2 to outline assumptions that undergird this research. Prominent literature includes: 1) Lewis's work in planned organizational change (Lewis, 1999, 2000a, 2000b, 2007, 2011; Lewis & Russ, 2012; Lewis & Seibold, 1993, 1996, 1998), 2) social constructionist views of technology use in organizations such as the social influence model (Fulk, Schmitz, & Steinfield, 1990) and adaptive structuration theory (DeSanctis & Poole, 1994), 4) diffusion of innovations in healthcare organizations, and 4) research emphasizing the

distinctive role demographics play in the variation of employee resistance. I conclude this chapter with a list of theoretically-informed hypotheses.

In Chapter 3, I explain the research design in addition to the research sites, participants, the data collection timeline, and research protocols for both the pilot and primary study. Chapter 4 contains the study's preliminary and primary findings. This chapter outlines the model explaining the social and behavioral antecedents of four outcomes variables: 1) employee resistance to EHR implementation, 2) employees' perceptions of change success, 3) employees' perceptions of the relative advantage of the EHR system, and 4) their perceptions of communication quality surrounding the change. This chapter specifically specifies the features of the structural equation model (SEM), including the path coefficients, significance levels, and direct and indirect effects between the variables that comprise it.

In Chapter 5, I offer a discussion highlighting the theoretical and practical contributions of the constructed model, emphasizing the pivotal role work-arounds and coworker social influence play in the implementation and change process, along with a set of study limitations. Finally, I propose directions for future research that will continue this scholarly conversation and thereby add to this dissertation's findings.

Chapter 2: Literature Review

Organizational Change, Implementation, and Resistance

In the contemporary organizational environment, globalization and economic instability have increased the frequency of organizational change worldwide. Downsizing, mergers and acquisitions, new production technologies, outsourcing, and increased competition are becoming more commonplace and introducing a norm of rapid change into the organizational environment (Bordia, Hobman, Jones, Gallois, & Callen, 2004; del Val & Fuentes, 2003; Elying, 2055; Gaertz, 2000; Hakken, 1993; Lewis, 2011). This trend will likely continue to be a foundation of organizational life in the impending future as scholars continue to describe change as "endemic, natural, and ongoing" (Thomas, Sargent, & Hardy, 2011, p. 22). Yet organizations that undergo large-scale innovation often, and along several dimensions of work, can induce significant health risks for employees including stress, emotional and physical exhaustion, and anxiety (Dahl, 2011). These innovations are often financially and temporally taxing for employees (Kotter & Schlesinger, 1979). Given these conditions, it is no surprise that a range of corporate studies, such as one recently conducted by IBM, repeatedly report that change implementation efforts fail 60-70% of the time—especially when they involve far-reaching technological changes and adjustments to elaborate technological systems (Jørgensen, Owen, & Neus, 2008; see also Burnes & Jackson, 2011). Moreover, the "change gap" (Jørgensen, Owen, & Neus, 2008, p. 1), or the disparity between expecting

or needing a change and the feeling that organizational players can actually manage it, is remarkably growing with the passing of each fiscal year.

The forces encumbering successful organizational change are multi-faceted and numerous. Some scholars have suggested that the primary feature souring organizational change efforts is the failure to buttress structural organizational improvements in hierarchy, technology, and communication networks with changes in the psychology of employees and managers (Schneider, Brief, & Guzzo, 1996). In other words, innovations employed to improve economic and relational performance will only take root if employees recognize and feel the need for change because organizational change occurs primarily through *people*, and only secondarily through technology and structure.

The most pivotal and turbulent phase of the planned organizational change process is implementation—the stage encompassing the broad range of activities that transpire between the adoption of a procedure, technology, and/or behavior and the point at which it is assimilated in a stable fashion (Tornatzky & Johnson, 1982). Defined as "the translation of any tool or technique, process, or method of doing from knowledge to practice" (Tornatzky & Johnson, 1982, p. 193), implementation transforms cutting-edge innovations from abstract ideas into concrete plans and objectives. As such, it is this often protracted phase of change that is frequently fraught with overtones and/or direct acts of managerial frustration, employee cynicism, and worker resistance.

Resistance, which has been a primary area of study in the organizational change literature, is a phenomenon that is responsible for delaying or slowing down the change process, thereby obstructing implementation through hostility, quarreling, and reduced

worker output (Miller, Johnson, & Grau, 1994). Yet it is important not to fall prey to the change-agent centric view, which presumes that resistance to change is inherently bad and depicts resistant employees as stubbornly creating unreasonable obstacles to impede change efforts (Ford, Ford, & D'Amelio, 2008). On the contrary, resistance can be defined as any conduct that attempts to maintain and protect the status quo. For this reason, some have labeled resistance as social or structural inertia, and claim change is not necessarily always beneficial (Hannan & Freeman, 1984; Keen, 1981; Sastry, 1997; Tushman, 1997). Moreover, resistance can actually be symbolic of first order conflicts in attitudes and behaviors that work to expose certain dysfunctional processes that were not diligently scrutinized during the formulation/planning stages (Waddell & Sohal, 1998).

Concerning new technological initiatives in organizations, scholars have demonstrated that resistance can crystallize the technological features that are relevant and valuable to different groups and also deter them from wasting time and/or resources incorporating features of the technology that are not pertinent to their specialized work (Scott, Lewis, Davis, & D'Urso, 2009). Therefore, the resistance that occurs in this situation is actually constructive, and this constructive component is realized as *groups* reshape and negotiate the use of a technology to the maximal potential for their specific tasks. The reshaping of the use of technology, and the accompanying resistant behaviors, only comes to fruition through the language and communicative behaviors of employees within each distinct group. As such, the next section of this chapter conceptualizes the entire implementation process as a communication phenomenon and advocates the

adoption of a social constructionist view of technological change to highlight the role language and social influence play in the implementation process.

IMPLEMENTATION AS A COMMUNICATION PHENOMENON: A SOCIAL CONSTRUCTIONIST VIEW

Communication is a central component to organizing and sensemaking (Weick, Sutcliffe, & Obstfeld, 2005). Furthermore, Taylor and Van Avery's work (2000) suggests that communication is also a fundamental tool for guiding the action and cognitive schematics that bolster change initiatives. From their perspective, communication is an:

> ongoing process of making sense of the circumstances in which people collectively find ourselves and of the events that affect them. The sensemaking, to the extent that it involves communication, takes place in interactive talk and draws on the resources of language in order to formulate and exchange through talk…As this occurs, a situation is talked into existence and the basis is laid for action to deal with it. (p. 58)

It is not surprising then that Lewis & Seibold (1998), in their comprehensive review of organizational change implementation literature, convincingly argue for a "reconceptualization of the implementation of planned organizational change as a communication-related phenomenon" (p. 94). While researchers have acknowledged the importance of communication in several derivatives of organizational change such as resistance to change programs (Fairhurst, Green, & Courtright, 1995; Fidler & Johnson, 1984), fidelity, uniformity, and authenticity of the implementation process across stakeholders (Lewis, 2007), behavioral and interaction-based coping responses of

innovation users (Lewis & Seibold, 1996), and the participative approaches used by implementers during organizational change enterprises (Lewis & Russ, 2012), Lewis and Seibold (1998) note that much less attention has been dedicated to the informal implementation communication that reinforces or detract from the formal communication of planned changes within organizations.

On the other hand, a great deal of work conducted by organizational researchers to date has examined the role of communication processes in the implementation of sophisticated communication technologies into organizational life (Fulk, 1993; Fulk, Schmitz, & Ryu, 1995; Fulk et al., 1990; Poole & DeSanctis, 1990; Rice & Aydin, 1991). Several streams of theorizing have emerged to provide the crux of what has been labeled a social constructionist approach of media use in organizations. The foundational themes underlying social constructionist theories, such as structuration theory (Poole & DeSanctis, 1990; Giddens, 1979), adaptive structuration theory (DeSanctis & Poole, 1994), social influence model (SI) of technology use (Fulk, Schmitz, & Steinfield, 1990), and social information processing theory (Salancik & Pfeffer, 1978), argue that social interaction within an organization forges a shared meaning among actors. For adaptive structuration and the SI model in particular, this shared meaning coordinates actions and attitudes as well as determines the end uses of new technologies in organizations. This process creates a convergence in the social system as individuals' technology-related behaviors reflect those of important communication partners, and interpretive schemes are merged through interaction.

To put it differently, technologies are unpredictable because how they will be perceived and the features that will be used will be distinct and even contradictory across different organizational contexts. When a new technology is introduced into an organization, communal uncertainty spikes and sensemaking activities are triggered. The need for joint sensemaking is imperative as the processes accompanying new technologies are often poorly understood, at least initially, and are "continuously redesigned and reinterpreted in the process of implementation and accommodation to specific social and organizational contexts" (Fulk, 1993, p. 922). Communication is a vital ingredient in these much-needed sensemaking acts, and the corresponding interaction with social agents influences technology-related cognitions, behaviors, and ultimately structures (Fulk et al., 1995).

As the next two sections delineate, this dissertation primarily relies on the social influence model, adaptive structuration theory and diffusion of innovations to dissect the reciprocal relationship between 1) social interaction and 2) technology use, in organizations undergoing a change in their fundamental technological infrastructure. While diffusion of innovations focuses on the organizational level of analysis, structuration propositions focus on the group level of analysis (Poole, Siebold, & McPhee, 1985), and the social influence perspective (Fulk et al., 1990) explores the social effects of technology use on an *individual* level. Yet all of these doctrines share the theoretical assumption that technology use in organizations is not objective, but instead is "particularly subject to influences of social interaction because by nature it [communication technology] is interactive rather than a stand along technology." Thus,

"communication technology itself is inextricably entwined in the social interaction is facilitates" (Fulk et al., 1995, p. 266). Uncovering the implications of this for the implementation of planned change in healthcare organizations is a primary area of exploration in this dissertation.

CHANGE IMPLEMENTATION, SOCIAL INFORMATION PROCESSING, AND *INFORMAL* SOCIAL INFLUENCE

According to Lewis and Seibold (1993), communication processes are an intrinsic element of *implementation activities*, or activities "designed and enacted by internal or external change agents to specify usage of innovations and influence users' innovation-role-involvement, their formal (prescribed) and emergent patterns of interactions with and concerning the innovation" (p. 324). Communication processes undergirding these implementation activities include user training, and more importantly to the argument of this paper, user interactions and feedback regarding change programs. Indeed, resistance can manifest in employees' feedback communication in addition to their behavior, especially when change is mandated and obligatory for multiple stakeholders in the organization because this further exacerbates resistance. Therefore, alternating levels of worker feedback and communicative support can either transfuse resistant attitudes throughout the organization or suppress them.

Lewis (2011) argues that a weakness in current approaches to change implementation is overly ascribing the reactions of affected employees to their *individual* emotional responses, direct experiences, misunderstandings, and cognitive framings. From this limited purview, previous research underestimates the impact that multiple

stakeholders of organizational change have on one another and the *social dynamics* that create and sustain a *mutual sensemaking* of the change (Lewis, 2011).

For example, previous work has explored the social influence roots of change-specific cynicism, often encountered by organizational employees during a change. Change-specific cynicism, or "a disbelief of management's stated or implied motives for a specific organizational change" (Stanley, Meyer, & Topolnytsky, 2005, p. 436), has been linked to intention to resist that change (Qian & Daniels, 2008; Stanley et al, 2005). This resistance can escalate quickly as cynicism is said to be *contagious* and diffused through informal rather than formal organizational networks (Qian & Daniels. 2008). However, perhaps the finding that colleague cynicism has been found to predict levels of change-specific cynicism is even more interesting because it further evidences the tenets of SIP and the SI model (Qian & Daniels, 2008). Thus cynicism transposes into a social communication problem rather than a stable personality trait, and change-specific cynicism becomes a product of social construction within distinct social contexts (Qian & Daniels, 2008).

Several theories can be applied to contour the exploration of Lewis's argument and place more focus on the informal social exchanges that prescribe a joint meaning of the change processes encountered by employees during a workplace restructuring. In his work depicting how technology is permeated via adoption patterns throughout an organization, Bass (1969) empirically modeled both external and internal influences to expand on technological diffusion theory (Rogers, 1962). While sources outside of the adopter's social system, such as economics and politics, drive external influences to

adoption, internal influences to adoption are driven by social factors that play a critical role in consumers' willingness to embrace a technology. These internal influences are conceptualized as "social contagion" (Burt, 1987, p. 1287) in the diffusion of technological innovations literature. As others have since acknowledged, it is conventionally recognized that new technology use and acceptance is propelled by this social contagion. Moreover, "actors' adoptions are a function of their exposure to other actors' knowledge, attitudes, or behaviors concerning the new product" (Ford, Menachemi, Peterson, & Huerta, 2009, p. 275).

Social contagion is a core constituent of social information processing theory (SIP) (Salancik & Pfeffer, 1978) and the social influence model (Fulk et al., 1990) of technology use—both of which propose many psychological and communicative mechanisms through which coworkers influence the attitudes and behaviors of their colleagues. To elaborate, social information processing theory claims that social information, or cues in the form of 1) overt statements that individuals assimilate, (2) interpretations of events, (3) communication that increases the saliency of events by simply calling attention to them, and (4) provisions of standards for judging the appropriation of particular behaviors and for justifiably rationalizing workplace activities, creates cohesiveness amongst coworkers. Moreover, it provides a solid foundation to predicate that technology-related attitudes are not individually laden, but socially constructed. Moreover, SIP theory has explored both informational (Miller & Monge, 1985) and relational (Meyer, 1994) aspects of this social magnetism process.

Building on SIP theory, the social influence model contends that perceptions of medium quality will systematically vary across groups, and this difference in the perceptions of media will translate into differences in communication media patterns of individuals in distinct social contexts (Schmitz & Fulk, 1991). For example, in their study investigating the effects of perceived media richness on the use and assessments of email in addition to the impact of social information exchange, Schmitz and Fulk (1991) discovered that coworker use of email was a stronger and more consistent predictor of individual media assessments than supervisor use. This suggests that coworkers actually exert more social influence when it comes to ascribing technologies with perceptions of usefulness and richness. Subsequent research found similar findings, provoking the authors to assert:

> Although social information processing theory specifies supervisors as significant sources of social influence…supervisors' relative contributions appear smaller than for immediate coworkers. Perhaps in the domain of media perception and choice, the influences of *like others* are more profound than those of supervisors. (Fulk, Schmitz, & Ryu, 1995, p. 279)

In regards to organizational change, the SIP theory and social influence model both provide a framework for understanding previous scholars' arguments advocating the decisive role *informal, coworker communication* plays in effective organizational change (Daly, Teague, & Kitchen, 2003; Elving, 2005; Lewis, 2011). These theoretical lenses can also be employed to help explain how organizational change is reinvented or appropriated, which is explored in the next section of this chapter.

ADAPTIVE STRUCTURATION AND DIFFUSION OF INNOVATIONS: REINVENTION AS APPROPRIATIONS

Extant research on planned change in organizations has principally investigated implementation as a top-down operation, adopting a managerial perspective (Lewis & Seibold, 1998). Success of organizational change efforts is often equated with a change coming to fruition just as the managers had originally envisioned it. However, Lewis (2011) points out, "this approach leaves out important consideration of the processes by which organizations self-correct; avoid groupthink (i.e. insulating themselves with from critical voices disconfirming evidence, or reconsideration of goals); and maximize use of available resources in maintaining vigilance in decision-making" (p. 5). Research has repetitively demonstrated that front-line workers have the capacity to reinvent innovations during the process of adoption (Glaser & Backer, 1977; Rice & Rogers, 1980). For example, in her study examining the implementation of a new information technology in one organization over a two-year period, Orlikowski (1996) indeed discovered that organizational actors appropriated the technology overtime. The actors enacted a series of "subtle but nonetheless significant changes" in their attempts to resolve unanticipated breakdowns and contingencies, capitalize on opportunistic shifts in structure and coordination mechanisms, and embrace inventive procedures. Altogether, these changes evolved the "local" efficiency of the technology via a series of cognitive and normative accommodations (p. 63).

Thus the informal socialization preceding and sustaining a planned change program becomes cogent and is extremely influential in terms of predicting change

success at the organizational level. Not surprisingly then, Lewis and Seibold (1998) call for a more dynamic perspective of planned change that "highlights the active agency of all organizational members in implementation activities" and claim that the "impact of 'informal implementers' may be as influential as the efforts of formal implementation teams, if not more so" (p. 126).

When inundated with a challenging change venture, organizational members will likely seek out information to ease uncertainty levels and, in doing so, play an active role in modifying their implementation behaviors to individualize their new roles (Lewis & Seilbold, 1998). Rather than passively accepting the overall effects of change, *employees are likely to reinvent or adapt their behaviors* according to the socially constructed realities and informal relationships they form with those around them (Dornblaser, Lin, & Van de Ven, 1989; Leonard-Barton, 1988; Rice & Rogers, 1980). Acting as the engine for this social construction, communication is the fundamental ingredient incrementally erecting, designing, contriving, and driving these behavioral-change performances. It is conceivable, then, that tensions often emerge between implementers and users of technology in that the structure implementers intended for new technological innovations is reproduced through social dimensions, specifically worker's language use and (inter)actions (social dimensions). As such, the innovation is modified in ways not originally aligned with the implementer's intent (Poole & DeSanctis, 1994). Yet a team's ability to efficiently adapt to environments in meaningful, but perhaps unforeseen, ways is a hallmark for high performance (Salas, Rosen, & King, 2007).

As explained in the next paragraph, adaptive structuration theory is one theoretical perspective that provides a scholarly platform for outlining the duality of structure between the technology and the social system because the theory emphasizes a proposition of "appropriation" that is remarkably similar to the idea of *reinvention* (i.e. employees informally re-designing the use of a technology and its features) (DeSanctis & Poole, 1994; Poole & DeSanctis, 1990).

Adaptive Structuration. Stemming from Gidden's work on structuration theory (1979), which has yielded insight into organizational communication (Fulk, 1993; Heracleous & Hendry, 2000), *adaptive* structuration theory provides a viable framework for studying the role of advanced information technology in organizational change (Barley, 1986; Beckert 1999; Sarason, 1995). One preeminent reason for this is because it examines the process from two vantage points: 1) the types of structures built into advanced technologies, and 2) the technology structures that actually emerge in social systems as people interact with the new technology and faithfully use, adapt, or even ignore certain technological features based on the communicative and work needs of the group (DeScanctis & Poole, 1994).

Exactly a decade later, Poole and DeSanctis stretched Gidden's work into a strictly technological setting. Labeling it the "evolution-in-use" perspective, Poole and DeSanctis (1989) argue, "no matter what features are designed into a [technology] system, users mediate technology effects, adapting systems to their needs, resisting them, or refusing to use them at all.

The operative technology is determined by patterns of appropriation and use by human beings" (p. 7). According to the authors, technologies are comprised of both *structure potential* and *structures in use*. The confluence and/or aberration of the potential structure of a technology and the structures that are actually being utilized depends on how groups *appropriate* the technology, or select certain structures to satisfy their contextual exigencies or pursue prevalent practices (Poole & DeSanctis, 1990). Groups can either 1) appropriate a technology *faithfully*, meaning they use the technology in a way that complies with its *spirit*—the general understanding of how it "ought" to be used based on the intended ideas of its original designer; or 2) *ironically* appropriate a technology, meaning it is utilized in a way that is inconsistent with or violates the spirit of the technology. Thus, the scholars renounce preceding technological determinism arguments and instead emphasize how groups dynamically work to socially/situationally create perceptions of a technology and its utility. Therefore these perceptions can vary across groups and organizations (Poole & DeSanctis, 1992; DeSanctis & Poole, 1994). Consequently, technologies are bound to social orders and are interpretively flexible (Poole & DeSanctis, 1990).

Diffusion of Innovations. In his book *Diffusion of Innovations*, Everett Rogers synthesizes fifty years of research on the prevention and dissemination innovations in various styles of organizations. According to Rogers, "diffusion is the process by which a innovation is communicated through certain channels over time and among the members of a social system" and he envisions "diffusion is a special type of communication concerned with the spread of messages that are perceived as new ideas" (Rogers, 1995, p.

35). Given that healthcare organizations are constantly evolving and thrive on innovation in evidence-based medicine, delivery systems, information systems, and scientific experimental research, the diffusion of innovations framework is often applied in the study of successful implementation of change in healthcare organizations (Berwick, 2003; Cain & Mittman, 2002; Crook, Stephens, Pastorek, Mackert, & Donovan, 2015; Denis, Hebert, Langley, Lozeau, & Trottier, 2002; Fitzgerald, Ferlie, Wood, & Hawkins; Greenhalgh, Robert, Bate, Kyriakidou, Macfarlane, & Peacock, 2004; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004). Similar to adaptive structuration theory, diffusion of innovations depicts organizational change as a process that thrives on micro-level social contexts. To generate new insights into social change, this theoretical framework argues, special attention must be devoted to understanding the needs of different user groups and the importance of peer-to-peer conversations. Instead of being driven by managerial attempts to persuade, successful change is primarily grounded in the evolution or "reinvention" of the change, which entails that products and behaviors are modified to better accommodate the preferences end users. In much the same way that repetition does not equate learning, the simple spread of an innovation does not equate reinvention. Yet learning and reinvention are coalesced and required for successful organizational change. Moreover, reinvention is typically depicted as a shared sensemaking process as we rely on our peers to help us learn how to best use the innovation. No two organizations are the same and therefore new programs, such as information systems, must be adjusted so that they cater to the specific organization and

peer groups in which they are implemented (Rogers, 1995; Schroeder, Van de Ven, Scudder, & Roley, 1986).

According to Rogers (1995) in addition to a number of empirical studies on innovation in healthcare organizations (see Greenhalgh et al., 2005 for the full references), there are several key attributes of innovations, from the perspective of the adopter, which explain a large amount of the variation in the rate of innovation dissemination. These attributes include relative advantage, triability, complexity, compatibility, and observability. One aim of this dissertation is to specifically study how reinvention is related to the perceived relative advantage of an innovation in two health care networks. Relative advantage perceptions are heightened when a new innovation, or technology, has a clear, unambiguous advantage for employees in either effectiveness or cost effectiveness and thus is more easily and readily accepted and implemented (Greenhalgh et al, 2005). Simply put, if employees cannot visualize or understand the advantages of using a new innovation, they will not pursue it further. However, in healthcare organizations that undergo federally mandated change, this choice to comply or not comply is often not within the employee's discretion.

Given the previous consideration of choice, the diffusion of innovations in healthcare organizations can involve restrictions on decision-making processes that are currently less captured in the traditional application of the theory, and thus contribute to nuances in our understanding of its tenets. While innovation-decisions are often conceptualized as optional or collective, they can also be grounded in authority, which implies that choices to adopt or reject an innovation are made "by a relative few

individuals in a system who possess power, status, or technical expertise" (Rogers, 1995, p. 372). Yet research within the realm of healthcare innovation has found that collective innovation decision-making was not only important, but critical to successful innovation implementation (Noyes, Lewis, Bennett, Widdas, & Brombley, 2013). If healthcare employees are deprived of their choice to adopt an innovation, despite the perceived relative advantage it affords them in their work, their resistance to using the technology will inevitably spike (Greenhalgh et al., 2005; Rogers, 1995). However, this lack in choice to use the technology can conceivably be assuaged by reinvention, or an employee's capacity to refine or modify that technology to better suit the needs of their work. Moreover, there is strong evidence that the overall successful adoption of an innovation is contingent upon change reinvention, specifically in healthcare organizations (Greenhalgh et al., 2005; Gustafson, Sainfort, Eichler, Adams, Bisognano, & Steudel, 2003; Ovretveit, Bate, Clearly, Cretin, Gustafson, McInnes, McLeod, et al., 2002). In light of these connections and arguments for directionality, this dissertation seeks to validate the aforementioned relationships between reinvention, the perceived relative advantage of a technology, resistance, and perceived success of change implementation within an authority innovation-decision context. In the next section, I use the propositions in adaptive structuration theory and diffusion of innovations to more clearly argue for the direction of the relationship between reinvention and informal social influence that is proposed in the model that is specified tested in this dissertation.

Making a Case for Directionality. DeSanctis and Pooles' (1994) theoretical propositions claim that the key to understanding the adaptation patterns that emerge with

various technologies is to study groups' interactions. Put differently, studying how the communicative actions and behaviors of group members develop over time reveals the recursive relationship between technological and social system *structuration.* Structuration is the "process by which systems are produced and reproduced through members' use of rules and resources" (Poole & DeSanctis, 1989, p. 11). Moreover, previous studies have demonstrated that informal communication is the primary vehicle through which social needs are understood and realized in organizations, as well as how cohesion is maintained and innovation in ideas is generated (Johnson, Donohue, Atkin, & Johnson, 1994). As previously discussed, diffusion of innovations literature also emphasizes the importance of peer-to-peer communication and peer networks in the spreading of organizational change and innovations because it is often these individuals who hold our trust and with whom we can express our vulnerability. For this reason, it is conceivable why Lewis (2011) asserts that the informal perspective on organizational change deserves much attention; it is rich with untapped inquiries and potential areas of application-centered learning and theoretical knowledge-building.

Given the dual process model offered in adaptive structuration theory and the close, somewhat recursive, tie between reinvention and peer social influence in diffusion of innovations theory, the direction between informal social influence and reinvention, or appropriation, might be questioned. However, prior research supports the argument that informal social influence in the form or coworker social support and feedback is first an antecedent to change reinvention and only later an outcome (Fulk, 1993). For example, Fulk's (1993), similar to other social constructivists' research (Bijker, Hughes, & Pinch,

2012; Leonardi, 2012; Orlikowski, 1992, 2000), provides empirical and theoretical evidence that "work groups share identifiable patterns of meaning and action concerning communication technology" and these influential technology-related behaviors then predict technology conformity, compliance, and internalization effects (p. 921). Adaptive structuration theory posits that groups are first given a set of rules or regulations, or in the scope of this study an initial set of technological features in an information system, and *afterwards* adapt the rules constituted within this system, through their interactions and behaviors, in order to better fit their needs (Poole & DeScanctis, 1994). Similarly, innovation diffusion research within healthcare organizations has suggested that healthcare professionals first seek new system information, feedback, and support from their peer networks and *afterward*s use this aggregated information to construct a shared knowledge of how to actually use the new organizational system (Holden, 2013; Tucker & Edmondson, 2003). Thus, in the model outfitted in this research based on these theoretical frameworks, informal social influence is conceptualized as the mechanism through which reinvention, or the modification of an organizational change, is socially constructed and emerges.

EHR implementation is one specific type of acute organizational change that is currently sweeping the nation with a success rate contingent upon the informal interactions and in situ adaptations of its members. This context of planned organizational change, which is often propelled by authority innovation decisions, is explored in the next section.

EHR as a Specific Context of Planned Organizational Change: Challenges and Questions

Planned change involves much more than the implementation of new policies, programs, or procedures. As previously mentioned, it can be the impetus to an elevated degree of discontinuity and disruption in the workplace as people learn new roles, navigate new functions of their work, and acclimate to new machinery, values, and resources. Organizational members are relocated, re-situated, and converted—all in the hopes of giving the organization a fresh face-lift, which many of them at least initially fail to understand.

Even with this degree of general ambiguity that corresponds with change, the introduction of EHR into healthcare organizations can be even more confounding. Because healthcare is an industry that is tied to agencies of the state, the organizations in this field undergo frequent and complex isomorphic pressures as governmental actors exercise decisive power over institutional rules (For example, see Yang, Fang, & Huang, 2007). It is not uncommon for the federal government to regularly designate industry standards to which all of the organizations in that industry must conform. Labeled *coercive isomorphism*, this type of enforced and often involuntary change "results from both formal and informal pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society within which organizations function" (DiMaggio & Powell, 1983, p. 150). Thus rather than embracing an organizational change for normative reasons, such as contesting with competitors, or mimetic reasons, such as modeling your organization after another that has achieved

success, hospitals and other healthcare organizations are being coerced into revising their traditional means of recording patient records, which can serve as a source of resentment for several reasons other than the learning curve it commands.

CHALLENGES OF GOVERNMENT-MANDATED CHANGE: RADICAL, RULE-BOUND, AND BAD FAITH

EHR implementation is considered a *radical,* as compared to a routine, change because it clearly stipulates new processes and components that are a risky departure from the status quo. Thus, levels of resistance will likely be even more elevated with this genre of change. Indeed, this is the case for changes that are more strategic rather than evolutionary (de Val & Fuentes, 2003). Moreover, EHR implementation tactic often represents a *rule-bound* change process approach, which capitalizes on centralized power and highly structured/programmed tasks (Marcus, 1988). Unlike autonomous approaches to implementation, which accept that "people in the lowest echelons of an organization exhibit autonomy by redefining policies during the course of implementation" (Marcus, 1988, p. 237), rule-bound approaches are *formally* generated and oftentimes do not provide managers or subordinates with the opportunity to pursue more relevant courses of action when they emerge. Thus, these approaches are often tarnished with managerial "bad-faith compliance" (Bourgeois & Brodwin, 1984; Lewis & Seibold, 1998, p. 99).

Indeed, research in medical informatics has continuously suggested that ICT development in a healthcare context should not be oriented around a standardized data-repository system, but rather designed for integrated patient care, which is process—not end task—oriented and has a primary goal of understanding patient needs (Berg &

Toussaint, 2003). As such, researchers have discovered that physicians and nurses implementing electronic health records have used the models in ways that are partial, eclectic, and highly implicit (Berg & Toussaint, 2003) in order to more efficiently serve the patient. This is possible because healthcare providers are themselves rich sources of memory and sometimes rely on their own cognitive maps and the information they informally share with each other to augment patient outcomes and satisfaction. Instead of inputting data, rather, they devote their time to ensuring that their activities are and remain coordinated so as to rightfully attend to their patients.

Hence, a core challenge of EHR, and perhaps other large-scale ICT developmental systems introduced to healthcare organizations, is to "fruitfully use the ICT as simultaneously a coordinating and accumulating tool-in-development, and drawing upon these functionalities as a change agent (never fully predictable!) in an ongoing process of organizational development" (Berg & Touissant, 2003, p. 232). If health professionals are not granted the leverage to find their footing during new change initiatives, or make adjustments vis-à-vis informal reinvention, is resistance more likely to surface in the "off the record" or spontaneous interactions surrounding the change? As Reger, Gustafson, Demarie, and Mullane (1994) suggest, skepticism is not a stranger to employees throughout the informal socialization that precedes fully assimilated change: "organizational members are active 'framers' as they attempt to make sense of change using cognitive frameworks that may or may not match those of upper managers" (p. 568).

In healthcare environments in particular, previous research has demonstrated that organizational members who engage in more informal social interactions at work and seek to establish informal, supportive relationships are significantly less likely to confront stress throughout their careers (Leiter, 1988; Pines, Aronson, & Kafry, 1981). Past literature investigating the impact of social interaction following a new technological change also discovered that beliefs about personal mastery of a technology are directly influenced by the individuals with whom a person interacts in the their workspace. Moreover, the most impactful of these interactants are their structurally equivalent coworkers (Burkhardt, 1994). Thus, informal social interactions are seemingly the key to improving employee morale, especially in times of change that thrive upon high uncertainty. Past research has hailed the role of co-worker social support in positively enhancing job involvement, job satisfaction, organizational commitment, work effectiveness, and task performance (Chiaburu & Harrison, 2008). Specifically, in healthcare and human service organizations, coworker social support has been negatively linked to emotional exhaustion and turnover (Ducharme, Knudsen, & Roman, 2007; Erenstein & McCaffrey, 2007). In the context of this specific study, it is hypothesized that informal social influence, in the form of coworker feedback and social support in regards to EHR implementation and use, will have a direct effect on the organizational change outcomes in this study, including employee perceptions of change success, employee perceptions of the relative advantage of the EHR technology, and finally, employee resistance. Given the challenges of this specific type of organizational change and the social work dimensions/behavioral adjustments that can either mitigate or

multiply these challenges, the remaining sections of this chapter offer the hypotheses that provide the backbone to this dissertation.

HYPOTHESES GUIDING THIS STUDY

Social Influence and Outcome Variables

Positioning the previous arguments within the frameworks of social influence and adaptive structuration theory, a primary objective of this dissertation is to discover how informal, social interactions can act as an undercurrent to change events, either obstructing or fostering psychological—perceptions of change success and technology profitability—and behavioral—employee resistance and work-arounds—outcomes.

Specifically, the current research is designed to unveil the impact that informal social influence has on the vacillation of four outcome variables: (1) *change reinvention*, or the degree of departure from an intended change design (technology use) due to change actors dynamically shaping and molding innovations as they diffuse into an organization (Rice & Rogers, 1980; Lewis, 2011); (2) *employee resistance* to change, constructed as a behavioral, cognitive, or communicative "act of disobedience, defiance, and/or a reactive process by which employees oppose the initiatives of change agents" (Lewis, 2011, p. 190); (3) employee *perceptions of change success*, which will be measured by three items that ask employees to indicate how successfully they believe the change has been implemented within their organization; and finally (4) employee perceptions of the *relative advantage of the technology*, which is defined by Rogers (1995) as "the degree to which an innovation is perceived as being better than the idea it

supersedes" (p. 212). Unlike the scholar's conception of compatibility—which measures the degree to which a new innovation is consistent with existing values—or complexity—which measures how difficult a new technology or innovation is to understand—perceptions of relative advantage revolve around a comparison and/or juxtaposition of two competing ideologies. One ideology is grounded within the comforts of current knowledge—in this case, paper records; the other is an optimistic look towards the future and uncharted territory. This relative advantage variable focuses on the capacity for a new technology to improve workflow, increase efficiency, and introduce other benefits that outweigh the costs of training. Therefore, this variable is of key interest in this study.

These variables and theoretical arguments constitute the first multi-faceted hypothesis guiding this study. It is important to note that while past literature builds strong theoretical arguments suggesting the aforementioned variables are interrelated, structural equation modeling—the analytical technique used in this dissertation—does not meet the criteria for statistically measuring directionality of influence (see Hoyle, & Smith, 1994). Rather, directionality is inferred by reasonable hypotheses formulated according to accumulated theory and past research. Thus, given the scholarship previously cited, the first set of hypothesized relationships are posed:

> Hypothesis 1: Informal social influence in the form of coworker feedback and support will significantly impact interactions with and perceptions of organizational change.
>
> H1a: There will be a direct positive relationship between the informal communication surrounding change implementation, specifically

coworker feedback and social support, and change reinvention in healthcare organizations.

H1b: Informal communication surrounding change implementation, specifically coworker feedback and social support, will lead to perceptions of change success in healthcare organizations.

H1c: Informal communication surrounding change implementation, specifically coworker feedback and social support, will lead to change resistance in healthcare organizations.

H1d: Informal communication surrounding change implementation, specifically coworker feedback and social support, will lead to perceptions of the relative advantage of EHR technology in healthcare organizations.

Reinvention and Outcome Variables including Communication Quality

Additionally, this dissertation also investigates the impact change reinvention, or in this case technological appropriation, has on each of the aforementioned outcome variables, plus one more: employee's *perception of communication quality* surrounding the change. The reasoning behind adding this additional variable is multi-faceted, and I'll spend the rest of this section clarifying why it is included.

First, it is important to unequivocally emphasize that the value of the potential outcomes of a work-around can either be positive or negative; they can be constructive or destructive (Warren 2003). Indeed, work-arounds can have an unpredictable nature because they are grounded in particular employee behaviors and workplace environments

(Blick, 1997). This ideology is further informed by the aforementioned adaptive structuration proposition that different groups can create distinct uses for the same technology as a result of the socially constructed language each group uses to 1) describe the technology and 2) create a reality surrounding it. As such, change reinvention, or work-arounds, can lead to problems of quality with systems that some believe should be reliable, consistent, and uniform (Spear, 2005; Spear & Schmidhofer, 2005). In fact, Reason (1990, 2004) has used a Swiss cheese metaphor to portray work-arounds as holes in the system where potential violations of safety protocol reside. Past literature in the healthcare field is inundated with research recognizing the infamous connections between work-arounds and increases in risk as well as decreases in patient safety and patient care quality (Edmondson, 2003; Spear & Schmidhofer, 2005). While this literature is sizable, the relationship between work-arounds and *perceptions of communication quality* surrounding a change has heretofore been unexplored (Halbeslenben, Wakefield, & Wakefield, 2008, p.3). Nevertheless, this relationship deserves attention. As the scholars previously cited have suggested, work-arounds can cause incongruities and breaks in consistency; however, as Stevenson and Greenberg (1998) point out, *unifying* narratives are not only needed, but often desired to guide change initiatives and explain unfolding sequences of events during times of heightened uncertainty.

This contradiction appears problematic because, as previously inferred, work-arounds can be conceptualized as creating multiple, situationally contingent narratives. Potentially interpreted as a form of deviance, work-arounds can signify a form of digression from a prescribed, *functional* behavior that is aligned with a set of codified

rules, procedures, or protocols. Yet the *normative* behaviors that naturally emerge within unique working or "reference" groups have the ability to alter behaviors surrounding work tasks, transforming behavioral alignment from a mandatory action to one that embraces a "home-grown" mentality. As a result, different pockets of norms can be found within several dimensions of a healthcare organization—including norms set around occupational groups, shift groups, break room groups, and age groups. Adaptive structuration theory posits that each of these pockets will engage in unique technological work-arounds to answer the distinctive blocks in workflow the new technology creates for each specific group.

This segmentation of behavior might also lead to perceptions of divisive communication surrounding the change. If each working group holds an atypical picture of the operating ability of a new technology and interacts differently with it, it is likely the narrative surrounding the technology's efficiency, value, and prescribed usability will also vary—especially across the organization as a whole. Thus, there could be a negative relationship between prevalence of change reinvention, or work-arounds, and perceptions of the quality of communication surrounding the change coming from all sources within the organization.

On the other hand, the ability to engage in work-arounds, and consequently expedite work and reduce disruptions stirred by the new technology, could also encourage employees to outsource for information less frequently. In other words, behavioral work-arounds might diminish the need for high quality communication surrounding the change; in fact, several scholars have referred to work-arounds as a

means to imperative, first-order problem-solving within an organization, in which employees create a mechanism to get the job done (Halbesleben et al., 2008; Tucker & Edmondson, 2002). As such, increases in work-arounds might evolve into increases in perceptions of the communication quality surrounding a change simply because people who engage in more work-arounds rely on the quality of change communication less frequently than those who engage in fewer work-arounds and must constantly consult outside sources.

In fact, psychology studies often find a direct effect of personal relevance on attitudes in that if something is highly relevant to a person, s/he is more concerned with its consequences and attributes. However, if something is of low relevance, perhaps perceptions of communication quality surrounding a change, people will care less for its consequences and attributes and are less critical in that they adopt something similar to an out-of-sight, out-of-mind framework (Liberman & Chaiken, 1996). This extant research questions the positive or negative direction of the relationship between work-arounds and communication quality. However, it builds a strong case that a pathway will emerge from work-arounds to perceptions of change communication quality in the final model of this dissertation. These arguments coupled with the previous literature on resistance, perceptions of change success, and perceptions of relative advantage of a technology, generates the next hypothesis:

> Hypothesis 2: There will be a direct relationship between healthcare employees' levels of reinvention in organizational change and their resistance to change, perception of change success, perception of the relative advantage

of EHR technology, and perception of the quality of communication surrounding the change.

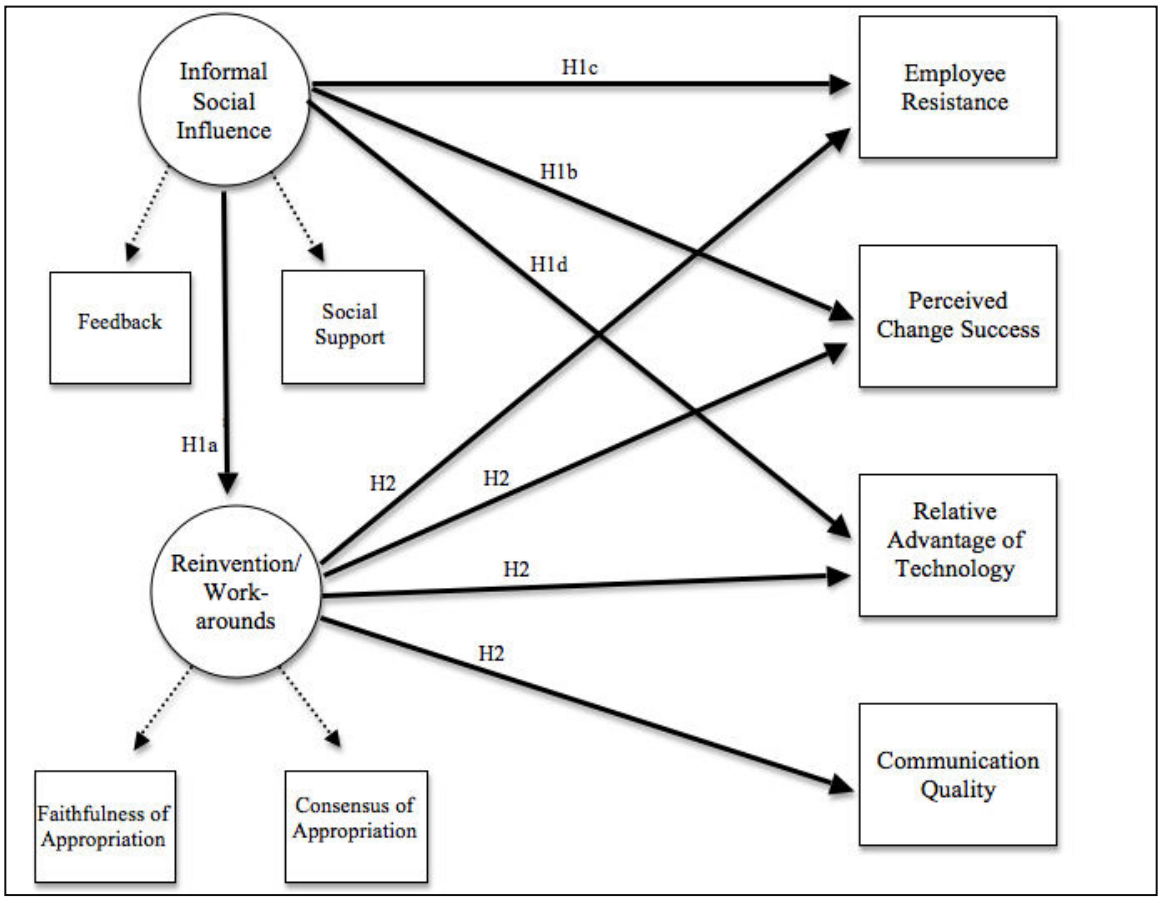

Figure 2.1. Proposed SEM Model: Coworker Social Influence and Organizational Change.

Demographics and Resistance

The stakeholder groups comprising an organization will likely have different foundations of experience and cognizance. This is due to their position in the hierarchy, occupational community, or prior socialization into specific jobs, which impact the way they interpret and receive messages about a change (Gallivan, 2001; Lewis, 2007). Given the confidence and control medical practitioners are trained to espouse when interacting

in their workplace (Baumann, Deber, & Thompson, 1991; Eisenberg et al., 2005; McCabe & Timmins, 2003; Studdert, Mello, Sage, DesRoches, Peugh, Zapert, & Brennan, 2005; Weick, 1979) and their often-cited inhibitions to disclose uncertainty (for example, see Schor, Pilpel, & Benbassat, 1999), nurses and especially physicians will likely not be satisfied having their much-deserved and incrementally-earned power stripped from their repository.

Indeed, a study on medical leadership in Canada, funded by the NIH, argues that doctors in Western populations have struggled with the recent strong movement towards medicalization. This is due in large part to their expensive and timely training requirements:

> Within hospitals and clinics, many aspects of the physician's daily routine have changed dramatically during the past generation, adding another level of complexity to the management of healthcare…doctors are increasingly unhappy with the way they are managed. A main cause of physician dissatisfaction lies in the fact that "the individual orientation that doctors were trained for does not fit with the demands of current healthcare systems." (Chadi, 2009; Edwards, Kornacki, & Silversin, 2002, p. 835.)

Faced with numerous problems like funding constraints and demands for greater accountability, the Chadi argues that doctors are:

> More and more frustrated with their daily workload and don't feel as appreciated and supported as they might have been in the past. Physicians frequently receive instructions regarding these new demands from leaders who either do not possess a clinical background or do not wish to occupy the leadership role they are occupying. Hence, the lack of clear and reassuring guidance coming from respected and qualified professionals affects doctors as much as the overall well-being of the whole Canadian medical system (2009).

Conceivably, power issues can become a central issue for doctors throughout EHR implementation. Using their own political moves, doctors might hinder the change

process to maintain their own original power by, at least informally, eliminating the power of the change agent.

Nurses are also undergoing a shift in which ever-increasing productivity expectations and demands have led to enhanced nurse retention in hospitals and reductions of quality of life (Gifford, Zammuto, & Goodman, 2002). It is likely that the uncertainty accompanying EHR implementation will at least initially have a dramatic impact on nurses who will be thrust into an unpredictable environment, thereby increasing an already weighty psychological and physically exhausting workload (Chambliss, 1996). EHR implementation will implore nurses to endure stretches of cognitive resilience, rather than cognitive reliability, as they manage unexpected events and adjust existing organizational rules to cater to new circumstances (Bracco, Gianatti & Pisano, 2008). Nurses have been depicted as procuring a "glue function" in their work, which implies a holistic view of both the patient's medical and social needs and the other health professionals' actions with patients (Jinks & Hope, 2000, p. 273). Other scholars have discovered that nurses use this "glue function" to enhance quality of care (Fagerberg, 2004). It can feasibly be conjectured that learning a new electronic medical system for information input will at least initially throw a wrench into a nurse's systemic performance, interfering with his/her workflow as s/he experiments with work-arounds that can alleviate work delays and interruptions. Thus a new EHR system has the propensity to contaminate "the glue" securing the patient-centered working culture (Jinks & Hope, 2000, p. 273).

In addition to occupational role, it is likely that employee age will also serve as a fundamental characteristic that defines an employee's aptitude for more or less change resistance. However, exactly how age will impact the capacity to resist is not necessarily transparent. Theoretical perspectives such as the diffusion of innovations (Rogers 1962, 1983, 1995, 2003) and the technology acceptance model (TAM) (Davis, 1989) have long acknowledged the mediating influence age plays on technology/innovation adoption and the implementation process (see Porter & Donthu, 2006, for a more updated example).

While the general rule of thumb is that early adopters are younger in age because they abide by a set of more modern values and are less conditioned by an older, more traditional culture (Rogers, 1962), this relationship has been called into question on multiple occasions. In fact some more seasoned studies have found exactly the opposite: older aged veterans are in actuality associated with more innovativeness (Beal & Rogers, 1960; Dickerson & Gentry, 1983; Hoffer & Strangland, 1958; Sheppard, 1960). Nonetheless, Decker and colleagues (2012) recently discovered that physicians aged 55 or older lagged in adoption of EHR in comparison with their younger counterparts. Put very specifically into a health context, this finding is revealing, but additional research needs to be conducted to reaffirm its results.

The underlying psychology compelling this higher resistance in older generational crowds can at least partially be explained by peering into somewhat recent aging and metacognition literature. According to Hertzog and Hultsch (2000), aging usually coincides with a reduced perception in one's willingness or capability to learn, which can

thereafter translate into equally lowered perceptions in one's self efficacy in cognitive functioning (Bandura, 1997). Therefore, older healthcare employees might have concerns with their self-efficacy when it comes to using and maneuvering EHR systems encumbered with advanced, and seemingly complicated, customs and features. When it comes to the dicey terrain of change, older individuals tend to espouse self-referent, metacognitive beliefs, which convince them they are not well suited or equipped for the change due to their age. Accordingly, they perceive their ability to enact or perform said change to be deficient. These metacognitive beliefs, which surmount to self-reinforcing narratives that justify or rationalize one's actions based on her/his age, can affect older individuals' decisions "to engage in or avoid cognitively demanding situations" (Hertzog & Hultsch, 2000, p. 440). Additionally, they can provoke more seasoned employees to circumvent situations that are perceived to be anxiety producing and/or difficult due to their association with high levels of uncertainty.

While Decker and colleague's (2012) study confirmed older physicians are indeed trailing in the trend to adopt electronic health records, this dissertation seeks to build on this finding. Specifically, incorporating other hospital professions into the equation in addition to further understanding if this delayed adoption is at least partially explained by employee resistance contributes to previous literature.

The final demographic trait conjectured to be associated with employee resistance in this study is experience—that is, experience in one's specific occupation within an organization. While previous research has attested to the weight employee experience

has in constructing and designing temporal identities in the workplace (Barrett, 2014), the impact of employee tenure within an organization on resistance to change is heretofore largely unexamined. It is true that employees with more accumulated *social status* in an organization, one contributing element of which is occupational prestige, have been speculated to entertain higher levels of innovativeness (Rogers, 1962, 1983). Moreover, job experience has been cited as "a critical compounding variable in determining the acceptance or rejection of change" (Sagie, Elizur, & Greenbaum, 1985, p. 157).

However, social status in the organization are not necessarily equitable to occupational experience within an organization. There are several reasons for this discrepancy, but the most notable one is grounded in the implications of one ascertaining a heightened familiarity with the temporality of his/her specific workplace. Explained further, the level of experience acquired and earned within a particular organization determines perceptions of "insiders" and "outsiders." These temporal identities define 1) those who procedurally know the ropes in an organization, and thus are likely more accustomed to and protective of current practices, and 2) those who are still experiencing high uncertainty, and therefore are still searching for their own particular method of "fitting in" and belaboring workplace decisions (Barrett, 2014). The capacity for a new technological information system to disorder the intuitive knowledge uniquely assembled by "insiders" while potentially providing learning shortcuts to newbie "outsiders," is likely to have a negative outcome for the insiders who are more trained within the organization. In other words, it will result in the increased probability of this change to exasperate and hinder those who have accrued more experience in their particular

occupation and distinctively cultured organization. This demographic argument coupled with the others before it, which centered on employee occupational group and age, comprise the third hypothesis guiding this dissertation:

> Hypothesis 3*:* Employees' demographics will significantly impact their resistance to change in the following manner:
>
> > H3a) Physicians and nurses will be significantly more resistant to EHR implementation than administrators, technicians, and other health professionals/assistants. Physicians are the most resistant occupational group overall.
> >
> > H3b) Older employees will be more resistance to change than younger ones.
> >
> > H3c) Employees with more tenure in the organization will be more resistant to organizational change than those with less tenure.

Organizational Communication Surrounding Implementation

In addition, several academic studies on planned organizational change have suggested that organizational communication variables can also have an impact on worker resistance to change and assimilating formal change into mainstream activities (Allen, Jimmieson, Bordia, & Irmer, 2007; Lewis, 1999; Lewis & Seibold, 1993; Marcus, 1988). The simple frequency with which a change mission is presented, displaying statements throughout organizational venues and meeting rooms for example, has been

found to generate significant amounts of energy around the change as it crystallizes change objectives and aids in employees' comprehension and internalization of the innovation (Lewis, 2000). Thus, leaders, or managers, play a pivotal role in projecting these mission statements throughout the organization and into the informal conversations of employees (Graetz, 2000). This message dispersal garners commitment for the change and a sense of direction for employees. Indeed, disseminating critical information to help navigate an intra-organizational or inter-organizational transformation is one of the primary hallmarks in determining the success of planned and unplanned change efforts (Bharosa, Lee, & Janssen, 2010; Lewis, 1999). For example, Allen and colleagues (2007) discovered that direct supervisors are the ideal source from which employees seek implementation-based and job-relevant information in times of change-related uncertainty. Senior management, on the other hand, was more typically targeted for strategic information—including the rationale for the change and the updated future directions of the organization. Even beyond source, organizational scholars regularly attest to the functional, symbolic, and linguistic roles of communication in helping to frame and explain organizational change efforts, motives, and rationality (Albrecht & Hall, 1991; Fairhurst & Wendt, 1993; Fulk et al., 1990; Lewis & Seibold, 1990; Torppa & Smith, 2011).

Put simply, how organizational members find out about a change matters. In their study investigating how messages about a change affect desired outcomes, Papa and Papa (1990) deduce that more research is needed to understand the nuances in how formal and informal information contouring a change are comparatively influential in getting

employees to align with change ambitions and targets. They determine that "it may be possible that employees form perceptions of a change as soon as they hear about it from management or through the grapevine. If this is true, it may be important for managers or trainers to consider how they initially spread information about a change" (p. 37).

To that end, interpersonal channels have been strongly endorsed in communicating change to organizational employees, especially if that change is complex, and workers perceive it to be ambiguous and risky (Fidler & Johnson, 1984; Larkin & Larkin, 1994; Young & Post, 1993). Yet organizationally mandated change in many ways is conducted by a "faceless" change agent and can be impersonal and seem as if it is stemming from a foreign source. For instance, it is clear that the mandate to comply with EHR regulations in the U.S. is a result of the HITECH Act in the American Recovery and Reinvestment legislation (AARA), which was signed into law in 2009 by President Barack Obama (see "HITECH Act to Mandate", 2012). However, this distance between the organization and the authoritarian source spawns some critical questions. Mainly, how are organizational front-line members actually first introduced to and kept informed about change initiatives? For instance, Larkin and Larkin (1994) suggest that most media channels (reports, videos, presentations) are somewhat ineffective in implementing change as they are grounded in the CEO's, or in this case the president or government's, perspective. This "outsider" communication is bankrupt when it comes to influencing employees to change; yet this is exactly how many medical employees are introduced to and trained in EHR use. In the case of larger healthcare offices, technical support and training in regards to EHR use typically comes from corporate offices. For smaller

healthcare workplaces, EHR use and training information stems from vendor contracts or regional extension centers (RECs) (Goldberg, Kuzel, Feng, DeShazo, & Love, 2012).

Not surprisingly then, recent literature has begun spotlighting employees' perceptions of the *communication quality* surrounding a change. These perceptions are a primary ingredient dictating employees' (re)appraisals of change and driving need for uncertainty reduction; the ultimate ideology is that the provision of information alone is simply not enough (Bordia et al., 2004; Bordia, Hunt, Paulsen, Tourish, & DiFonzo, 2004). To better understand how the perceived quality of the communication processes underlying a change

sheds light on both employees' psychological outlooks towards that change as well as their interaction, or behavior, with it, the following hypothesis is posed:

> Hypothesis 4: Healthcare employees' perceptions of the quality of communication surrounding implementation initiatives will significantly predict their resistance to change, perception of change success, and perception of the relative advantage of the EHR technology.

Organizational Dissent Messages

Finally, messages of organizational dissent have also been linked to acts of social influence within the organization (Garner, 2009), and as such, dissent has been depicted as driving cognitions, attitudes and judgments (Nemeth, 1995), which are particularly vulnerable during times of large-scale organizational change. While change-specific cynicism has been conceptualized as a communication phenomenon in that it is socially

constructed through the communicative acts within an organization, cynicism is still a psychological condition that must be communicated. It follows that change-specific cynicism, is likely verbalized through messages of employee dissent, which entails "expressing disagreement or contradictory opinions about organizational practices, policies, and operations" (Kassing, 1998, p. 183). Previous scholarship has already demonstrated the positive relationship between the prevalence of dissent messages and employee burnout (Avtgis, Thomas-Maddox, Taylor, & Patterson, 2007). Yet it's likely that dissent messages can take a toll on the organizational as a whole as well—especially during times of high uncertainty. It is conceivable that dissent messages cripple organizational change efforts yet are multiplied during periods of change implementation. Kassing's (1998) model of employee dissent claims that dissent messages are instigated by a triggering event or agent that causes incongruence in employees' actual and expected state of affairs. Organizational change can indeed act as such a triggering event, and thus fuel dissent messages that hinder change outcomes and successful implementation. Thus, the next hypothesis in this study is posed:

> Hypothesis 5: Messages of dissent surrounding a change will positively predict change reinvention and resistance to change, and negatively predict perceptions of change success.

In sum, this dissertation is interested in exploring the five aforementioned hypotheses. Table 2.1 provides a comprehensive summary of the proposed research. Figure 2.1 presents an outline of the theoretically specified model.

Table 2.1. List of Study Hypotheses

Hypothesis 1: Informal social influence, in the form of coworker feedback and support, will significantly impact interactions with and perceptions of organizational change. H1a: There will be a direct positive relationship between the informal communication surrounding change implementation, specifically coworker feedback and social support, and change reinvention in healthcare organizations. H1b: Informal communication surrounding change implementation, specifically coworker feedback and social support, will lead to perceptions of change success in healthcare organizations. H1c: Informal communication surrounding change implementation, specifically coworker feedback and social support, will lead to change resistance in healthcare organizations. H1d: Informal communication surrounding change implementation, specifically coworker feedback and social support, will lead to perceptions of the relative advantage of EHR technology in healthcare organizations.
Hypothesis 2: There will be a direct relationship between healthcare employees' levels of reinvention in organizational change will significantly and their resistance to change, perception of change success, perception of the relative advantage of EHR technology, and perception of the communication quality surrounding the change.
Hypothesis 3*:* Employee demographics will significantly impact change resistance in that a) physicians and nurses will be significantly more resistant to EHR implementation than administrators, technicians, and other health professionals/assistants. Physicians are the most resistant overall, b) older employees will be more resistance to change than younger ones, and c) employees with more tenure in the organization will be more resistant to the organizational change and those with less tenure.
Hypothesis 4: Healthcare employees' perceptions of the quality of communication surrounding implementation initiatives will significantly predict their resistance to change, perception of change success and perception of the relative advantage of the EHR technology.
Hypothesis 5: Messages of dissent surrounding a change will positively predict change reinvention and resistance to change, and negatively predict perceptions of change success.

The next chapter of this dissertation describes the research design, methodology, and analytic methods that were used to conduct this research. In addition, the upcoming section will demonstrate how the variables reviewed and explicated in the current chapter are operationalized and therefore used to build a model that defines the nature of the relationships between any two variables in this study.

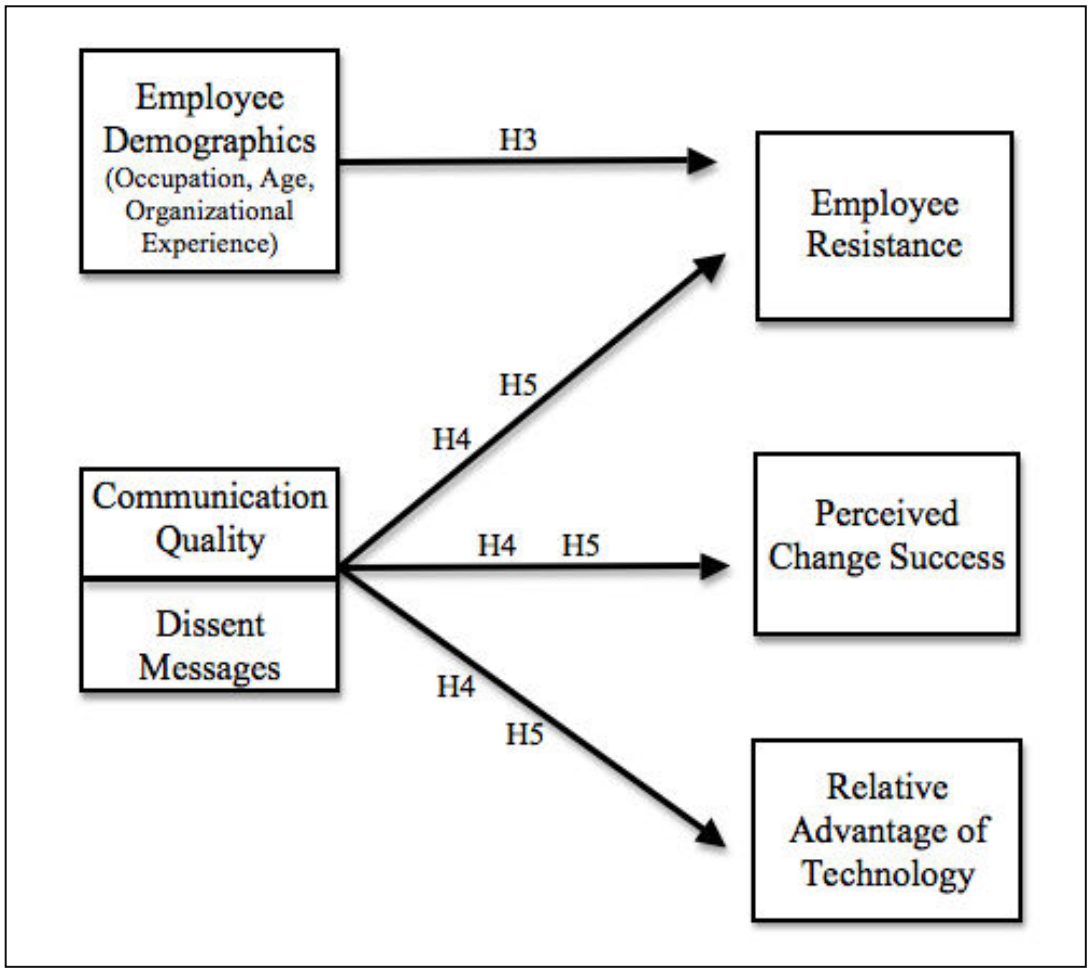

Figure 2.2. Predicted Relationships Outside of SEM Model

Chapter 3: Method

Study Overview

To address the hypotheses derived for this study, I collected quantitative and qualitative data in the form of a preliminary and primary survey, along with interviews and focus groups. However, the principal means of data collection and chief goals of this dissertation are grounded in quantitative research. Collecting interview and focus group data at the beginning of my project optimized the effectiveness of my primary survey because I was able to use preliminary inputs from a different method to improve my main data collection strategy.

I chose this overarching multi-methodological approach for several reasons. In behavioral and social science research, the research question(s) should drive the research methodology (Weathington, Cunningham, and Pittenger, 2010) and, consequently, inform the methods and design of the investigation (see Brewer & Hunter, 2005; Bryman, 2007; Creswell & Plano Clark, 2007; Rao & Woolcock, 2003). While the hypotheses proposed in this study require quantitative methods, future inquiries I plan to explore with my collected research, such as discovering specific work-arounds that are occurring with EHR in the workplace, will require qualitative undertakings. However, in the current study, I utilized preliminary qualitative data in the form of interviews and focus groups as broad qualitative data used to enhance my instrument and make sense of quantitative findings. This method of a complementary research design, which uses preliminary qualitative data to develop survey instruments, is commonly used in health-related

research (Bauman & Adair, 1992; Fultz & Herzog, 1993; Morgan, 1998). The purpose for this mixed method design strategy, commonly known as development, is to increase the validity of constructs and inquiry results by capitalizing on inherent strengths in both methods (Greene, Caracelli, & Graham, 1989).

Therefore, although some scholars see qualitative and quantitative work as opposite orientations to research, the two approaches can be mutually supportive (Lee, 1991). In fact, methodically integrating both strands of research can engender stronger inferences and conclusions as together they demonstrate a more coherent, comprehensive, and meaningful picture than either could standing alone. Using both qualitative and quantitative methods allows for methodological triangulation, or the combination/convergence of research methodologies in studying the same phenomenon, which "is not a tool or a strategy of validation, but an alternative to validation" (Denzin & Lincoln, 1994, p. 2). Utilizing both methods adds depth, breadth, and accuracy to the research and helps to ensure that variance is indeed due to study variables and not the selected research method.

The hypotheses framing this dissertation are concerned with measurement, explanation, and prediction. The main objective is constructing a theory-based empirical model that explains the impact of social influence and change reinvention on 1) employee resistance, 2) perceived change success, 3) perceived relative advantage of EHR technology, and 4) perceived communication quality surrounding the change. Consequently I posed five hypotheses to explore the various effects amongst these variables, for which quantitative methods proved to be the most valuable overarching

approach. Now that I have provided an overview of the research design, in the following sections, I explain the research sites, participants, data collection timeline, research protocols, data collection details (for both the pilot survey and primary survey), and finally, and how the variables are operationalized.

RESEARCH SITE

I collected data from two primary research sites. Although the organizations participating in this study did not specifically request to be blinded, I still chose to use pseudonyms for these organizations to protect the identities of the workers who comprise them. The healthcare industry is currently undergoing considerable changes, and the goal of this study was to not critically evaluate work-arounds at the worker's expense, but rather to understand the communicative and psychological conditions that cause them. Consequently, I will call the research sites Healthcare Center A and Healthcare Center B. Both of these healthcare organizations are located in the Southwestern U.S. Healthcare Center A is a nonprofit federally qualified Health Center that delivers medical, dental and behavioral services to the underprivileged citizens in the surrounding county. Healthcare Center B comprises a larger healthcare campus that includes an acute-care hospital, centers for out-patient procedures, a clinic-family medicine center, and a primary care facility as well as other professional offices.

Healthcare Center A

Healthcare Center A is composed of approximately 400 employees and also houses a family medicine residency program, which currently generates a graduating

class of roughly 35 residents per year. The healthcare facility became a Section 330 (e) community health center in 1999 and provides a laundry list of services to the less fortunate individuals in it surrounding community. These services include: comprehensive primary medical care, 24 hour emergency on-call, behavioral healthcare services, cancer screening, social services, dental care, diabetes testing/care, gynecology, health/nutritional education, immunizations, labs/ X-rays, mental/psychiatric health services, obstetrics, pediatrics, pharmacy, referrals for specialty care, and sexual abuse support services, among other services.

Healthcare Center A houses four resident clinic team areas with seven exam rooms each and adjacent resident work rooms; two dedicated minor procedure rooms; a 13-room outpatient clinic, which includes a behavioral health training clinic; faculty and administrative offices; a resident conference room and adjacent 200-seat auditorium; a full service pharmacy with robotic prescription processing; counseling services and two psychiatrist offices (*Waco Texas Family Medicine Residency Program*, 2014).

Healthcare Center A implemented its EHR system in 1997, and since then, it has more than tripled the number of patients served—currently serving around 92,00 residents in its county. Healthcare Center A has also expanded from a single location to ten different sites within this time span. In 2009, Healthcare Center A was awarded with the HIMSS (Healthcare Information and Management Systems Society) Nicholas E. Davies Award of Excellence, which recognizes outstanding achievement in the implementation of healthcare information technology (IT). This accolade specifically acknowledges use of EHRs and publically promotes healthcare leaders who demonstrate

that healthcare IT can be used to enhance patient safety and elicit quality outcomes. (See Monegain, 2009 for a press release covering the 2009 Davies Award recipients.)

As the facility continues to grow, they have further expanded their innovative technology use to enhance medical education by collaborating with the local community college's School of Nursing to create a simulation lab. This state-of-the-art facility houses high fidelity mannequins and an audio-visual recording system that allows physicians-in-training to practice high-stakes scenarios in a seemingly real-life, albeit controlled, environment without harm to real patients.

Within the next five years, Healthcare Center A is concurrently working to transition to a Patient Centered Medical Home (PCMH). This is a model of patient care that prioritizes information coordination between the patient, his/her personal physician(s) and, when necessary, the patient's family. This emphasis on coordinated care also seeks to promote patient information transferability across a broader healthcare system. This system includes hospitals, specialty care, and home healthcare, for example, and it stretches to incorporate sensitive transitions, such as a patient's discharge from a hospital. (See the PCMH Resource Center website at pcmh.ahrq.gov for more information).

The CEO of the Healthcare Center A, openly declares EHR implementation and use as a cornerstone of this organization's expansion and the catalyst of their improvement efforts (Monegain, 2009). Healthcare Center A was in fact one of the first academic customers of an IT healthcare provider known as "Epic Corporation" and was involved in the testing and piloting of their electronic health record system, now called

EpicCare, before it was publically released. The healthcare facility continues to grow its business relationship with Epic. The organization's early adopter status was a primary reason why it was awarded with the prestigious Davies Award, aforementioned, for improving patient outcomes through the use of an electronic health record. I further elaborate on the popular EHR vendor EpicCare in following sections of this chapter.

Healthcare Center B

I also recruited participants from Healthcare Center B, which is a general medical and surgical hospital located in the same city as Healthcare Center A. Founded in 1905, the Healthcare Center B Network, the first hospital in its city, is dedicated to providing exceptional healthcare with a special commitment to the poor. It is operated by a parental system called Ascension Health, the nation's largest Catholic and non-profit health system. Healthcare Center B encompasses a 301-bed acute care full-service medical center with cardiac, orthopedic, obstetric, surgical weight loss, rehabilitative and emergency services. Services rendered include inpatient and outpatient services in addition to patient/family support and imaging services. In addition to full-time Healthcare Center B hospital employees, I also reached out to specialty care physicians who have privileges at Healthcare Center B to broaden the number of physicians in my sample. All physicians recruited in this sample, including those working for Healthcare Center A, are a part of a broader integrated Healthcare Network.

EpicCare. EpicCare is easily the most widespread EHR provider used in large hospitals. In fact, 70% of Stage 7 U.S. healthcare systems use EpicCare. Stage 7 is reached when the healthcare organization is truly a paperless environment across all departments and occupations and, as a result, patient records can be shared across healthcare systems and the full advantage of health information exchange is realized. (See the figure below for a list of the steps in the Electronic Medical Records Adoption Model).

As of 2014, 270,000 physicians use EpicCare and approximately 51% of the U.S. population have personal medical records located in this system (*MinuteClinic to Adopt EpicCare,* 2014). One notable difference between Epic and its competitors, and perhaps one of the catalysts for the vendor's success, is the system's traditional client server model. EpicCare performs customized installations for each of its patrons. Upon being hired, EpicCare technicians spend months working with the unique nature of each healthcare establishment to appreciate and accommodate the organization's objectives, workflow, and functionality needs. Together, EpicCare developers and the respective hospital/healthcare system leaders co-construct and design the architecture of the EHR to ensure that it respects the idiosyncrasies of each healthcare organization. As a result, the organization can fully capitalize on its investment in the software. Still, it should be noted that there is a cemented foundation to the system's layout—some of the technology's settings, content, and features are preconfigured.

In fact, some skeptical users and academics have even attested that these preconfigurations, or starter settings, shackle users to a platform that is neither agile nor flexible and could even potentially include errors (see Yackel & Embi, 2010 for an example). Consequently, they have called into question the EHR's promise of flexibility and functionality.

Regardless of this documented debate, EpicCare strongly advertises its soaring customer ratings and largely attributes these results to their specialty services, including 1) a hands-on, validation-based implementation approach, 2) an interactive and robust total recall training program, and 3) a relationship-oriented optimization package, which includes the services of an optimization team that works with the healthcare organization to ensure continued success long after training ends. They do this by first-handedly answering employee questions and fine-tuning their EpicCare skill sets.

Still, perhaps the most fundamental selling point from the perspective of Epic engineers is system's capacity to create an integrated health record that promotes *connectivity*. EpicCare spans hospital departments and occupations to connect each member of the care team to a single record and embedded clinical intelligence. It has been recently estimated that nearly 5.6 million patient records were exchanged securely via Epic's *Care Everywhere network* in September 2014 (www.epic.com). This network embodies a framework for interoperability that provides physicians with a more complete patient medical record by creating a patient database resource. This patient database

provides communality by linking physicians through commonly held information about their patients (www.epic.com, 2014). In addition, the Care Everywhere network can also compile pivotal patient data from non-Epic EHR systems that comply with EHR industry standards. However, a richer data set is exchanged and additional connectivity options are available when an Epic system is both encoding and decoding the information.

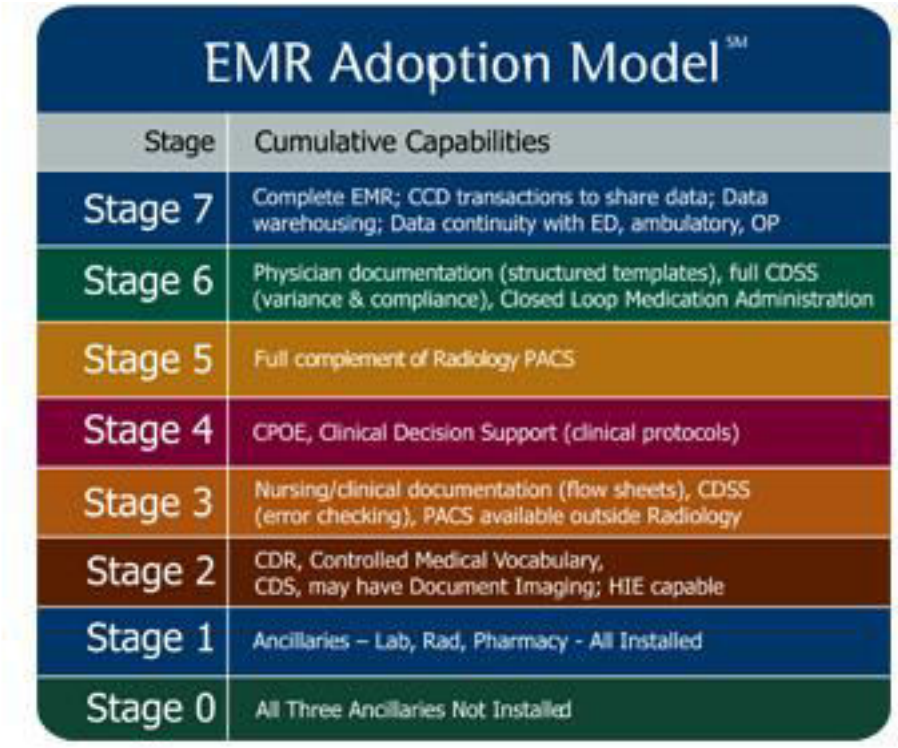

Figure 3.1. The HIMSS EMR Adoption Model.

In light of the perceived advantages and elaborate options EpicCare records offer (see Table 3.1 for the design highlights of the EpicCare Ambulatory Electronic Health Record), some what have gone so far as to coin this EHR contender the "Apple" of healthcare technology and innovation. Further substantiating the analogy to Apple Computing is the Epic Corporation's dominant market position. Practitioners have suggested that Epic has a foreseeable potential to dwell on the cutting edge—staying one comfortable step ahead of its clients' needs by having an uncanny ability to perceive latent consumer desires (Shaywitz, 2012).

Table 3.1. List of Design Highlights of EpicCare Ambulatory EHR.

- Physician personalization can be done on the fly - with minimal training.
- "Smart Software" features learn your preferences and suggest corrections.
- Intuitive filtering tools simplify longitudinal chart review.
- Navigators bundle related functions into common workflows.
- NoteWriter quickly captures discrete observations
- Patient-entered data flows directly from MyChart to the EpicCare chart.
- Speech recognition captures narrative notes.
- Fast system response times for many concurrent users.
- Decision support - clinical and financial - links to suggested action.
- In Basket automates results review and communication.
- Telemedicine options create cost-savings and patient engagement opportunities for accountable care.
- Dashboards aggregate quality/outcome metrics alongside productivity and financial metrics.

PARTICIPANTS

The participants for this study were organizational employees recruited from Healthcare Center A and Healthcare Center B. I established contact with key players within these organizations during the fall of 2013 and acquired physical access into Healthcare Center A and a list of practicing physicians with privileges at Healthcare Center B during this time. My primary contact at Healthcare Center A, the Chief Financial and Operating Officer, aided in my distribution of the survey across departments and occupational levels at the family health center clinic. He recruited participation during an organization-wide meeting on February 5, 2014. My key contacts at Healthcare Center B included the Director of Health professionals Services and an Emergency Medicine physician with fifteen plus years of experience. The Director of Health professionals Services shared a list of Healthcare Center B physicians' names,

departments, specialties, phone numbers, and mailing addresses. This list only contained information that was already made available to the public through the local phonebook. The senior Emergency Physician helped me devise a survey distribution plan based on the employees and departments that had already implemented the Epic records, those in the process, and those that had not yet began implementation.

The final cross-organizational sample size consisted of 345 healthcare employees, who were recruited using a mix of a criterion and voluntary sampling methods. The voluntary sampling method was specifically used for Healthcare Center B physicians and nurses who self-selected into the paper survey after receiving it in the postal mail. Because demographics—in particular occupation—were critical to the goals of this research, the analysis of subgroups in the data set is important. To retain the statistical power in the study, I recruited at least 30 people in each of the primary occupational categories—physicians, nurses, technicians, and administrators. I also recruited participants from several other healthcare positions including pharmacists, dentist, dental assistants, physician and nurse assistants, clerks, employees in the billing and research analysis departments, and medical transcriptionists/secretaries.

In selecting research sites and participants, my main priority was to recruit a sample of both public and private healthcare employees that varied in not only occupation, but also age and levels of experience within their occupation. Along with the distinct criterion for diversity there was also a list of essential similarities that each candidate had to fulfill. These qualifying commonalities link the participants together and hence demonstrate their cross-organizational needs to organize patient records. Namely,

the similarities are as follows: 1) all participants practiced/worked in the same community, 2) all physicians were on staff at the same hospital, 3) all participants worked at a clinic or other healthcare facility that used an EpicCare system, and 4) all participants were affiliated with an integrated Healthcare Network, and thus, had the ability to refer patients to one another in addition to frequent patient information exchange. To elaborate on this last criterion, it is commonplace for Healthcare Center A patients to receive specialty referrals from health officials to many of the private-care physicians I sampled at Healthcare Center B—including those specializing in cardiology, pediatrics, obstetrics and gynecology, urology, optometrists, and neurology. In addition, Healthcare Center A is closed on the weekends and patients seeking their services during this time are re-directed to the Emergency Department of Healthcare Center B's hospital. As a more evident prerequisite, each participant had to be *currently* working in an EHR system as a daily part of his or her occupational role. Because of this, I also sampled the two departments in the Healthcare Center B hospital that were currently working in Epic. One was in the midst of the preliminary implementation phase, and the other had completed the preliminary implementation phase of EpicCare and was now somewhat transitioning into the adoption stage. Namely, these departments were the Hospitalists Department and the Emergency Medicine Department.

The size of my sample, 345, can be attributed to the diligence of my key contacts at each organization. The Chief Financial Officer of Healthcare Center A commenced in a word of mouth campaign with Healthcare Center A employees and the Epic Corporation to broadcast this research and its benefits for both his organization and

the EHR vendor. In addition, the Emergency Physician from Healthcare Center B sat down with me on three occasions to brainstorm a survey distribution plan that ensured we delivered the survey to people who could answer the survey questions, and who also would be genuinely interested in doing so. Consequently, the success of our two mail outs was visible not only quantitatively in the number of questionnaires returned, but also qualitatively. Although I did not include a comment box in the questionnaire, several physicians and nurses spontaneously wrote notes beside certain items or included blank pieces of paper providing paragraphs of contextual details further delineating their EHR use. This was done without my requesting or encouraging them to provide such information. Moreover, not only did a paper questionnaire eliminate the propensity to overly target participants who favored using the computer/Internet, which would be a considerable detriment to the validity of this research, it also manifested in a perceptibly high completion rate. I discuss this response rate further in the upcoming sections of this chapter.

DATA COLLECTION TIMELINE

Over the course of my data collection, I collected data during three different time periods across the two aforementioned healthcare networks. Specifically, for Healthcare Center A, I traveled to the site and distributed paper surveys by hand on the fifth day of February, 2014 and returned three weeks later to pick up the surveys from my primary contact at the organization. To encourage survey returns and participation, my primary contact and I sent email reminders to Healthcare Center A employees at strategic points

in time when employees were most likely to scan their inbox. For example, we sent an email reminder on payday, February 14th, because Healthcare Center A personnel sends email verification when money is deposited into employees' bank accounts. I closed data collection at this site on February 26, 2014.

For the Healthcare Center B sample, I mailed paper surveys via USPS to Healthcare Center B physicians and nurses over two separate time periods. (Please see forthcoming sections of this chapter for a more detailed description of this mail-out process). Table 3.2 outlines the dates for this mail delivery distribution. Combining all data collection methods, my accumulative survey response rate was 61%. In the next section, I explain the pilot survey conducted and offer a more detailed description of the participants who participated in the pilot and primary study.

Table 3.2. Number of Questionnaires and Response Rate.

	Distribution Dates	*N*	*n*	Response Rate
Healthcare Center A	Feb 5-26	310	219	71%
Healthcare Center B (mail out)	Feb 3-21	120	54	45%
	March 10-31	60	28	47%
Totals		490	301	61%

* Another 44 surveys were also collected from Healthcare Center B employees, totaling 345 total returned surveys. See the "Primary Study Survey" section for more details.

DATA COLLECTION DETAILS AND RESEARCH PROTOCOLS

As Table 3.2 denotes, I gathered data via a survey throughout the course of a two-month period (February and March of 2014). I assigned each individual a participant number to keep each his/her data secure over time and across data collection methods. Numbers 1-135 consisted of participants stemming from the first and second mail out and 136-345 comprised the Healthcare Center A participants. In the next few paragraphs, I describe the pilot survey I conducted to ensure the robustness and construction of my survey, and I delineate the research protocols followed as I collected and analyzed the data.

Pilot Survey.

To enhance the face and content validity of my questionnaire, I conducted a pilot survey, which is often used to pre-test or try-out a research instrument (Baker, 1994). Specifically, I used the pilot survey to ensure that the instructions and wording on the questionnaire were comprehensible in preparation for the major study and to identify if proposed methods or instruments were inappropriate, extraneous, or too complicated (De Vaus, 1993; Fink & Kisekoff, 1985). During this dress rehearsal for the final instrument, I recruited 27 participants from a hospital organization in Norway, including physicians, nurses, administrators, medical transcriptionists, and medical students. I began interviews and focus groups with these individuals in May of 2013 and completed the survey pilot survey in July of 2013. This Norwegian hospital was an ideal site for this pilot study because it is in the third stage of its implementation process. This stage involves

converting the hospital from paper-based records to a paperless system and, in doing so, redesigning the whole range of work procedures in the hospital. Major change occurs during this stage, which is considered the most labor-intensive phase of this organizational change because it exacerbates levels of employee uncertainty. Moreover, studies in Norwegian hospitals have previously concluded that physicians are underutilizing certain features of implemented EHR systems during this stage (Laerum, Ellingsen, & Faxvaag, 2001), and stakeholders within these hospitals are using the system to varying degrees (Lium, Laerum, Schulz, & Faxvaag, 2006).

Pilot Survey Results. Between June 4th and July 15th, 2014, I conducted 12 interviews with Nordland hospital employees and 16 additional employees participated in my survey, taking it in an online format. (Please see Table 3.4 and 3.5 below for a description of the interview and survey participants.) As evidenced, the sample population across the interview and questionnaire participants was considerably diverse.

Table 3.4. Demographics of Interview Participants in Pilot survey.

Demographic	Frequency	Percentage
Gender		
Male	5	42%
Female	7	58%
Age		
18-29	2	17%
30-44	4	33%
45-59	5	42%
60-75	1	8%

Table 3.4 (continued)

Occupation		
Physician	5	42%
Nurse	1	8%
Administrator	2	17%
Medical Transcriptionist	2	17%
Medical Student	2	17%
Experience		
1-5 years	3	25%
6-10 years	3	25%
10-15 years	4	33%
15-20 years	1	8%
20 or more	1	8%
Specialty Areas: Included oncologists, pediatrics, internal medicine physicians, Chief of Nursing, Director of Medical Records, Director of Patient Safety, and an anesthesiologist. Medical transcriptionists and medical students did not have specialty areas.		

N= 12

The key findings stemming from my pilot survey included the following: 1) it took participants too long to take the survey, which made it a great challenge to convince people to partake in the research. The online survey was open for nearly two months, but only yielded 16 participants and 11 surveys were completed in their entirety; 2) in the instructions to the survey, the term "coworker" needed to be further defined. Participants were confused as to whether this meant someone who they worked with everyday or if it encapsulated those they saw less frequently, but had met in the organization

Table 3.5. Demographics of Questionnaire Participants in Pilot survey.

Demographic	Frequency	Percentage
Gender		
Male	5	31%
Female	11	69%
Age		
18-32	5	31%
33-44	11	69%
Occupation		
Physician	10	62%
Nurse	3	19%
Nurse (Adv)	3	19%
Experience		
1-5 years	14	87%
10-15 years	2	13%
Specialty Areas: Included internal medicine physicians, medical and surgical ward employees, and woman and child physicians.		

N= 16

As a result another sentence was added to the instructions for the support and feedback scales in order to clarify that "coworkers," at least in this study, referred to those who surround you at work on a weekly, if not daily, basis; 3) several occupations needed to be included or revised in the demographics portion of the survey. For example, the survey needed to include answer choices for physicians and nursing assistants, employees working specifically in billing, and unit/medical record clerks. The term medical *transcriptionists* was also added onto "medical secretaries" to provide clarity; 4) the organizational dissent scale variable only significantly correlated with one other variable in the study—resistance.

Moreover, the direction of the correlation between the dissent variable and resistance was in the opposite direction than I had expected (See Table 3.7). Upon further investigation, I discovered that these items were the most skipped in participant responses. In interviews, participants mentioned employees would be less likely to answer these items as they questioned perceived "motives of management," which were more difficult for the employees to ascertain. As a result, this 16-item variable was dropped from the questionnaire, and in doing so, the call to shorten the survey was also answered; 5) the face validity of the coworker social support scale was called into question. The participants in the pilot survey interviews collectively agreed that three of the items in the scale were irrelevant and/or did not correctly capture the way employees receive social support for this new technology in the workplace. As a result, these three items were dropped from this study's coworker social support measure. (See "Operationalization of Variables" section for more detail); finally, 6) the content validity of the resistance variable was brought into question. From interview data, it was deduced that the resistance variable was not adequately representing the different facets of resistance. Namely, while cognition and affective resistance were accounted for, behavioral, or communicative, resistance needed to be more represented. Changes were made to the scale to answer this proposed revision. (Again, see operationalization section for more detail).

PRIMARY STUDY SURVEY

After making the changes to my survey in response to the abovementioned pilot survey conducted in the fall of 2013, I began collecting research for my primary study in February 2014 at both Healthcare Center A and Healthcare Center B. In the next two paragraphs, I outline the research protocols used to collect data at each location.

Healthcare Center A. In November 2013, I contacted the Chief Financial Officer from Healthcare Center A, and we constructed a plan for my research in this organization. Before distributing the questionnaire to employees, both Healthcare Center A administrators and EpicCare associates working in the organization had to approve its content. We sat down on two occasions to discuss items on the questionnaire and their designed intention to assess employee's affects and cognitions in this research project. At the request of EpicCare associates, I change a couple of items on the survey so that they did not assume a negative response to record implementation. For instance, on the resistance scale, I changed one item from "I think this change is negative" to "I think this change is positive." Given the 5-point Likert scale used to answer this item, this slight alteration to the scale does not violate the rigor of the research. Instead it was a matter of language preference that convinced EpicCare to sign off on the questionnaire distribution. Healthcare Center A administrators were collectively excited about the research and most of our conversations centered around data sharing and their access to my results after the termination of the project.

Given the deficient results of the online survey in my pilot survey, the Chief Financial Officer and I decided to use a pen and paper strategy and to distribute the

survey to employees in an organization-wide meeting held on February 5th, 2014. As an incentive to participate, I stapled a raffle ticket to each distributed survey that automatically entered each participant into a contest to win one of several gift-card prizes. Participants were given three weeks after the meeting to return their paper questionnaires to the secretary working in the Chief Financial Officer's office. They were also asked to package the questionnaire in a manila envelope to secure the privacy of their responses. Out of the 310 surveys distributed during the meeting, 219 were returned, which amounted to a 71% response rate. (See Table 3.6 for a demographic description of primary survey participants). Several email reminders were distributed to employees, sent by the Chief Financial Officer, to remind them of the timeline associated with the data collection and the impending deadline for their personal contributions.

Healthcare Center B. From February 3rd to March 31st, 2014, I distributed two rounds of paper surveys via USPS to physicians who worked for Healthcare Center B. (See Table 3.6 for more information on the make-up of this portion of the study sample). The Director of Health professionals Services provided me with a list of 315 private and public healthcare physicians who worked for Healthcare Center B. Over the course of two mail-outs, I sent 180 of these physicians an envelope including: 1) a copy of my questionnaire, 2) a cover letter describing who I am and the goals of the study (see Appendix B for a copy of this letter), 3) a pre-stamped envelope addressed to my personal home, and 4) a note that asked physicians to email me if they would be willing to distribute the survey to their nurses, physician/nursing assistants, and a range of other health professionals in their office working in the EHR system. Each mail-out provided

physicians three weeks to respond. Overall, I received questionnaires from 82 physicians and 44 of their coworkers. (See Table 3.6 for the demographics of survey participants.) This distributed questionnaire measured how healthcare employees' resistance, and perceived change success, relative advantage of the EHR system, and communication quality surrounding the change are attributed to coworker social influence factors and change reinvention, or work-arounds. Most items were answered on a 5-point, Likert-type scale, but one scale, perceived communication quality, was answered on a 7-point semantic differential scale to stay consistent with previous scholarship (See Appendix A for a copy of the questionnaire). In the next section of this chapter, I further outline the scales and explain how I operationalized the variables in this research study.

Table 3.6. Demographics of Participants in Primary Study

Demographic	Frequency	Percentage
Gender		
Male	112	32.9%
Female	228	67.1%
Age		
18-29	71	20.8%
33-44	133	38.9%
45-59	102	30.0%
60-75	31	9.1%
76 or older	5	1.5%
Occupation		
Physician	113	33.2%
Nurse	67	19.7%
Technician	41	12.0%
Administrator	30	8.8%
Physician Assistant	4	1.2%
Nurse Assistant	15	4.4%
Medical Transcrip	6	1.8%
Dentist	4	1.2%
Dental Assistant	19	5.6%
Clerk	15	4.4%
Billing	9	2.6%
Pharmacist	3	1.0%
Clinic Social Worker	3	1.0%
Accountant	3	1.0%
Research/Analyst	5	1.5%
Experience		
1-5 years	107	31.5%
6-10 years	73	21.5%
10-15 years	45	13.2%
15-20 years	37	10.9%
20 or more years	78	22.9%
Computer Experience		
Under 1 year	3	1.0%
1-2 years	16	4.7%
3-5 years	41	12.1%
6-10 years	76	22.4%
More than 10 years	204	60.0%

Table 3.6 (continued)

Computer Comfort		
Very Comfortable	12	3.5%
Somewhat Uncomfort	10	2.9%
Neutral	17	5.0%
Somewhat Comfort	83	24.3%
Very Comfortable	220	64.3%

OPERATIONALIZATION OF VARIABLES

Outcome Variables.

Resistance to Change. To assess resistance to organizational change, I used Shaul Oreg's Change Attitudinal Scale (2006), because it measures a multi-dimensional resistance to change in an employee work-related context. This scale is composed of three subscales that are designed to measure 1) an employee's affect, or positive and negative attitude towards a specific change; 2) his/her behavioral reactions to change, which is a subscale primarily composed of communication acts surrounding the change. Example items from this behavioral subscale include, "I speak/have spoken rather highly of the change to others," and "I present/have presented objections regarding the change to management; and finally 3) an employee's cognitions about a change, or his/her evaluation of the merit or capability of the change. Example items from this subscale include "I believe that this change will make my job harder," and "I believe this change will benefit the organization." Each subscale has five items and was answered on a 5-point Likert scale, but given the results of the pilot survey that encouraged me to condense the instrument, I used an abbreviated version of this scale that consisted of nine items. However, I also added an additional item to the behavioral scale to further emphasize a communication component to the scale. This item read, "I complain/have

complained about this change to my colleagues." I made this addition to address concerns I found in the pilot survey. Reliabilities for this scale ranged from .77 to .86 in previous studies (Oreg, 2006; Oreg & Berson, 2011). In this study, the resistance scale had M = 2.4, SD = .92, N = 340, and Cronbach's α = .91).

Change Reinvention. To measure change reinvention, I used two scales that were designed to capture the extent to which users of an advanced information technology 1) believe they have appropriated its structure "faithfully," and 2) agreed on how to adopt and use the new technology in their organization. In this study, the scale was specifically geared towards EHR use. Each of the scales is composed of five items that are measured on a 5-point Likert scale ranging from (1) *strongly disagree* to (5) *strongly agree*. Past studies have indicated that the faithfulness scale (FOA) and the consensus of appropriation have reliability coefficients estimated around .85-.93 (Chin, Gopal, & Salisury, 1997; Salisbury, Chin, Gopal, & Newsted, 2002; Salisbury, Gopal, & Chin, 1996). In this particular study, the faithfulness of appropriation (FOA) scale had a M = 4.0, SD = .78, N = 340, and a Cronbach's α = .80. As for the consensus of appropriation (COA) scale, the M = 3.9, SD = .77, N = 340, and the Cronbach's α = .85.

Perception of Change Success. I measured employees' perceptions of change success using three items I constructed, which included, "please indicate how successfully you think EHR has been implemented into your healthcare organization," "please indicate how successfully you believe your organization has coped with this technological change," and "please indicate how successfully your organization has adjusted to this technological change." Each item gave participants an answering scheme

that ranged from (1) *not at all successfully* to (5) *very successfully*. In this study, the M = 4.0, SD = .83, N = 340, and Cronbach's α = .83.

Relative Advantage of Technology. To ascertain how advantageous employees perceived the EHR system to be in regards to their productivity and efficiency at work, I used Moore and Benbasat's (1991) scale assessing perceptions of relative advantage. This scale consists of seven items and participants answered on a 5-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. Examples of scale items include: **"**using EHR enables me to accomplish work tasks more quickly," "using EHR makes it easier to do my job," and "overall, I find the EHR system to be advantageous to my job." In this study, the M = 3.7, SD = 1.3, N = 341, and the Cronbach's α = .97.

Independent/ Predictor Variables

Informal Social Influence. To measure how the reactions and opinions of hospital employees are socially influenced by the informal conversations they engage in with coworkers and peers, I used two separate scales inquiring as to the: (1) the feedback employees perceived others offering in regards to EHR use, and (2) the social support employees perceived coworkers to offer in regards to EHR use and implementation.

Employee feedback/evaluation. I utilized Steelman, Levy, and Snell's (2004) Feedback Environment Scale to assess employees' perceptions of the informal feedback their coworkers offered them in regards to EHR implementation activities. This feedback scale was originally designed by the authors to understand the mechanisms that support feedback. The feedback environment refers to the "contextual aspects of day-to-day

supervisor-subordinate and coworker-coworker feedback processes rather than to the formal performance appraisal feedback session" (Steelman et. al, 2004, p. 166). While this scale has two dimensions—supervisor factor and coworker factor—I chose to solely utilize the latter. The latter dimension of the scale measures employee perceptions of coworker's source credibility, feedback quality, favorable feedback, unfavorable feedback, source credibility, and his/her degree of promoting feedback seeking. As only some dimensions were applicable to the goals of the current research, I chose to only incorporate the feedback quality (3 items), favorable feedback (2 items), and unfavorable feedback (2 items) subscales. These items were answered on a Likert scale that ranged from (1) strongly disagree to (5) strongly agree. The reliability for the feedback scale has ranged from .81- .92 in previous studies. (Norris-Watts & Levy, 2004; Steelman et. al, 2004).

In this study, the feedback scale in its totality had a $M = 3.7$, $SD = .81$, $N = 339$ and a Cronbach's $\alpha = .90$

Coworker social support. To assess the level of social support employees perceived receiving from their fellow coworkers in regards to EHR matters, I combined two scales including the Supervisor Social Support Scale, which was modified to be geared towards coworkers and peers (Shinn, Wong, Simko, & Ortiz-Torres, 1989), and the coworker portion of the Supervisor/Coworker Support Scale (Ray & Miller, 1994**)**. Together, these two coworker-oriented scales comprise 12 items that are answered on a 5-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. Examples of the items include "my coworkers appreciate the work I do with EHR," "I feel comfortable asking

my coworkers for help if I have a problem with EHR," and "my coworkers share useful ideas and advice in regards to EHR."

Given the results of my pilot survey in addition to the need to shorten the survey, I used an abbreviated nine-item version of this scale. The three items I excluded (based on the commentary from participants in my pilot survey) included: "my coworkers respect my use of EHR," "my coworkers are understanding and sympathetic with EHR issues," and "my coworkers seem to make time for me if I need to discuss my work with EHR." Pilot survey participants found these items to be either superfluous or not relevant to their workplace interactions surrounding EHR training and usage. In this study, the nine-item scale had a $M = 4.1$, $SD = .70$, $N = 340$, and the Cronbach's $\alpha = .93$.

Perceptions of Communication Quality. To measure employees' perceptions of the quality of communication surrounding the EHR change, I used a scale developed by Mohr and Sohi in 1996. This scale asks respondents to assess the quality of information surrounding a certain event along the following adjectives: "timely/untimely", "accurate/inaccurate", "adequate/inadequate," "complete/incomplete," and "credible/not credible". In the instructions introducing the scale, I asked employees to appraise the communication coming from all organizational sources, including formal in addition informal channels. Participants ranked their affiliation with each adjective on a 7-point semantic differential scale. In this particular study, this scale had a $M = 3.13$, $SD = 1.3$, $N = 340$, and a Cronbach's $\alpha = .94$.

Demographics

Finally, I collected demographic information at the end of my questionnaire. This data acted as control variables and were used to discern differences between groups in the ANOVA analyses, explained in the next chapter of this dissertation. Specifically, I asked participants to report their age, experience level, and occupation, which were of upmost importance because the hypotheses in this study specifically proposed relationships between these demographic variables and employee resistance. I also asked participants to report their gender, experience with computers, comfort using computers, and whether they have used an EHR vendor prior to the one in which they currently worked. My chief contact at one of the healthcare research sites asked that I include these items specifically.

In this chapter, I described the methodological details of my pilot and primary study. This included a description of the research sites and participants, data collection timeline, research protocol, data collection details, and how the variables in this study were operationalized. In the next chapter, I describe my findings in detail.

Table 3.7. Correlation Table of Variables in Pilot survey.

	Support	Feedback	Dissent	Com Quality	Faith of Approp	Consensus of Approp	Success	Relative Advantage	Resistance
Support	1								
Feedback	.99**	1							
Dissent	.46	.30	1						
Com Quality	.84**	.91**	-.40	1					
Faithfulness of Approp	-.25	-.88**	.50	.74*	1				
Consensus of Approp	-.56*	-.55	-.46	.86**	.99**	1			
Success	-.29	.87**	.46	.57*	.45	.34	1		
Relative Advantage	-.83**	-.57	-.30	.89**	-.96**	.99**	.75**	1	
Resistance	-.83**	-.76*	-.99**	-.71*	.73*	-.88**	.45	-.88**	1

Note *$p < .05$ **$p > .01$

Chapter 4: Findings

Quantitative data collected from the primary study questionnaire revealed that there is a clear statistically significant relationship between the antecedent variables in this study—informal support, feedback and technological work-arounds—and the outcome variables—employee resistance, perceived EHR implementation success, and relative advantage of the new technology. This study sought to understand the pivotal, yet heretofore underemphasized, role that informal coworker communication plays in influencing the psychological and behavioral reactions of organizational members after a "radical" change has been introduced into an organization (Greenwood & Hinings, 1996, p. 1022; Watzlawick, Weakland, & Fisch, 1974). Even more importantly, this dissertation investigated the capacity of the work-around to positively or negatively influence employees' perceptions of the new technology and the change implementation process.

In general, the results of the model construction suggested that change reinvention, or the prevalence of work-arounds, was strongly and *positively* related to employees' perceived success of the change in the organization. Moreover, the best fitting model indicated that engagement in work-arounds was strongly and *negatively* related to employee resistance. In addition, the degree of social influence employees received from their peers positively influenced their decision to engage in work-arounds. In other words, those employees who received a *large* amount of coworker support and feedback regarding their technology use were likely to engage in *more* work-arounds. However, a direct path from the informal social influence latent variable to the other

observed outcome variables—resistance, perceived change success, and perceived relative advantage of the new technology—did not emerge in the best fitting model.

Furthermore, regression analyses conducted to test the two hypotheses in this study revealed that employees' perceptions of the communication quality surrounding the change and employee demographics were indeed significant predictors of the study's outcome variables. Before I elaborate on the described findings in detail, in the next session I provide an account of the data screening processes I used to first examine and prepare the quantitative data analyzed in this research.

PRELIMINARY ANALYSES

Factor Analyses and Descriptive Statistics

To prepare for my primary analyses, I first ensured that each of my scales measured one factor; I was specifically concerned with the scale I created that measured perceived change success. To do this, I conducted factor analyses for each variable measured in this study. First introduced by Thurstone in 1931, factor analysis is typically applied as a data reduction or structure detection method because its underlying purpose is to determine the amount of shared variance that exists amongst a set of variables (Williams, 1992). Given that each scale in the study is a part of a single measure, and therefore, I was not interested in identifying latent constructs at this point in my analyses, I conducted a principal component analysis with a varimax rotation to assess the scales for support, feedback, communication quality, consensus of appropriation, faithfulness of appropriation, relative advantage, and resistance. I used three criteria to determine the number of components in each scale: 1) factor loadings, 2) Kaiser's rule (Kaiser, 1960),

which states that only those components with eigenvalues greater than one should be retained, and 3) scree plots—which provide a graphical perspective of the eigenvalues to identify where the "leveling effect" occurs.

For the perceived support scale, all nine items clearly loaded onto one component that accounted for 65% of the total variance. Each of the factor loadings was .73 or greater. The Cronbach's alpha measure of internal validity yielded a .93.

For the feedback scale, all seven items loaded onto one factor, which explained 63% of the total variance. One of the factor loadings was .67, which is below the .70 threshold. The communality of this variable was also below the .70 threshold. However, the scree plot clearly indicated one component, therefore, I decided to keep this item. The resulting Cronbach's alpha for the seven item scale yielded a .90.

For the communication quality scale, all five items loaded onto a single component that accounted for 80% of the total variance. The factor loading for each item was .80 or greater. The Cronbach's alpha measure yielded a .94.

For the consensus of appropriation scale (COA), all five items loaded onto a single component that accounted for 64% of the total variance. However, the fifth item reported a communality value of .30, which is far below the standard .70 threshold. In addition, the factor loading for this item was only .55. As a result, I dropped the fifth item from the scale. As a four-item scale, the measure still loaded onto a single component, which then explained 74% of the total variance. Each of these items had a factor loading that was greater than .82. The resulting Cronbach alpha yielded a .88—whereas the previous five-item scale yielded a Cronbach's alpha of .85.

For the faithfulness of appropriation scale (FOA), all five items loaded onto a single component that accounted for 62% of the total variance. Each of the factor loadings was above .78. The Cronbach's alpha for the scale yielded a .80.

For the perceptions of change success scale, all three items loaded onto a single component that accounted for 85% of the variance. The factor loading for each item was greater than .80. The Cronbach's alpha for the scale was an .83. It should be noted that although the number of variables in this component was small, the factor analysis was still reliable as the sample size in this study was above 300 (Stevens, 2001; Tabachnick & Fidell, 2007).

For the relative advantage scale, all seven items loaded onto a single component that explained 91% of the total variance. Each factor loading was .93 or greater. The Cronbach's alpha for the scale yielded a .97.

Finally, the resistance scale was the only scale that was composed of combined measures. In the investigation of this scale, Kaiser's rule indicated that the nine items loaded onto two components—although the Cronbach's alpha for the scale in its totality yielded a .90. However, the communalities for some of the items were not greater than .70, indicating that Kaiser's rule for the eigenvalue criterion was not reliable, or questionable at best (Mertler & Vannatta, 2013). Because of this, I next assessed the variance explained by each component. After rotation, the first component accounted for 42% of the total variance and the second component accounted for 22% of the total variance, which combined to explain 65%. However, upon further review of the correlation matrix, I discovered that it was the fifth item in the scale that was the most

problematical. This item reads: “I speak/have spoken highly to others in support of this change.” It had comparatively low correlations with the other items on the scale and the factor loading was also below .50. I removed this item, and the remaining items loaded onto a single component that explained 65% of the total variance. When I also removed the fourth item as well—which read “I present/have presented my objections regarding the change to management/administration”—the remaining items loaded onto a single component that explained 71% of the variance. Moreover, each of the factor loadings in this now seven-item scale was .70 or above. As a result, I reduced this scale to seven items so that it measured one construct and captured more variance. The Cronbach’s alpha for the resistance scale—previously a .91—also increased to .93.

After conducting factor analyses, I examined the correlations between each of the variables in my data set and discovered that all of the variables in my primary study are significantly correlated with one another at the .01 level. This finding parallels the characteristics of the variable relationships in the Norway preliminary study. Table 4.1 depicts the values of the correlation coefficient for any two variables in the sample population, (n= 340), and emphasizes significant relationships.

In the forthcoming section of this chapter, I address the underlying assumptions for data in multivariate, regression, and SEM analyses and explain the verification of these assumptions in the preliminary analysis stages of this dissertation.

Meeting the Statistical Assumptions for Data Analysis

Before commencing in data analysis, the data were inspected for violations of the assumptions required for the statistical procedures used in the primary study, which

included one-way ANOVAs, multiple regressions, and SEM analysis. In the following sections, I define the principal assumptions for conducting these different types of analyses. I also explain the methods I employed to ensure these assumptions were met and my data were indeed adequate and statistically fit. Namely, these assumptions include homoscedasticity, linearity, normality and multicollinearity.

Homoscedasticity. The assumption of homoscedasticity presupposes that the residuals of continuous variables are normally distributed, and variances are uniform across all levels of the predictor variables. To assess this assumption, I examined the bivariate scatter plots for each variable, placing the z residuals in the Y-axis and the z predicted values in the X-axis. For each variable, the relationship between the z residuals and the z predicted values appeared erratic. When I charted a fit-line on the scatter plot for each predicted variable, this observation was further confirmed. The linear fit-line was very flat in the case of each variable. Heteroscedasticity, or the likelihood for the variability in the scores for one continuous value to be considerably different at all values of another continuous variable, was not an issue with my data set.

Linearity. The assumption of linearity presupposes the presence of a straight line for the bivariate relationship between any two variables—dependent and independent—in the data set. SEM is sensitive to violations in linearity because nonlinearity can distort estimates of fit and standard errors in SEM models. To confirm linearity in the data set, I examined bivariate scatter plots, parameter standard errors, variance explained, and model residuals—all of which provide critical information for identifying departures from linear relationships in SEM (Raykov & Penev, 1997). Assessing the residuals most

notably pointed to linearity as standardized residual plots demonstrated that the residuals clustered around the zero line for predicted values (Tabachnick & Fidell, 2007). Therefore, I concluded that the collected data were indeed linear.

Table 4.1. Correlation Table of Variables in Primary Study (n=340).

	Support	Feedback	Com Quality	Faith of Approp	Consensus of Approp	Success	Relative Advantage	Resistance
Support	1							
Feedback	.69**	1						
Com Quality	.39**	.29**	1					
Faithfulness of Approp	.38**	.27**	.28**	1				
Consensus of Approp	.54**	.41**	.34**	.42**	1			
Success	.45**	.32**	.42**	.37**	.57**	1		
Relative Advantage	.43**	.43**	.42**	.39**	.48**	.65**	1	
Resistance	-.41**	-.39**	-.43**	-.40**	-.48**	-.66**	-.84**	1

**. Correlation is significant at the .01 level (2-tailed)

Normality. To inspect the normality of my data, I looked at the values for skewness and kurtosis for each variable. When dividing the skewness and kurtosis values by their standard errors to get their z-values, a couple of the variables—perceived relative advantage of the technology and resistance—did have values just outside of the +/- 1.96 range. However, a visual inspection of each variable's histogram revealed a normal bell curve distribution. Furthermore, the normal Q-Q plots for each variable revealed that the dots graphed onto the axes of expected and observed values fell along a linear line; this also points to an approximate normal distribution. Thus, I concluded that while there were outliers in my data, which I discuss in the next paragraphs, my variables were approximately normally distributed.

Assessing Univariate and Multivariate Outliers. Outliers—whether they are caused by data entry errors, participant/sample misjudgments, or a participant's capacity to be vastly

different from others—can cause fundamental problems in accurately calculating the results within a data set. Outliers can distort results because many statistical analyses rely on squared deviations from the mean and outliers deviate farther from the mean than the rest of the distribution. If extreme enough, outliers can cause significant relationships to be reported as insignificant and insignificant relationships to be reported as significant (Aron, Aron, & Coups, 2006). For research to be ethical, it is imperative that researchers ensure that their results are a representation of the relationships inherent in the data rather than the product of a few extreme cases. Because of the considerable size of my sample, I had to explore options for identifying outliers beyond visually screening the data and

analyzing frequency tables. While the histograms did reveal continuity in my variables, I also checked the z-scores of each composite variable and discovered that two z-scores held absolute values that were greater than 3.29 (Field, 2009). After examining these two cases distinctively, I discovered that these two participants answered very differently from others in the data, and consequently, I removed these two cases from the sample. Afterwards, I concluded that there were no remaining univariate outliers in the data set.

Additionally, I checked for the existence of multivariate outliers using Mahalanobis distance (D^2), which is a statistical procedure used to detect observations that are inconsistent with the structure of a data set. The "distance" identifies the cases that are farthest away from the central data cloud. After comparing the Mahalanobis distance with the chi-square critical value, I discovered that one case was close to the significance threshold of a multivariate outlier—which is a p value less than .001 (Meyers, Gamst, & Guarino, 2006). In other words, the Mahalanobis Distance score for this case was very close to exceeding the critical chi-square value. I compared the value for this case to the mean and standard deviation of each variable, and decided to drop it from the data set.

Multicollinearity. Multicollinearity occurs when two or more of the independent variables in a SEM model are highly correlated and have a linear relationship with one another (Bollen, 1989). When this occurs, the inclusion of both of these variables into the model becomes problematic for estimation because, essentially, it is asking the model to estimate another parameter, yet not supplying additional information. Multicollinearity inflates the size of standard errors, and therefore, can make relationships appear

insignificant when they are significant—thus causing Type II errors. To confirm multicollinearity was not present in the variables in my data set, I examined tolerance, the variance inflation factor (VIF), and also scanned a correlation table containing all of my independent variables. Tolerance assesses the degree to which each independent variable stands independently of other variables (Darlington, 1990). To verify the absence of multicollinearity, the tolerance estimates for each variable must be greater than .20. This was indeed the case for each independent variable. The VIF measures the extent to which the variance of a regression coefficient inflates as a result of the co-dependence among the variables (Cohen, Cohen, West, & Aiken, 2003). The VIFs for each independent variable did not exceed four—again indicating that multicollinearity was not an issue (Keith, 2006; Miles & Shevlin, 2001). Finally, a correlation matrix containing all of the independent/predictor variables revealed that the highest correlation between any two independent variables had a Pearson's *r* correlation coefficient of .68—which is well below the values of .80 and .90 that scholars claim are grounds for collinearity concern (Grewal, Cote, & Baumgartner, 2004; Kaplan, 1994; Kennedy, 1992).

Missing Data. Missing data comprised a very small portion of this data—consisting of less than one percent of the data set. However, because AMOS cannot estimate a model with raw data that has missing values, and thus the χ^2 statistic cannot be calculated, the consequences of incomplete data are still consequential (Blunch, 2013). Given the small portion of absent data, I decided to use the single imputation method and substitute the arithmetic mean for missing values found within each scale. Some scholars have questioned the credibility of the mean imputation strategy in SEM because this

modeling procedure is based on variance and covariances (Brown, 1994). Noting this claim, I still chose this method because the small amount of missing data in a data set of this size will not cause bias or interrupt correlations or variances between variables.

STRUCTURAL EQUATION MODELING PROCEDURES

Testing procedures for the first two hypotheses—which investigated the impact of informal socialization and work-arounds on employee resistance and perceptions of EHR relative advantage and change success—involved Structural Equation Modeling (SEM). SEM is a second-generation multivariate technique (Bollen, 1989) that gained popularity in use among published Managing Information Science (MIS) studies (Chau, 1996). SEM is a comprehensive, flexible, and chiefly linear approach to modeling relationships among variables. The primary aim of SEM is to propose the structure of an implied covariance matrix, otherwise known as a model, and to evaluate the consistency of these correlations with those manifest in an observed, or empirical, covariance matrix (Bollen, 1989). The general structural equation model consists of two complementary models: the measurement model, of which factor analysis is an example, and the structural model, of which general linear modeling is an example. Six procedural steps are routinely practiced in the performance of a SEM analysis.

The following sections delineate the global procedures used in SEM analyses. According to SEM literature, the following six procedural steps are linearly followed in model construction: 1) model specification, 2) model identification, 3) sample size

calculation, 4) model estimation, 5) model evaluation, and 6) model refinement and respecification (Kline, 2010; Weston & Gore, 2006).

Model Specification. A structural equation model represents a pattern of linear relationships amongst a set of variables. The goal of such an analytic method is to provide a meaningful and parsimonious explanation for these observed relationships by constructing a model that equips the researcher with an interpretable path diagram. With that said, it is likely that the observed data can lend themselves to multiple models—each packed with potentially divergent explanations of the data. The task of model specification requires the researcher to specify this model in advance—and in particular, to specify the pattern of directional and non-directional relationships amongst the variables of interest. This allows the researcher to estimate the values of the model's parameters—or the numerical weights and covariances that are associated with directional and non-directional associations between variables (MacCallum, 1995). Model parameters can be specified as either fixed parameters, in which the relationships between variables are assigned a specified number based on previous research, or free parameters, in which the relationships between certain variables are unknown and thus left free to vary. The researcher must also build, or specify, both the structural model—containing the latent variables—and the measurement model—containing directly observed, or empirically measured, variables.

Figure 4.1 specifies in advance the overall conceptual model correlating with the first two hypotheses in this dissertation. This figure depicts the implied variable pathways and relationships that my hypotheses explore in the observed data. SEM applies a

discrepancy function to compare this implied model, which contains the specified variance/covariance matrix, with the observed variance/covariance matrix found in the data from my sample (Kaplan, 1995). If small residual differences are discovered in the comparison of the specified model and observed data, meaning the implied and observed relationships in the data are equivalent, then the specified model is considered to be a good fit. In other words, the specified model plausibly predicts and explains the empirical relationships observed in my sample (Kline, 2010). Although my dissertation research was guided by hypotheses, it was still somewhat exploratory in nature. Several parameters were left free to vary. The goal of this research is to further define and explore this model and its parameters, rather than confirming a completely confirmatory hypothesized fit. With that said, I had to be very careful throughout the next sequential step in SEM analysis to make sure that my model was indeed identified—or in other words, there were more known variances and covariances in my model than unknown parameters.

Model Identification. Model identification implies that there is one best or unique value for each and every parameter in the specified conceptual model. For the SEM software to theoretically derive these unique values, there must be more data points, or measured variances/covariances, in the specified model than parameters to be estimated (Kline, 2010). Having more specified data points than free parameters results in an over-identified model, which signifies that the researcher can proceed with his/her data analysis. It can usually be assumed that exogenous variables—or variables that do not receive a directional influence from any other variable in the model—direct

relationship paths, covariances, and error variances all denote parameters that require estimation.

The number of observed, or known, data values in a model is equal to $p\ (p+1)\ /2$, where p equals the number of observed variables (Hoyle, 1995). This equation is also called the *t-rule* (Bollen, 1989). Evaluating the degrees of freedom (*df*) is a prerequisite to model identification; the *df* is equal to the difference between the number of observed data values in the model ($p\ [p+1]/2$) and the number of parameters to be estimated, or free parameters. If the researcher has fewer observed data values than parameters to be estimated ($df < 0$), then the model is under-identified, and it cannot be tested because there is insufficient data. If the two are equal, ($df = 0$), then the model is just identified. If there are more observed values—variances and covariances in the measured variables—than parameters to be estimated ($df > 0$), then the model is over-identified. Over-identification means there is more than one exact solution or more than one set of parameter estimates is possible. This is actually favorable because the researcher can then explore which parameter estimates provide the best fit to the data (Kline, 2010).

In my particular data set and model, I included eight observed variables and two latent variables. According to the way that I distinctively specified the model guiding this study, I calculated 36 observed parameters and 34 estimated, or free, parameters. Therefore, I concluded that my model was over-identified, which is a signal that I could move forward with my data analysis. However, compliance with the t-rule does not necessarily guarantee that a model is identified—although violation of it does guarantee it is *not* identified. Both the structural and measurement model must be identified and there

are several alternative rules that can be employed to ensure this is indeed the case. Some of these rules are necessary but not sufficient, others are sufficient but not necessary, and still others are necessary *and* sufficient. For my measurement model, I particularly used the two indicator rule (O'Brien, 1994), which states that a measurement model is identified if: 1) there is more than one latent variable in the model, 2) each latent variable is correlated with at least one other latent variable, 3) there is only one non-zero element per row of lambda, 4) there are two or more indicators per factor, and 5) the theta is diagonal. All of these criteria were met in my model. This particular rule is sufficient, but not necessary, meaning that because it was met, my model is properly identified.

For my structural model, my calculations with unknown and known parameters satisfied the t-rule; however, this rule is necessary but not sufficient. Consequently, I used the sufficient but not necessary recursive rule to identify my model. This rule states that if there are no correlated errors in the endogenous variables of a model and if the arrows indicating effects of endogenous variables on other endogenous variables all run in the same direction—or in other words, no feedback loop relationships exist—then the model is identified (Bollen, 1989). These prerequisites held true in the specification and construction of my structural model.

Model Estimation. After an SEM model has been specified based on the researcher's theoretical framework and the model has also been identified, the next procedural step of SEM analysis is estimation. This step requires using the observed raw data, or the observed covariance/correlation matrix, to estimate the parameters that have been specified. The primary objective is to determine the goodness-of-fit between the

specified model and the sample data. An SEM computer software program (in my case, AMOS) calculates this by iteratively yielding parameter values until the residual between the observed covariance matrix and the covariance matrix implied by the model is minimized and no more improvements can be made (Bowen & Guo, 2011; Byrne, 2010). This is achieved by using a *discrepancy function* in the estimation process that locates the point where the discrepancy between the sample covariance matrix and the implied covariance matrix is the least.

Several discrepancy, or fitting, functions are used in structural equation modeling—the most common of which is maximum likelihood (ML) estimation (Bollen, 1989; Kline, 2010). This is the default discrepancy function in most SEM software programs, and in AMOS, ML estimation is also a feature that allows for the imputation of missing data (Blunch, 2013). This calculus-based procedure is based on multivariate normality, and it was devised to estimate all paths in the conceptual/implied model to maximize the likelihood that they are found in the observed model (Kline, 2010). The ML estimating method is rather robust and is asymptotically unbiased—meaning that in larger sample sizes, it provides an impartial estimation of the population value. It is also efficient in that it provides a variance estimate that is smaller than other consistent estimation methods. Moreover, the ML estimator renders a distribution that is approximately normal and is scale invariant (Bollen, 1989).

Yet even with all of the ML method's advantages, characteristics of the sample and variables in the study should dictate which estimation procedures are most suitable for distinct SEM analyses. Other estimation approaches are recommended when using

categorical or ordinal variables and non-normal data such as Weighted Least Squares (WLS) and Weighted Least Squares Mean and Variance adjusted (WLSMV) (Bowen & Guo, 2011). Due to the widespread use of Likert scales in social science research, statisticians have suggested that estimating procedures from the weighted least squares family are more appropriate (Jöreskog, 2005). However, this is also grounded in the conceptualization of the Likert scale as either an interval or ordinal type of measurement (See Brown, 2011).

Model Evaluation. After the model is estimated, the evaluation step commences. In evaluating the model, researchers are predominantly concerned with the assessment of model fit, path coefficients, and standard errors (Kline, 2010). There are several model fit indices used in SEM. Table 4. 2 catalogues these fit indices along with their corresponding statistical criteria. The chi-square test of model fit is the most commonly used fit index; however, it is very sensitive to large sample sizes. It is based on the central χ^2 distribution, which assumes that the model fits perfectly in the population. This is problematic given that postulated models—no matter how well they are theorized—can only fit observed, or real world, data *approximately* and never *precisely* (Byrne, 2010).

Because the number of cases in my sample size, n= 340, is considerably larger than the sample size needed to position the chi-square test a reasonable measure of fit—which is approximately 75-200 cases—it is probable that the chi-square analysis will result in a statistically significant calculation. Moreover, the pilot survey results indicated that the variables in my model are significantly correlated with one another, which can also result in the chi-square analysis suggesting poor fit when in reality the model

comprises good fit. In other words, this can lead to a false negative or Type 1 error (Hoe, 2008; Kenny, 2014).

Given the limitations inherent in the chi-square test, other indices of fit have been widely developed and utilized over the past three decades (see Bentler, 1990; Browne & Cudeck, 1993; Gerbing & Anderson 1993; Hu & Bentler, 1995; Jöreskog & Sorbom, 1993; MacCallum & Austin, 2000). For example, an alternate evaluation of the χ^2 statistic is to examine the ratio of the χ^2 value and the degrees of freedom for the model (Jöreskog & Sorbom, 1993). A small χ^2 value relative to its degree of freedom is indicative of good fit. Kline (1998) suggested that if χ^2/df is 3 or less, it is an indicator of good model fit. In addition, other fit indices such as the CFI (Bentler, 1990) and RMSEA (Steiger, 1990) are less sensitive to sample size, and thus, more resilient indicators of fit for this study. These and other indices—located in Table 4.2—are more pragmatic criteria that are typically assessed in an ad hoc manner in conjunction with the chi-square statistic. They also take additional features of a model into consideration when assessing fit—including sample size, model complexity, degrees of freedom, and/or violations of multivariate normality and variable independence (Fan, Thompson & Want, 1999; Kline, 2010). Scholars recommend assessing an assortment of model fit indices to ensure a well fitting model is not discarded or, vice versa, an ill-fitting model is retained (Hu & Bentler, 1999; Kline, 2010; Raykov & Widaman, 1995). Consequently several indices were consulted during the model evaluation phase of data analysis in this dissertation.

Table 4.2. Fit indices and statistical criteria

Fit Index	Criterion for Indicating Good Fit
Chi-square (χ^2) test	Non-significant value (p >.05) (Yet problematic for sample sizes < 75 and > 200)
Standardized Root Mean Residual (SRMR)	Value of .05 or less indicate good fit
Comparative Fit Index (CFI)	Values > .95 indicates good fit. (Values range from 0 to 1)
Tucker-Lewis Index (TLI) of Non-normed Fit Index (NNFI)	Values > .95 indicates good fit. (Values range from 0 to 1)
Root Mean Square Error of Approximation (RMSEA)	Values < .06 = good fit; Values .06-.10 = Moderate fit.
Chi-square/degrees of freedom (χ^2/df) ratio	Values smaller than 3 (Kline, 1998)

In addition to reviewing the model fit indices, model evaluation also comprises asking oneself if the parameter estimates of a model make sense, both theoretically and intuitively. This is accomplished by examining the direction of effects, the magnitude and statistical significance of the path coefficients and factor loadings, and also the R^2—or the squared multiple correlation—values to determine how much variance is accounted for in each observed model variable (Bollen, 1989; Raykov & Widaman, 1995). Values of 0.59 to 0.87 are described as "moderate to large" R^2 values (Bollen, 1989, p. 288). In assessing standardized path coefficients, values must be at least 0.2 and ideally above 0.3 to be

considered meaningful and worthy of reporting (Chin, 1998). Standardized coefficients between 0.3 and 0.6 are considered moderate, 0.6 to 1.0 strong, and greater than 1.0 is interpreted as decisive (Song & Lee, 2012).

Model Modification/Respecification. Model building and model trimming encompass the analytical step known in the SEM literature as model modification and/or respecification. Although SEM is a deductive analytical tool that estimates and tests causal relationships based on previously established theory, it is this step that also positions this versatile modeling technique in the exploratory realm. Although *model building*—which involves adding plausible paths to a model or releasing model constraints—and *model trimming*—which involves eliminating one or more nonsignificant paths in a model—should *not* be pursued without theoretically meaningful grounds or an empirical motive, this process still embodies a post-hoc modification of the model (Kline, 2010). Indeed, as opposed to a strictly confirmatory approach, this dissertation utilizes the *model development approach* in SEM analysis, which coalesces confirmatory and exploratory objectives into reaching one end goal. To clarify, this approach involves not only testing the fit of the originally implied model, but also authorizing potential changes to the model based on the SEM modification indices and expected parameter change statistics (Garson, 2012).

The Lagrange Multiplier test (LM) is used to guide model building to improve the overall model fit. However, model building can negatively impact parsimony, and consequently, I proceeded with caution during this step of the analysis. Model building should be minor, selective, and not impose substantial changes on other model

parameters (Byrne, Shavelson, & Muthén, 1989; Kline, 2010). Model trimming is assessed using the Wald statistic, which indicates paths that can be removed from the model, thereby improving model parsimony, without harming overall fit. Model trimming often entails the deletion of nonsignificant items, deletion of problematic items—such as cross-loadings or items that fail to measure their hypothesized construct—and the deletion of double-loading items that lead to inadequate fit (Bowen & Guo, 2011). Like model building, trimming must also be theoretically defensible and researchers should be prudent in their quest to not make a large number of arbitrary changes in their models (Byrne, 1998). For the integrity of academic research, it is vital to explicitly account for the changes made so that the model refrains from capitalizing on chance or idiosyncrasies in the collected sample that might not be generalizable to other data sets (Browne & Cudeck, 1989; Tomarken & Waller, 2003).

Sample Size and Power Calculation. Discerning the number of participants to be included in a sample is critical to SEM analyses because there may not be enough power to detect differences between several competing models when the researcher is working with a smaller *n*. The general, and somewhat vague, rule of thumb for SEM analyses is to have a sample of no fewer than 200 participants and to have 400 when observed variables are not multivariate normally distributed (Kline, 2010). In general, more expansive models contain more estimated parameters, and consequently they require larger sample sizes.

However, it is important to note that bigger is not always better. If the variables are reliable, the model is not overly complex, and there are three or more indicators per

factor, a smaller sample size will be sufficient for the convergence of a model solution (Anderson & Gerbing, 1984; Bearden, Sharma, & Teel, 1982; Bollen, 1990). To determine the sample size I needed based on my specified model, I examined a priori power considerations (Kim, 2005; MacCallum, Browne, & Cai, 2006; MacCallum, Bowne, & Sugawara, 1996). Generally speaking, the sample size recommended for a SEM model that has an anticipated effect size of .01, a desired power level of .80, a desired probability level of .05, and has two latent and eight observed variables is 152. A sample size of n= 200 was selected for this study, however, I ended up recruiting 345 participants. Because I accumulated more participants than I had originally anticipated, it also increased the statistical power in my SEM analyses.

As defined by Faul and colleagues (2007), statistical power is the probability that a statistical test correctly rejects the null hypotheses (H_0) when it is false. As such, statistical tests lacking statistical power are inadequate because they cannot discriminate between H_0 and the proposed hypothesis (H_1) with an acceptable degree of reliability (Faul, Erdfelder, Lang, & Buchner, 2007). In the specific context of CFA and SEM models, statistical power signifies the "sensitivity of χ^2 to detect model misspecifications" (Brown, 2006, p. 413). In other words, statistical power is measured by a propensity to reject the null hypothesis—which, in SEM, is assessed using a discrepancy function that determines the closeness of the implied mean vector and correlation matrix with those discovered in the observed model. When the statistical power is too low, it affects the operability of the discrepancy function. Researchers should avoid power levels that are too low in their analysis—which could result in the

failure to reject false models—or too high—which could result in the rejection of acceptable models (McQuitty, 2014).

To determine the power associated with my SEM model, I employed MacCallum, Browne, and Sugawara's (1988) power analysis technique that combines non-central χ^2 distributions with the RMSEA statistics to test the null hypothesis and obtain a power estimate for the SEM model in its entirety. To utilize this analytic strategy, I gathered five pieces of information: the RMSEA value below which the model is considered to have acceptable fit (H_0), the RMSEA value above which the model is considered to have unacceptable or ill fit (H_a), the degrees of freedom (*df*), the *p* level (α), and the sample size (*n*). For the first four values, I used .05, .08, 32, and .05 respectively. The calculations revealed power levels of above .90 for the model, which surpasses the .80 conventional cutoff value for acceptable statistical power prescribed by Cohen (1988).

This section of my dissertation reported the preliminary analyses of the data and the procedural steps that were performed to prepare for and enact the forthcoming primary analyses. After analyzing the factor analyses, verifying the statistical assumptions for SEM, regression, and multivariate analyses, and preparing for the six procedural SEM steps, I determined that the resulting quantitative data set was sufficient to proceed with the primary analysis. Consequently, I elaborate on the results of the primary analyses in the subsequent sections of this chapter.

PRIMARY DATA ANALYSIS FOR HYPOTHESES 1 AND 2: CONSTRUCTING AN EHR CHANGE MODEL

I used structural equation modeling to examine the influence of the informal social influence latent variable—comprised of coworker social support and feedback—and change reinvention—comprised of consensus and faithfulness of technology appropriation—on three outcomes: employee resistance to change, employee's perceived change success, and employee's perceived relative advantage of the new EHR technology. While SEM is ordinarily reserved for explicit models constructed using a rich set of hypothesized causal paths, my use of SEM is somewhat exploratory, yet still firmly grounded in theoretical justifications. As discussed in the literature review section, there is plausibility, based on past research, that the variables included in my model are highly correlated with one another. With that said, some of variables, including reinvention and the social influence streaming from coworkers, have received little empirical attention in the body of organizational change research. Thus, the specific relationships of these variables with the study's outcomes variables are obscure in regards to the size of the coefficients, direct and indirect paths, and significant levels.

Table 4.3. List of Hypotheses: The Guidelines for Model Specification

Hypothesis 1:Informal social influence in the form of coworker feedback and support will significantly impact interactions with and perceptions of organizational change.
H1a: There will be a direct positive relationship between informal communication surrounding change implementation, specifically coworker feedback and social support, and change reinvention in healthcare organizations.
H1b: Informal communication surrounding change implementation, specifically coworker feedback and social support, will lead to perceptions of change success in healthcare organizations
H1c: Informal communication surrounding change implementation, specifically coworker feedback and social support, will lead to change resistance in healthcare organizations.
H1d: Informal communication surrounding change implementation, specifically coworker feedback and social support, will lead to perceptions of the relative advantage of EHR technology in healthcare organizations.
Hypothesis 2: There will be a direct relationship between healthcare employees' levels of reinvention in organizational change and their resistance to change, perception of change success, perception of the relative advantage of EHR technology, and perception of the communication quality surrounding the change.

The model I constructed and explored, contained specific variables suggesting casual directions of influence based on the theoretical tenets of adaptive structuration theory, the social influence model, and Lewis' work on organizational change; however, this implied model acts as a shell. The composition of the final model came to fruition only after adding and omitting several pathways in accordance with the posed hypotheses (see Table 4.3 above). With each revision, I subsequently assessed each variation in the SEM model's output.

I used SEM to explore these relationships for three reasons: 1) this model analytic procedure accounts for measurement error, which reduces inaccuracies; 2) it allows for

the analysis of a complete multivariate model, including the assessment of indirect and direct effects amongst variables; and finally 3) it tests for casual relationships between independent and outcome variables (Byrne, 2010; Kline, 2010).

Assessing Both the Measurement and Structural Equation Model

Both the measurement and latent model were constructed, scrutinized, and assessed according to each of the SEM procedural steps previously discussed. The initial measurement model fit satisfactorily, according to the variable relationship paths offered in the proposed model found in Figure 2.1, entitled "Coworker Social Influence and Organizational Change." In other words, the general direction of the regressions between the variables was confirmed. Thus, there were little adjustments to the measurement model prior to examination of the structural model (Segars & Grover, 1993; Stapleton, 2002). At this step, confirmatory factor analysis (CFA) and reliability analysis (Blunch, 2013; Byrne, 2010) were again performed and assessed via AMOS on the four manifest variables representing the two latent constructs.

Second, the initial structural model imposed on the latent factors and defined in the measurement model was then explored and tested for explanatory power and increased goodness of fit. The model was rigorously tested and analyzed according to the indices listed in Table 4.2, and the best fitting model was selected in the end, which is scrutinized in the discussion chapter of this dissertation. (See Figures 4.2 and 4.3 for a visual of the initially implied and final model). The final structural equation model was developed by means of Maximum Likelihood estimation procedures, which is the default estimating

method in the AMOS statistical software program. (Blunch, 2013; Byrne, 2010).

In the next two sections, I discuss this process further and delineate how I first tested the variable relationships and pathways in the measurement and structural models individually, using multiple regression analyses, before I proceeded to test the model in its entirety. The model constructed in this dissertation work is organized by hypotheses, however the width and depth of past organizational change literature is not expansive enough in the areas of change reinvention and coworker social influence to make unyielding confirmatory propositions. Consequently, I first ran multiple regression analyses to corroborate the directionality of the effects suggested in the initial model, shown in Figure 2.1. The statistical results of the accumulated regression analyses then provided substantive evidence to proceed with the model construction and to assemble the pieces of the model, or the individual statistically verified paths, into a more meaningful and concrete whole. According to Karl Jöreskog (1993), this strategy of incrementally building and testing a SEM model is called *model generating,* as opposed to a *strictly confirmatory* practice where empirical data are obtained to test fit and then accepted or rejected. In model generation, an initial or tentative model is presented, and if this model fails to fit the data or improvements can be made, the model is modified and tested again until it produces a substantially meaningful interpretation. The two forthcoming sections explain the multiple regressions that were conducted to legitimize the model generation process, in addition to their corresponding results.

Analyzing the Impact of Social Influence on Reinvention and the Outcome Variables

The first set of hypotheses sought to further understand the role coworker social influence played in 1a) change reinvention, 1b) perception of change success, 1c) resistance to change and 1d) perceptions of relative advantage of the new organizational technology. To test the significance of these relationships, I inspected the structural model specifically questioned in H1a, and ran multiple regressions to understand the significance of the impact of social influence on the rest of the remaining outcome variables, H1b-1d.

The structural portion of the model tested in H1a (see Figure 4.2) revealed that the overall model fit was outstanding (χ^2 = .086, df = 1, p = .77, CFI = 1.0, AGFI = .99, RMSEA = .01). These statistics indicate that there is very little difference between the sample variance-

covariance matrix and the reproduced variance-covariance matrix implied by this structural, or latent, portion of the model. The regression weights and standard estimates for the paths can be seen in Table 4.4.

H1b-1d targeted the relationship between social influence and the remaining outcome variables in the study. To scrutinize the specific relationships within each of these hypotheses, before inspecting the model in its totality, I ran three separate multiple regressions. Each multiple regression analyzed the predictive power of the social influence independent variables—co-work social support and feedback—on one dependent variable: perception of change success (1b), employee resistance to change

(1c), or employee perception of the relative advantage of the technology (1d).

Table 4.4. Regression Weights for H1a Structural Model

			Estimate	S.E.	C.R.	*p*	St. Estimate
Reinvention	<---	Social Influence	.53	.08	6.96	***	.30
FOA	<---	Reinvention	1.00				1.34
COA	<---	Reinvention	1.47	.20	7.32	***	1.92
Feedback	<---	Social Influence	1.00				.72
Support	<---	Social Influence	1.15	.11	10.63	***	.96

The results of these statistical tests revealed that coworker feedback (β = -.21, p < .001, *CI* 95% [-.42, -.09]) and social support (β = -.26, p <. 01, *CI* 95% [-.57, -.19]) were significant predictors of employee resistance (F[2, 337] = 38.6, R^2adj = .18, p <.001). In regards to employee perceptions of change success, the statistical analyses reported that coworker social support was a significant predictor (β =. 43, p < .001, 95% *CI* [.36, .68]), however, coworker feedback (β = .02, p > .05, 95% *CI* [-.11, .16]) was non-significant (F[2, 337] = 42.8, $Radj^2$ = .20, p< .001).

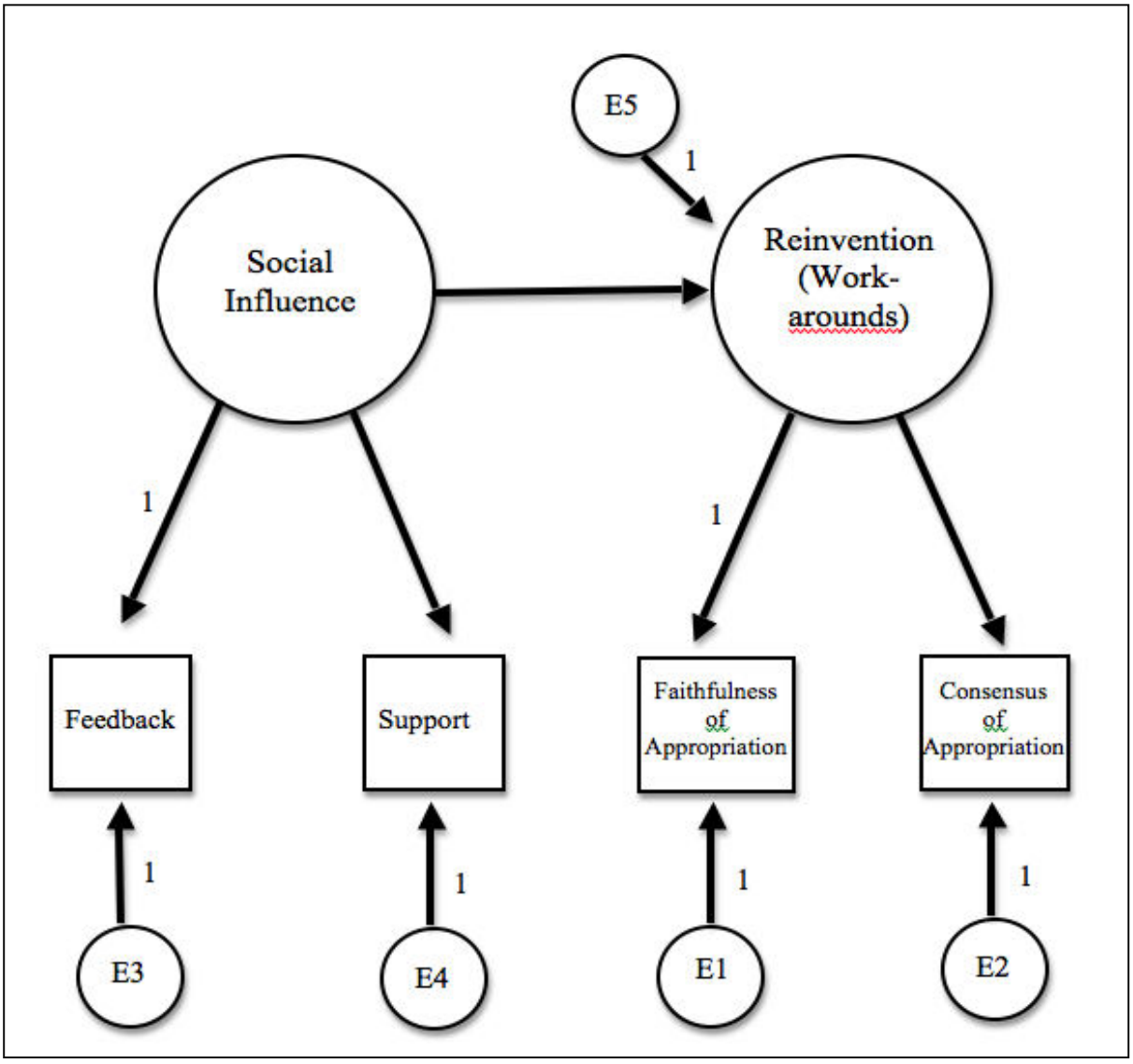

Figure 4.1. The Structural Model Tested in H1a

Finally, coworker feedback ($\beta = .26$, $p <. 001$, 95% *CI* [.20, .60]) and coworker social support ($\beta = .25$, $p < .001$, 95% *CI* [.21, .69]) were both found to be significant predictors of employees' perceptions of the relative advantage of the EHR technology ($F[2, 337] = 47.3$, $Radj^2 = .22$, $p < .001$). Given the overall significance levels reported in these analyses, I confirmed that I had empirical justification to continue with my initial structural model design. To be more specific, I decided to include the paths from the latent variable social influence to each of the outcome observed variables—resistance, perceived success, and relative advantage—when testing the model in its totality. Table 4.5 provides a summary of the multiple regression statistics associated with each outcome variable as well as the bivariate correlations for each of the predictor and dependent variables.

Table 4.5. Summary for Social Influence Multiple Regression Analyses.

	Resistance			Success			Relative Adv.		
	r	St. E	β	*r*	St. E	β	*r*	St. E	β
Support	-.45*	.10	-.26	.57*	.08	.43	.43*	.08	.25
Feedback	-.32*	.08	-.21	.37*	.07	.02	.42*	.08	.26
R^2adj		.18			.34			.22	
F		67.1*			87.7*			47.3*	

*$p < .001$

In the next section of this chapter, I explain the results associated with the second research query, which questioned the relationships between the outcome variables in this study and the change reinvention construct.

Analyzing the Influence of Change Reinvention on the Outcome Variables

The second research question investigated the relationship between change reinvention and each of the study's outcome variables—resistance, perceived success, and relative advantage of technology—in addition to employees' perceived communication quality surrounding the change. To explore each of the relationships questioned in Hypothesis 2, I first conducted four separate multiple regressions. Each multiple regression included both variables composing the latent construct change reinvention—namely, consensus of appropriation and faithfulness of appropriation—as the predictor variables and either perceived resistance, perceived success, perceived relative advantage of the technology, or communication quality as the dependent variable. The multiple regression analyses disclosed that consensus of appropriation (β = -.38, $p < .001$, 95% *CI* [-.61, -.36], tolerance = .83, VIF = 1.21) and faithfulness of appropriation (β = -.24, $p < .001$, 95% *CI* [-.44, -.18], tolerance = .83, VIF = 1.21) significantly predicted employee resistance to the EHR technology (F[2, 337] = 67.1, $Radj^2$ = .28, $p < .001$) and are *negatively* correlated with this outcome variable. Consensus of appropriation (β =. 50, $p < .001$, 95% *CI* [.42, .62]) and faithfulness of appropriation (β = .16, $p < .01$, 95% *CI* [.06, .27]) also significantly predicted an employee's perception of change success (F[2, 337] = 87.7, $Radj^2$ = .34, $p < .001$), but the predictor variables are *positively* correlated with this outcome variable. Similarly, results revealed that consensus of appropriation (β = .39, $p < .001$, 95% *CI* [.46, .78], tolerance = .83, VIF = 1.21) and faithfulness of appropriation (β = .22, $p < .001$, 95% *CI*

[.20. .52], tolerance = .83, VIF = 1.21) are significant *positive* predictors of an employee's perceived relative advantage of the EHR technology (F[2, 337] = 65.0, $Radj^2$ = .27, p < .001). Finally, the results of a multiple linear regression suggested that a decent proportion of the total variation in communication quality (F[2, 337] = 27.6, $Radj^2$ = .14, p <.001) was significantly predicted by consensus of appropriation (β = .27, p < .001, 95% *CI* [.26, .62]) and faithfulness of appropriation (β = .17, p < .01, 95% *CI* [.10, .46]). Table 4.6 below summarizes these results as well as provides the bivariate correlations for each of the predictor and outcome variables.

Table 4.6. Summary for Reinvention Multiple Regression Analyses

	Resistance			Success			Relative Adv.			Com Quality		
	r	St. E	β	*r*	St. E	β	*r*	St. E	β	*r*	St. E	β
Consensus of Approp	-.49*	.07	-.38	.57*	.05	.50	.49*	.08	.39	.34*	.09	.27
Faithfulness of Approp	-.40*	.06	-.24	.37*	.05	.16	.39*	.08	.22	.28*	.09	.17
R^2adj		.28			.34			.28			.14	
F		67.1*			87.7*			65.0*			27.6*	

*p < .001

Given the overall high level of significance I discovered in the multiple regression analyses conducted and reported above, I decided to again maintain my initial model design. In other words, I retained the pathways stemming from the latent construct change reinvention to each of the outcome variables while later testing the fit of the integrated model. In the next section of this results chapter, I explain and graphically present the complete model that each of these regression analyses collectively built. Because SEM allows researchers to a) test an entire model, rather that focusing on

individual coefficients; b) take into account mediating variables through measuring and reporting direct and indirect effects; and c) use latent variables to not only explain observed covariation in behavior, but also account for measurement error; I did not expect *all* of the significant variable paths unearthed by the previous multiple regression results to be retained in the comprehensive path diagram of the final best fitting SEM model. The following section reports the result of the initially constructed model and then offers an alternative model that includes fewer variables paths, yet is a more accurate testament to how the researched variables systematically covaried in the sample population.

Testing the Accumulative SEM Model

As heretofore mentioned, structural equation modeling with Maximum Likelihood estimation was used to analyze the direct and indirect effects of two latent constructs—change reinvention and coworker social influence—on four dependent observed variables—employee resistance, perceived success of the technological change, perceived relative advantage of the new technology, and finally perceived quality of communication surrounding the change. All of these primary variables were presumed to be meaningfully related to one another based on past empirical research and theoretical considerations, yet the specific paths between variables, presence of mediating variables or indirect effects, and size and significance of path estimates were generated using the AMOS statistical software.

For all models tested, model fit was evaluated using the chi-square statistic, comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR), following the recommendations of good fit by Bagozzi and Youjae (1988) and Hu and Bentler (1999). The GFI (goodness-of-fit index), for example, was not used to assess model fit because researchers have suggested it is a tendentious test—easily affected by sample size (Sharma, Mukherjee, Kumas, & Dillon, 2005). The TLI and CFI tests are not only nondiscriminatory in the face of sample size fluctuation, they also impose penalties for adding additional parameters, as they represent *incremental* fit indices (Kenny & McCoach, 2003). In addition to the chi-square statistic and other indices previously offered, I also examined the χ^2 value relative to its corresponding degrees of freedom (*df*). When sample sizes surpass the 200 mark, the chi-square statistic can lose its capacity to consistently measure good model fit. As a result, Kline (1998) suggested that a χ^2/ *df* ratio is a more accurate depiction assessment. As Kline argues, a χ^2/*df* value of three or less indicates a well fitting model (1998).

SEM analyses investigating the initial model, which included all of the variable paths that were listed in each of the abovementioned hypotheses (See Figure 4.2), revealed a model that fit the data well: χ^2 (16) = 55.75, $p < .01$, $\chi^2/df = 3.4$, CFI = .97, TLI = .95, SRMR = .03, RMSEA = .08. Inspection of the path estimates revealed strong to very strong path estimates—all of which were statistically significant at the $p \leq .001$ level.

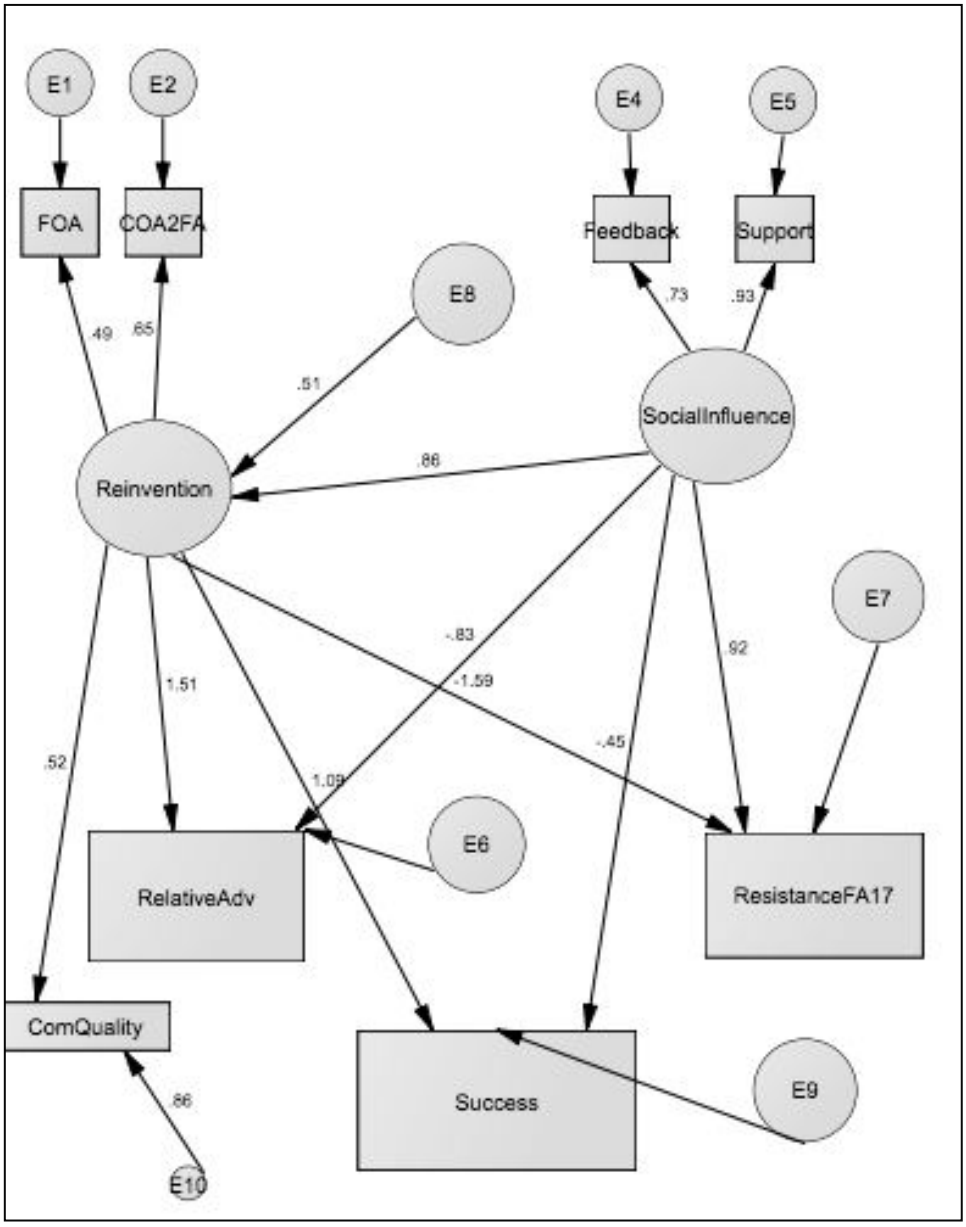

Figure 4.2. The Initial Model with Standardized Estimates.

Even with the impressive estimate sizes and significance levels composing the variable paths in this first, initial model, the modification indices suggested that the model could better capture the observed data. Adding and taking away one variable path and covarying one disturbance term that stem from the endogenous variables in the model could achieve this. In accordance with the literature on model re-specifying, the Lagrange Multiplier test (LM) was used to guide model building to improve the overall model fit. Because model building can negatively impact parsimony, I proceeded with caution and only made minor and selective changes to the model parameters as advised by the modification indices (Byrne, Shavelson, & Muthén, 1989; Kline, 2010). Model trimming is assessed using the Wald statistic, which indicates the paths that can be removed from the model, thereby improving model parsimony without harming overall fit. Like model building, trimming must also be theoretically defensible, and I was modest and judicious in my quest to not make a large number of arbitrary changes to my model (Byrne, 1998).

The improved version of the initial model demonstrated outstanding fit: $\chi^2 = 29.03$ (15), $p > .01$, $\chi^2/df = 1.9$, CFI = .99, TLI = .98, SRMR = .02, RMSEA = .05. Moreover, all estimates were substantial and again significant. (See Table 4.6 and Figure 4.4 for a visually depiction of the modified model.) As demonstrated in Figure 4.3, the path between social influence and relative advantage was removed and a path was added between resistance and relative advantage.

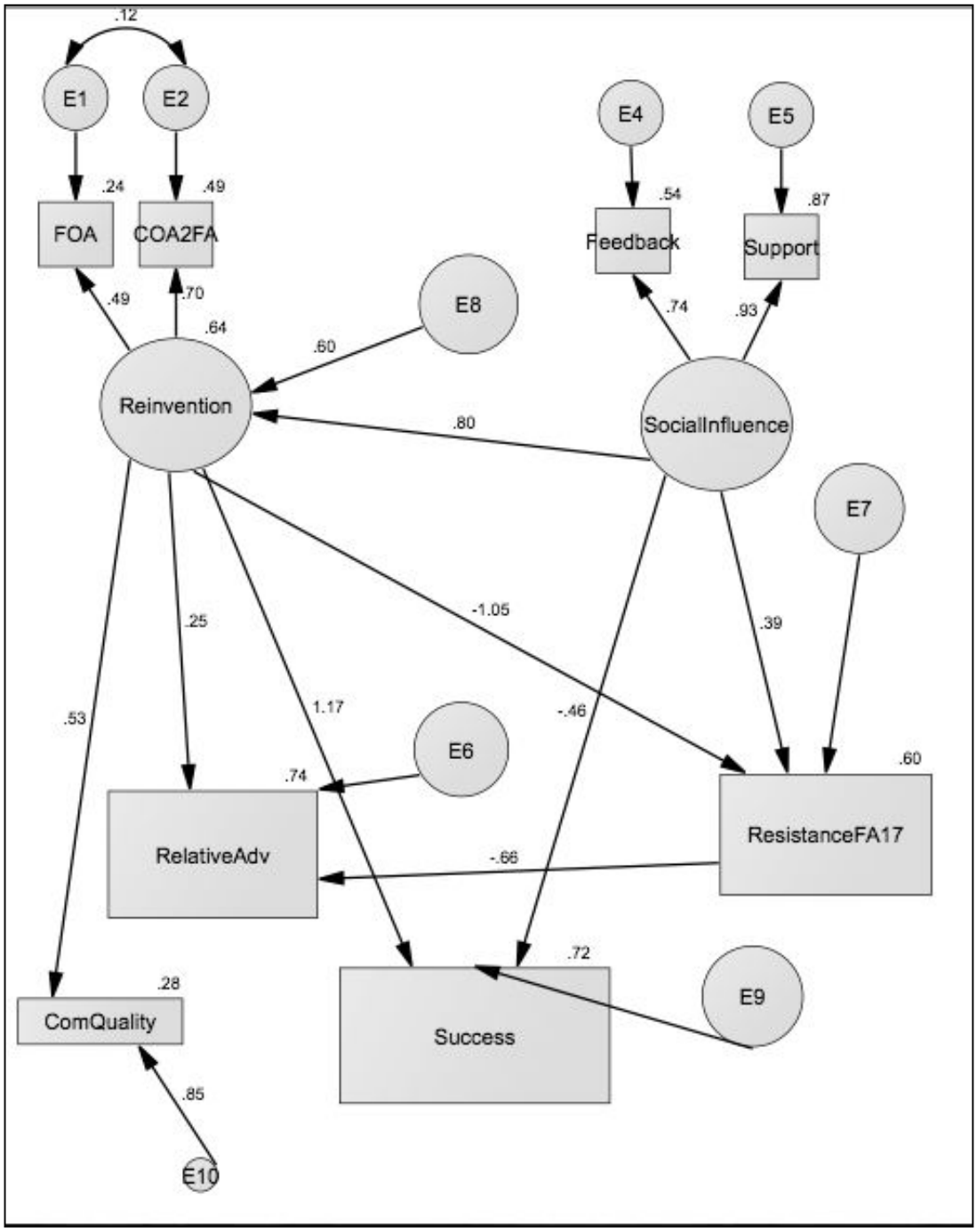

Figure 4.3. The Re-specified Model with Standardized Estimates

As for the covariances, the disturbance terms of faithfulness and consensus of appropriation were allowed to covary.

Table 4.7. Regression Weights and Standardized Regression Weights

			Estimate	S.E.	C.R.	*p*	St. Estimate
Reinvention	<---	Social Influence	.52	.07	7.85	***	.80
Reinvention	<---	E8	.23	.03	7.31	***	.60
ResistanceFA17	<---	Reinvention	-2.72	.40	-6.91	***	-1.05
ResistanceFA17	<---	Social Influence	.66	.20	3.4	***	.39
FOA	<---	Reinvention	1.00				.50
COA	<---	Reinvention	1.44	.16	8.99	***	.70
Feedback	<---	Social Influence	1.00				.74
Support	<---	Social Influence	1.09	.10	11.97	***	.93
Relative Adv	<---	Reinvention	.81	.18	4.57	***	.25
Success	<---	Reinvention	2.50	.37	6.73	***	1.17
Com Quality	<---	Reinvention	1.79	.24	7.32	***	.53
Success	<---	Social Influence	-.64	.18	-3.50	***	-.46
Com Quality	<---	E10	1.10	.04	24.84	***	.85
Relative Adv	<---	ResistanceFA17	-.83	.06	-14.06	***	-.66

Given the removal of the path from social influence to relative advantage, I next assessed whether change reinvention was acting as a mediating variable for the link from social influence to relative advantage. That is, I determined whether reinvention acted as a critical intervening variable in that it reserved a unique capacity to at least partially determine the influential nature of coworker social influence on employees' perceptions of relative advantage. Because AMOS output provides data on total, direct, and indirect effects (See table 4.7-4.9), one might assume that the output on indirect effects would completely answer this question. However, AMOS output only imparts the *total* indirect

effects for variable X on Y in the model. In other words, it does not disclose the *specific* indirect effects (Brown, 1997) for each mediating variable when there is more than one mediating variable in the model. For Brown (1997) and Holbert and Stephenson (2003), the specific indirect effect is the most imperative type of effect to consult when evaluating structural equation models for mediating variables.

Fortunately, in the newly customized model, I only have evidence of one mediating variable, which is change reinvention—also referred to as work-arounds in technology use. Consequently, I did not need to calculate additional equations, as described in MacKinnon, Lockwood, Hoffman, West, and Sheets (2002), to further understand the significance of other relationship-altering variables.

Table 4.8. Standardized Total Effects

	Social Influence	Reinvention	ResistanceFA17
Reinvention	.80	.00	.00
ResistanceFA17	-.45	-1.10	.00
Com Quality	.43	.53	.00
Success	.48	1.17	.00
Relative Adv	.50	.94	-.66
Support	.93	.00	.00
Feedback	.74	.00	.00
COA	.56	.70	.00
FOA	.40	.50	.00

Table 4.9. Standardized Direct Effects

	Social Influence	Reinvention	ResistanceFA17
Reinvention	.80	.00	.00
ResistanceFA17	.39	-1.10	.00
Com Quality	.00	.53	.00
Success	-.46	1.17	.00
Relative Adv	.00	.25	-.66
Support	.93	.00	.00
Feedback	.74	.00	.00
COA2FA	.00	.70	.00
FOA	.00	.50	.00

Table 4.10. Standardized Indirect Effects

	Social Influence	Reinvention	ResistanceFA17
Reinvention	.00	.00	.00
ResistanceFA17	-.84	.00	.00
Com Quality	.43	.00	.00
Success	.94	.00	.00
Relative Adv	.50	.70	.00
Support	.00	.00	.00
Feedback	.00	.00	.00
COA2FA	.56	.00	.00
FOA	.40	.00	.00

PRIMARY DATA ANALYSIS: HYPOTHESES 3 AND 4

I used IBM's Statistical Package for the Social Sciences (SPSS) 22 and Analysis of Moment Structures (AMOS) to analyze my quantitative data. In particular, I utilized SPSS to analyze Hypothesis 3 and 4, and AMOS to empirically test the fit and validity of

the model that I constructed based on previous literature. This model depicted above contains the most relevant and immediate variables within the specified sites of research as informed by my pilot survey results. In this section, I discuss the findings of the two proposed hypotheses.

Hypothesis 3: Employee Demographics and Resistance.

Hypothesis 3 predicted that three demographics—namely, occupation, age, and organizational experience level—would predict employees' levels of resistance to change. Specifically, this hypothesis postulated that a) physician and nurses will be more resistant to EHR implementation than administrators, technicians, and other health professionals, with physicians acting as the most resistant group overall; b) older employees would experience higher levels of resistance than their younger counterparts; and c) employees with more experience in their organization would be more resistant to organizational change while those with less experience would be less resistant. The first branch of this hypothesis was partially confirmed while the later two branches—involving age and organizational experience—were completely confirmed. Three one-way ANOVAs were used to largely support Hypothesis 3, which revealed that levels of resistance to EHR were indeed significantly different and in the proposed direction amongst occupational groups ($F[15, 324]= 10.98$, $p > .001$), age ($F[4, 334]= 3.74$, $p > .01$), and organizational experience ($F[4, 335]= 4.53$, $p > .01$). To further explore how sets of categorical means within these groups were significantly different from one another, I ran Tukey's post-hoc comparisons of the occupational levels listed in addition

to the employees' reported age categories and organizational experience level categories (See Table 3.6 to view the categories found within each of these demographic variables). The post hoc analysis indicated that physicians were by far the most resistant group when it came to using the new technology. Physicians (M = 3.1, 95% CI [2.9, 3.3]) were significantly more resistant to the new EHR technology than technicians (M = 2.0, 95% CI [1.7, 2.3], $p < .001$), administrators (M = 1.4, 95% CI [1.2, 1.6], $p < .001$), and nurse assistants (M = 1.7, 95% CI [1.4, 2.0], $p < .001$), but not physician assistants (M = 2.3, 95% CI [1.1, 3.5], $p > .05$). Physicians were also significantly more resistant to the use of the EHR system than nurses (M = 2.1, 95% CI [2.0, 2.3], $p < .001$), further confirming the Hypothesis 3. In addition, physicians experienced elevated levels of EHR resistance when compared to medical transcriptionists (M = 1.7, 95% CI [1.0, 2.4], $p <. 05$), those working with medical records in billing and clerk positions (M = 2.1, 95% CI [1.9, 2.4], $p < .001$), and dentists and dental assistants (M = 2.1, 95% CI [1.8, 2.4], $p < .001$).

In addition to being significantly *less* resistant to EHR use than physicians, nurses (M = 2.1, 95% CI [2.0, 2.3]) were significantly *more* resistant when compared to administrators (M = 1.4, 95% CI [1.2, 1.6] $p < .05$). However, there was not a statistically significant difference in resistance between nurses and technicians (M = 2.0, 95% CI [1.7, 2.3], $p > .05$), or between nurses and any other occupational group researched in this study. Still, nurses were comparably—although not significantly—more resistant to EHR use than technicians, administrators, and every other occupational group in the study with the exception of physicians, physician assistants, and those working in billing and clerk positions; as such, the predicted direction of the mean differences between nurses and

other occupational groups were at the vey least correct, if not correct and significant. (See Figure 4.1 for a bar chart representing the resistance means that were significantly different across occupational groups).

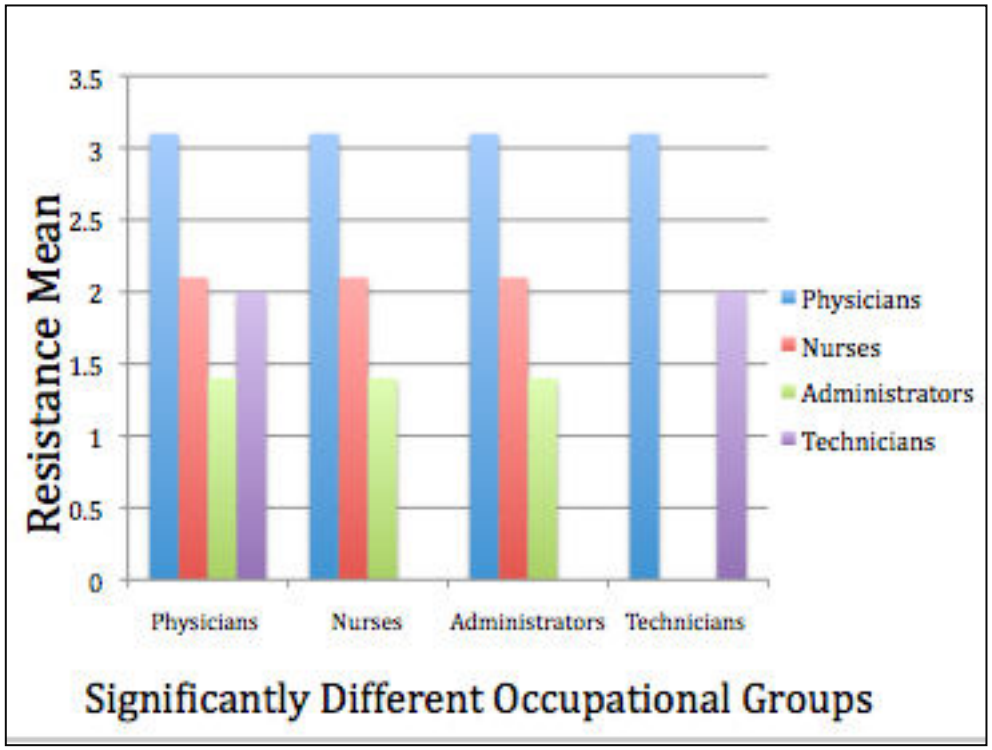

Figure 4.4. Significant Differences in Resistance by Occupational Group.

Hypothesis 4: Communication Quality's Influence on Outcome Variables

Hypothesis 4 predicted that the perceived communication quality surrounding the change of EHR implementation, training, and usage would predict levels of change reinvention, resistance to change, and perceptions of change success and the relative advantage of the new technology. Specifically it postulated that those employees who perceived the quality of the communication surrounding the change to be higher would

report a) lower levels of

resistance and b) more optimistic perceptions of change success and the relative advantage of the technology. To test this hypothesis, I regressed each of the outcome variables on communication quality. Results revealed that this hypothesis was supported. Perceived communication quality was a negatively correlated predictor of employee resistance ($F[1, 338] = 77.4$, $\beta = -.33$, $p <. 001$), accounting for 18.4% of the variance in the variable, and a positively correlated predictor of employees' perceived success of the change ($F[1, 338] = 73.6$, $\beta = .27$, $p < .001$) and perceived relative advantage of the new technology ($F[1, 338] = 72.4$, $\beta = .41$, $p < .001$), accounting for 17.7% and 17.4% of the variables' variances, respectively.

ELABORATING ON THE STATISTICAL RESULTS AND CHANGES MADE TO THE INITIAL SEM MODEL

For the integrity and viability of this research, I explicitly account for the aforementioned changes that were made to the initial SEM model in the subsequent discussion chapter to confirm that the elicited modified model did not capitalize on fortuitous events and/or meaningless ad hoc analyses. The forthcoming chapter elaborates on the multiple regression and ANOVA results found in this study in addition to the minor adjustments made to the initial model. The chapter not only works to deconstruct the meaning of these statistical analyses, but also deconstructs the model adjustments in the context of other model relationships. In addition, I offer a rigorous inspection into the ultimate global configuration of the final SEM model. The most noteworthy and sizable contributions derived from the aggregated findings are discussed in addition to their

theoretical and practical nuances. Finally, implications of these results are offered and explored from the specific vantage point of organizational change scholarship—with a goal to further unravel the ongoing implementation of the convoluted, yet promising, EHR system in today's healthcare industry.

CAUSALITY AND DIRECTIONALITY IN SEM MODELS

SEM provides an intuitive statistical analysis with ever increasing user-friendly software and graphic interfaces. As previously discussed, this SEM models have many benefits including being able to construct unobservable latent variables, model errors in measurements for observed variables, and model relationships between multiple predictor and criterion variables. With that said, the procedural steps of SEM are often inappropriately embraced and the results of models can be in interpreted in an invalid or flawed fashion (Biddle & Marlin, 198; Chins, 1998; Cliff, 1983; Mueller, 1997). One of the philosophical fallacies with SEM model interpretation is grounded in causation (Cliff, 1983; Duncan, 1975; Kenny, 1979). Referring to SEM pathways as demonstrating "causal" relationships among the variables, yet this inference cannot be proven with SEM analysis grounded in covariance matrices. Statisticians should be keenly aware that correlation does not imply causality (Biddle & Marlin, 1987). However, some researchers have drawn a distinction between causation and prediction. Some argue, when it comes to SEM analysis, "it would be very healthy if more researchers abandon thinking of and using terms such as cause and effect. Instead they should work [within the SEM

framework] in terms of regression relations with predictor and outcomes" (Muthen, 1992, p. 82).

In a similar vein, imposing the directionality of effects and indirect effects between the variables in an SEM model has received scrutiny as it frequently misunderstood (Hoyle, 1995; Lei & Qiong Wu, 2007). The arrows pointing from one variable to another in structural equation models are often incorrectly interpreted as if they are a measured outcome of SEM analysis. However, SEM estimation analyses, similar to ANOVA and regression analyses, cannot hypothesize direction. Rather, "directionality is a form of association distinguished from nondirectional association with logic (e.g. income cannot cause biological sex), theory (e.g. group cohesion affects group performance, or, most powerfully, by research design (e.g. a manipulated variable to which subjects are assigned randomly cannot be cause by a dependent variable)" (Hoyle, 1995, p. 11). It should be noted that this research used cross-organizational data in a single wave study, and as such, theory was used to justify inferences on directionality, not research design. When it came to the question of whether attitudes (resistance and perceived relative advantage of a technology, for example) affected behaviors (work-arounds) or vice versa, I relied upon the strong body of theoretical evidence and arguments produced by adaptive structuration, diffusions of innovations, and organizational change scholars (Bentler & Speckart, 1981).

With that said, one should keep in mind that even highly significant SEM models with structural paths and loadings of substantial strength should not be conceptualized as "proving" or "confirming" the theory or theories that are used to

construct them (Chin, 1998). Rather, these models should be viewed as empirical evidence of *one possible representation* of the relational constructs underlying the observed data—a representation that should be retained. This is critical to acknowledge because many, in fact infinitely many, alternative structures can yield identical data-model fit, and similarly, one model can replicate the tenets of many theories (Mueller, 1997). Thus, as I continue into the discussion chapter, please keep in mind that I am inferring the directional relationships in my model based on the theoretical arguments and the constructs being modeled.

Chapter 5: Discussion

Key Findings and Contributions

Past research in the field of organizational change has demonstrated that there is a need to focalize the informal acts of sensegiving and sensemaking that both inhibit and promote organizational change initiatives. Given that a great deal of past research has instead focused on the top-down communication strategies utilized to propagandize and funnel change, this study specified how perceived informal social influence can complement, reinforce, or conflict with official change communication. The goal of this study was not only to investigate how employees are active agents in the change communication process, but also to further understand the positive and negative valences of their informally influenced behaviors, or technological work-arounds. Results indicate that work-arounds are not idiosyncratic and consequentially problematic, but instead, are socially learned and shared— thus potentially acting as second-order problem solving (Tucker & Edmondson, 2003). Thus, work-arounds can be conceptualized as a symbol that coworkers are not individually coping, but instead, collectively working to change an inefficient system for the better.

In addition, the results of this study re-energize the call for researchers to appreciate and focus on the essential human communication processes that shape information systems like EHR. It is clear that employees do not universally interact with information systems based on premeditated or indoctrinated understandings of the technology. Rather, decisions in how to use information systems are group-centered and collaborative, and perceptions of the system's usability are developed in real time and

through several iterations. Therefore, we must adopt a human communication perspective of new information technology use and the change it solicits. Meaning originates in people, not in the technology itself, and as a consequence, the use of technologies like EHR will continually be produced and reproduced, negotiated and re-negotiated through language and social interactions. The current research strengthens the case that coworker language choices are especially influential in the sensemaking process throughout technological change initiatives, and more specifically, in the engagement of work-arounds.

This study also uniquely adds to the vast literature covering the multiple antecedents to resistance, perceived success, and perceived relative advantage of organizational change. While the best fitting SEM model demonstrates that social influence is positively associated with resistance and negatively associated with perceived change success, the direction of these relationships are inverted when work-arounds are introduced as a mediating variable. Moreover, the model indicates that the work-around is a full mediator in the relationship between social influence and perceived relative advantage of the EHR technology.

These findings represent key contributions in this study. Most of the extant literature in the healthcare and medical informatics fields equates the work-around with negative repercussions, such as reduced reliability of systems and increased patient safety issues (Blick, 1997; Halbesleben, Wakefield, & Wakefield, 2008). However, this study suggests some positive outcomes work-arounds can have on the psychological outlook of employees. Consequently, this research yields pragmatic implications for managers and

healthcare officials who are currently attempting to implement EHR systems, yet are affronted with difficulty from employees. Specifically, physicians, older aged, and more experienced employees comprise the most resistant groups according to the results of this study.

In addition to helping us reconsider the role and outcomes of work-arounds in healthcare and organizational change scholarship, this dissertation makes unexpected contributions in at least two areas of organizational communication theory and research. First, results of this study call into question the nature of social influence in organizational change initiatives. Past scholarship has praised managerial support and feedback as primary ingredients in successful organizational change ventures (Allen, Jimmieson, Bordia, & Irmer, 2007). Yet this study revealed that higher levels of *coworker* feedback and support generated more personal resistance toward EHR technology, in addition to lower perceptions that the change was successful.

Second, the organizational change literature advocates technological reinvention as a social learning process that is often necessary during implementation because it matches the technology to the unique features and preferences of localized settings (Bauman, Stein, & Ireyes, 1991; Stolz, 1984). The current research suggests that in addition to its physical and practical advantages, reinvention is also cognitively influential as it enhances organizational employees' *perceptions* of the change and change implementation To elaborate, the implementation of EHR systems is often met with resistance and other forms of disapproval because it seemingly imposes standardization. In other words, it strips organizations and their employees of their

individuality. However, as diffusion of innovation theory argues, reinvention extends a perception of customization even within this standardization process. The fact that employees can take action to place their local stamp of approval on the new technology eventuates in higher perceptions of the professional advantages it offers in addition to considerably lowering resistance to using it. Thus perception, action, and cognition are intricately linked in the reinvention process and collectively determine an employee's ability to identify with the EHR technology. This study measured employees' *perceptions* of the relative advantage of the technology, as compared to objective assessments of the technology's actual relative advantage to their work, and there were no actual performance outcomes gathered. Again, this study was grounded in measuring end user perceptions of change and the communication surrounding it.

Given these relationships, we are left with the question as to whether the positive outcomes that are often a product of reinvention are contributable to employees tangibly changing the technology or to the psychological attachment that stems from their actively identifying with it. Indeed, previous scholarship has acknowledged the capacity of technology use to create a common identity amongst members within an organization (Wiesenfeld, Raghuram, & Garud, 1998). Moreover, we must address the question as to whether the positive outcomes employees experience after reinvention are also positive for the patient. Perhaps employees' perceptions of implementation success, which this study found to be increased by engaging in work-arounds, are not synonymous with the governmental standards of implementation success outlined in the "meaningful use" criteria. Thus, while work-arounds enhance the mental state of employees during change,

they can also potentially harm the physical state of the patient. This is obviously problematic as the primary goal of EHR implementation is to improve the quality of patient care.

In this chapter, I further explore each of the expected and unexpected findings that together compose the major contributions of this dissertation. I follow this elaboration by offering some limitations to this study and, finally, establishing an agenda for future scholarship that builds on what we have learned here.

EXPECTED FINDINGS

Demographics and Resistance

This study is not the first to contend that the fate of online information system use in organizations is contingent upon their distinctive use by occupational cultures (Pfaffenberger, 1988, Dubinskas, 1988). For example, speaking to the reinvention of programs and technologies, Bauman and colleagues (1991) claim:

> The power of the program to accomplish its goals may be a function of characteristics of the population being served…The nature of the client population is especially likely to affect how a program is implemented if the program requires a high degree of compliance, cooperation, and participation by clients (p. 627).

This study is also not the first to confirm that physicians are the most resistant group to new technologies in the healthcare industry (Berner, Detmer, & Simborg, 2005; Friedberg et al., 2013), but it does provide unconventional insight into certain strategies

that might curtail this resistance. Physicians mostly agree with the concept of EHR technology, but are often dissatisfied with its actual use due to "time-consuming data entry, interference with face-to-face patient care, inefficient and less fulfilling work content, inability to exchange health information between EHR products, and degradation of clinical documentation," (American Medical Association, 2013, p. xvi; Jensen, Kjaergaard, & Svejvig, 2009). In addition, it is less likely that EHR technology offers enough flexibility to match the needs of physicians' practices—as compared to nurses and other occupational groups. Moreover, the "promise" of a better EHR in the future does not enhance their delivery of present patient care (American Medical Association, 2013, p. xx). Unfortunately, several have speculated that the goal of decreased documentation time in EHR projects will not soon be realized (Poissant, Pereira, Tamblyn, & Kawasumi, 2005).

Yet despite this abundance of research surveying physician resistance to new technologies, the current research is innovative in that it not only documents physicians' resistance, but it also demonstrates trends that could reduce this inertia once it materializes. It is very possible that physicians, in particular, view the implementation of an EHR system as "deskilling" or degrading their work (Hakken, 1993, p. 119). Physicians are not only celebrated for working with their hands, which are now more preoccupied with typing, but their professional identity and autonomy are re-negotiated with the advent of a new information system. Consequently, EHR systems challenge the authority and status of doctors within organizations (Jensen et al., 2009).

However, as this study suggests, one way to ease the threats on physician's authority and autonomy is to give them an opportunity to first-handedly adjust the system through reinvention, or to engage in shared, *hands-on* work-arounds. The pilot survey interviews , for example, suggested that physicians were more tolerant of the new technology if they were able to hire scribes or use dictation systems that allowed real-time dictation into the EHR system. These comments, in addition to the mediating role of the work-around in the relationship between social influence and resistance found in the SEM model, support the change reinvention literature's call for *mutual adaptation*. This concept claims that, in order for a program/technology to successfully accomplish its goals, both the program/technology and the particular setting in which it is implemented must be simultaneously adapted (Berman & McLaughlin, 1976; Berman & Pauley, 1975). Work-arounds can be depicted as a sign of this mutual adaptation process—as efforts towards locating a comfortable *fit* while the new technology and existing workflow process are initially merging (Halbesleben et al., 2008). Thus, work-arounds can symbolize sagacious activation with the new system and lead to less resistance in using it.

The additional demographic results discovered that healthcare employees are also more resistant if they are a) older or b) have more experience within the organization. This finding substantiates the aforementioned discussion of a new technology's ability to reduce self-efficacy in older populations and trivialize the accumulated intellectual capital of organizational insiders. Karl Weick and colleagues (2005) assert that who we think we are as organizational actors—or our identity—shapes what we enact and how

we interpret and react to new technologies. It is true that after a cultural shock is introduced, it often *universally* triggers high levels of uncertainty, and a collective need to engage in sensemaking. However, sensemaking patterns are *distinctive* across demographic groups because how some identify with the change may be more challenging than others.

For example, when researching the generation of momentum for change, Dutton and Duncan (1987) theorized about the interaction of urgency and feasibility assessments and their connection to organizational employees' responses. They concluded that when assessments of urgency are high and feasibility of the change are low—which is likely the case for older aged and more experienced employees—employees often react by ignoring/minimizing the issue or defending against the change. Both of these can be interpreted as types of resistance. On the other hand, when assessments of urgency and feasibility are both high—which is likely the case for younger employees and those with less accumulated experience—employees engage in re-orienting strategies, an accelerated momentum for change, and are more accepting of radical transformations in their work. Thus, this study provides nuance and depth to understanding how different demographical brackets affect employees' interpretation of change, and how this interpretation then amplifies or minimizes their resistance.

New Insights into Organizational Communication Quality During Implementation

Results from this study indicate that perceived change communication quality is a compelling mechanism for successful organizational change. To elaborate, perceptions of

the communication quality stemming from all sources in the organization—supervisors, coworkers, administrators—positively predicted perceptions of change success and the relative advantage of the technology in addition to negatively predicting employee resistance. All of these relationships were highly significant at the .001 level. These findings suggest that if employees encounter timely, accurate, adequate, complete, and credible communication during change initiatives, they will more fully embrace the potential of new technologies. In addition, they will relax their defensive stances and generally entertain more cognitive flexibility towards change initiatives.

Collectively, these observed relationships also question the sufficiency of employing strategic ambiguity during times of organizational change. While Eisenberg (1984) claims strategic ambiguity promotes unity by avoiding exclusion, enhances one's flexibility to adapt to unfamiliar situations and modify defective ones, and gives the illusion of co-constructed change, the findings in this study suggest that these benefits could be one-sided. In times of high uncertainty—such as implementing an information system that significantly reorients and potentially jeopardizes one's work—filtering an organization with language that is purposefully abstract might aid administrators, but further frustrate frontline users. Whereas this communication tactic allows managers/administrators to create a dynamic shared understanding of change and heeds a plurality of voices (Eisenberg & Witten, 1987; Williams, 1976), it is likely that restless employees universally crave specific instruction, comprehensive explanations, and detailed reasoning for trajectories. In other words, a call to primarily focus on the intangible concepts that everyone can agree upon while undermining specific points of

disagreement will likely not satisfy employees who involuntarily have their careers invested in this radical change. Consequently, perhaps the best practice is to anticipate that the quality of an employee's work throughout the initial stages of a change initiative will match the quality of the organizational communication surrounding the change.

In addition to its relationships with the outcome variables in this study, perceived quality of change communication was also significantly and strongly predicted by change reinvention, or work-arounds. Instead of acting like counterproductive first-order problem solving that "keeps communication of problems isolated so that they do not surface as learning opportunities," the work-arounds in this research resulted in *enhanced* perceptions of the communication quality surrounding the change (Tucker & Edmondson, 2003, p. 60). As argued in Chapter 2, this finding could indicate that employees who engage in technological work-arounds perceive change communication to be higher quality because they simply rely on it less. In fact, this overlaps with past literature that equates work-arounds with immediate problem-solving and action orientation at the expense of taking time to seek out information, communication, or shared support to overcome the inefficiency (Tucker, 2004; Tucker & Edmondson, 2003).

Truthfully, the argument for the inherent risk in an independently contrived and sustained work-around is difficult to refute. However, a more comprehensive look into this study's model characterizes the work-around as not only positively predicting perceptions of change communication quality, but as mediating the relationship between social influence and perceived change communication quality (See Figure 5.1 below). In other words, the model depicts work-arounds not as idiosyncratic but as a *product of*

social influence amongst coworkers. The work-arounds pursued in this study were not individually pursued and furtive, but perhaps symbolic of collective learning. This conceptualization has more power in explaining the path between work-arounds and positive perceptions of change communication. Previously, I theorized that employees who engaged in work-arounds might not heavily rely on change communication, and were therefore less critical of it. However, with the model's multiple-path insight, it appears that work-arounds elevated perceptions of change communication due to their *interactive, socially constructed nature* in this study.

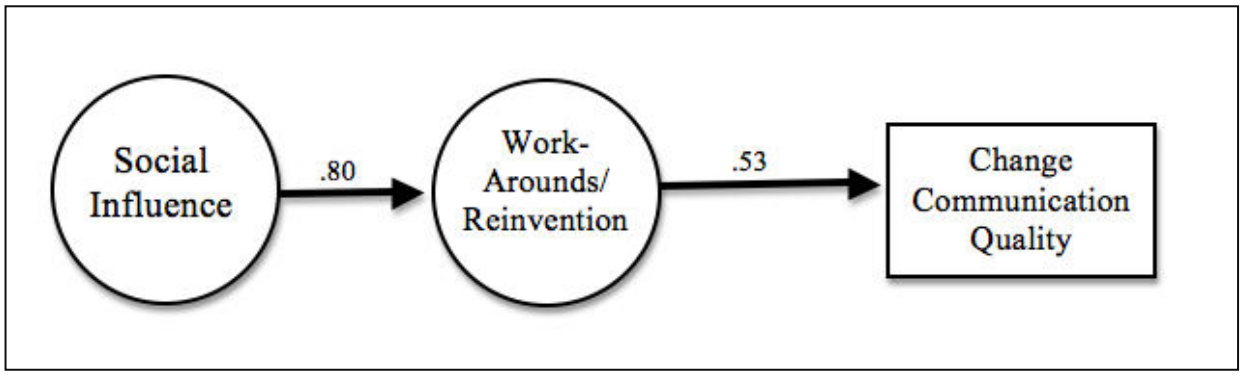

Figure 5.1. Social Influence, Work-Arounds, and Change Communication Quality.

Certainly, the fact that work-arounds enhanced perceptions of change communication quality—rather than result in perceptions of low-quality compartmentalized or divisive communication—somewhat discredits the interpretation of a work-around as an erratically executed, privatized, and troublesome quick fix. Sharing feedback and support in regards to EHR use positively predicted work-arounds, which then caused employees to be more complimentary of the organizational communication engulfing the change initiative. Thus, the work-around is conceivably symbolic of a

socially shared solution to overcome inadequacies in the new technology, which has positive outcomes for employees. This re-conceptualization of the work-around as a positive, socially learned, and shared behavior is explored in the following sections of this chapter.

UNEXPECTED FINDINGS

Rethinking the Work-around in Organizational Change

Whether they are labeled as errors, mistakes, deviance, breaches of protocol, short cuts, or even defiance, work-arounds have frequently been cited as grounds for serious patient safety concerns (Beatty & Beatty, 2004; Halbesleben, Wakefield, & Wakefield, 2008; Harris, Treanor, & Salisbury, 2006; Koppel, Wetterneck, Telles, & Karsh, 2008; Spear, 2005; Tucker & Edmondson, 2003; Vecchione, 2005). While academics have described specific work-arounds, a more thorough and philosophical investigation is needed to fully understand the nature, causes, and consequences of these performances (Halbesleben, et al., 2008). This study sought to answer this call for scholarship by exposing the effect of coworker social influence on the work-around. Furthermore, this research aimed to reveal how work-arounds impacted perceived change success and relative advantage of EHR technology in addition to employee resistance. The next few paragraphs delineate the unexpected role these seemingly pivotal behaviors played in the healthcare environments examined. In doing so, I push for a broader definition of work-arounds, and propose that overt communication discussing these behaviors is a vital factor in realizing their positive or negative attributes.

Work-arounds as learned, shared, and social. Adaptive structuration theory and the diffusion of innovations literature both underscore social learning as the impetus to the ever-evolving processes wherein groups of people purposefully adapt technologies to their localized needs and circumstances (DeSanctic & Poole, 1994; Rogers, 1978; 2003). As we witnessed in this study, this social contagion is considerably coworker influenced and is a hallmark for high performance during organizational change because it signifies change efforts are being validated (Salas, Rosen, & King, 2007). With the implementation of EHR technology, both adaptive structuration theory and diffusion of innovations assert that the particular social environment in which the technology is implemented will negotiate and shape how a technology is used. This idea corresponds with Bauman, Stein, and Ireys' (1991) principle of program uniqueness. According to this principle, social programs are never implemented in exactly the same manner across organizational contexts because they are "very complex phenomena operating in a dynamic and ever interacting way with their environments" (p. 624).

Given the vast amount of literature in these domains that emphasizes the confluence of technology use and social structures during implementation, it is somewhat surprising that health scholars still depict work-arounds as emblems of personalization. For example, Tucker and Edmondson (2003) depict work-arounds as quick responses that perhaps exacerbate underlying issues because they are not shared with other employees. Thus, failures become more pervasive without consistent solutions. In opposition, they advise what they term "second-order problem solving", or creating participation

mechanisms that collaboratively address impediments to workflow (Tucker & Edmondson, 2003, p. 61).

Yet why is it assumed that the work-arounds initially pursued by employees during organizational change ventures are not at all constructive, shared, or diffused throughout the organization? Even if not influenced through overt statements of new technology use, coworkers will likely socially learn from others through observation and surveillance. As quoted in Chapter 2, an employee's acceptance, and thus use, of a new technology is a function of his/her "exposure to other actors' knowledge, attitudes, or behaviors concerning the new product" (Ford et al., 2009, p. 275). Nevertheless, as mentioned in the second chapter, Tucker and Edmondson's (2003) research did find that nurses sought out information from people with whom they were socially close. However, the authors claim they should be asking professionals better equipped to answer these questions—such as system designers—but chose not do so to preserve their competent reputations.

Citing this work, Halbesleben and Rathert's (2008) study hypothesized that employee personal influence would be negatively associated with work-arounds. Yet their hypothesis was not supported, and thus complements the results of this dissertation. Personal and social influence fuel work-arounds rather than restraining them —a finding that re-affirms the tenets of adaptive structuration theory and diffusion of innovation's principle of reinvention.

Together, the aforementioned points argue that the leading conceptualization of work-arounds as individualized performances that inhibit organizational change by

equivocating inefficiencies must be called into question. This dissertation demonstrates that coworker feedback and perceived social support in regards to EHR use were relatively frequent (*M*= 3.7/5 and 4.1/5 respectively). Furthermore, their comprised latent variable of social influence significantly and strongly predicted the occurrence of work-arounds (See Figure 5.2 below).

Past research advocating socio-technical change sheds additional light on this social influence to work-around path in that it could be symptomatic of "innovation-system fit" (Greenhalgh, Stramer, Bratan, Bryne, Mohammas, & Russell, 2008, p. 6). To clarify, innovation-system fit appraises the degree to which an innovation is aligned with an organization's broader knowledge and goals. Coupled with increased work-arounds, the healthy levels of coworker social influence observed in this study could exemplify attempts to adapt and integrate the technology, thus achieving alignment.

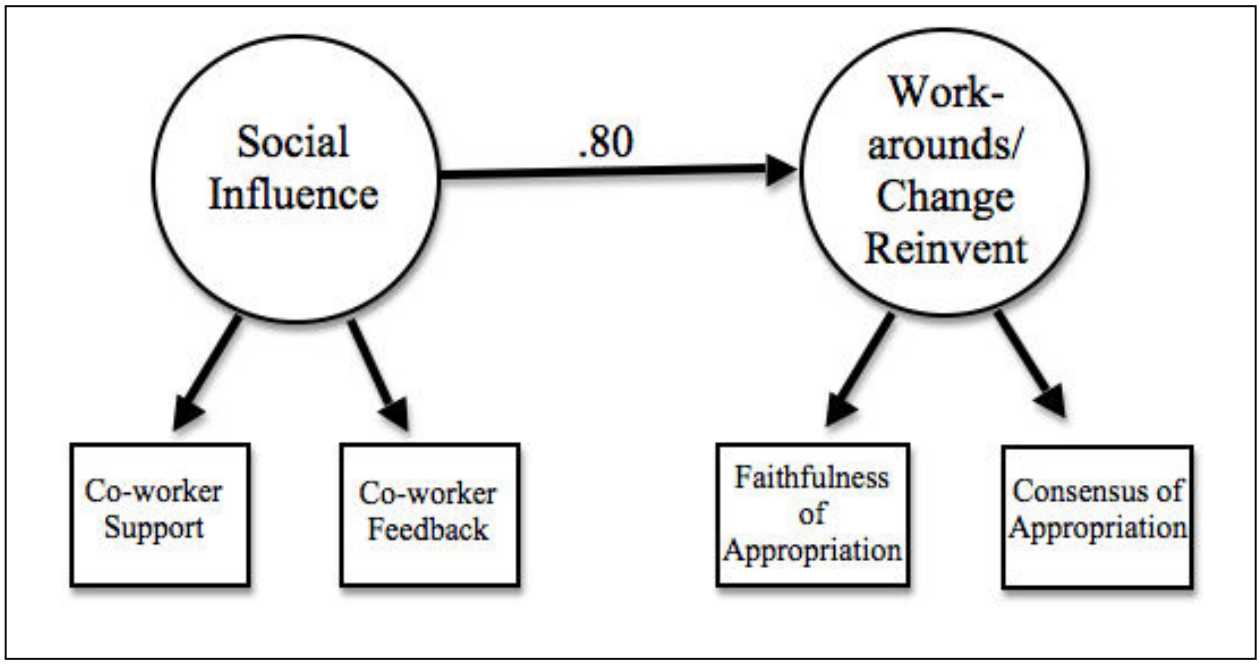

Figure 5.2. Informal Social Influence Causes Work-arounds.

Moreover, even if nurses and other health professionals are seeking help from within their social network as compared to more qualified sources, their actions and behaviors using the technology will still be scrutinized and shape newer versions of the technology. The current EHR literature in the health and informatics fields does a commendable job spotlighting how new technological structures frame and perhaps limit healthcare employees' behaviors and actions. However, there is much less focus on the other ingredient in the dual structuration process. That is, more research should centralize how health employees' behaviors, actions, and communication are co-constructing and re-shaping EHR systems (See Figure 5.3 below).

Correspondingly, EHR systems should be measured with flexible, as compared to pre-defined, goals when it comes to their successful implementation (Greenhalgh et al., 2008).

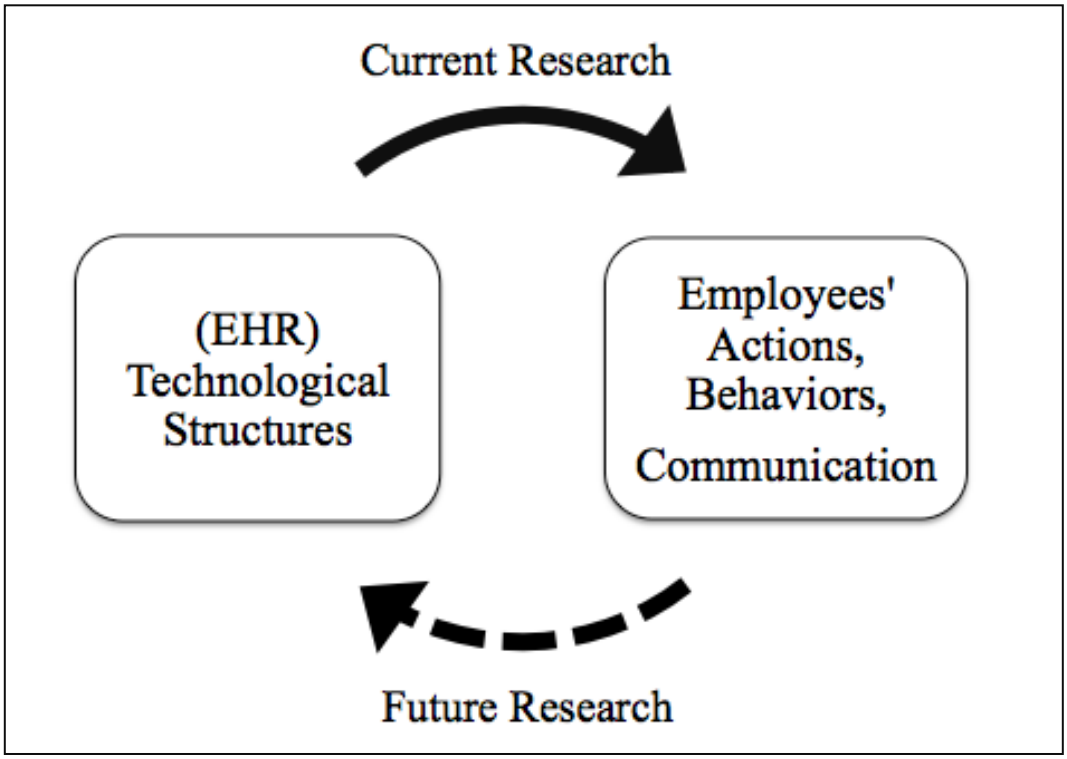

Figure 5.3. EHR Research within the Dual Structuration Process.

Finally, the work-around literature in the healthcare domain should expand its theorizing beyond conceiving work-arounds as only temporary. Canons of adaptive structuration theory and diffusion of innovations more sophisticatedly perceive the work-around as a symbolic cue that reveals the structure of the technological system is incompetent. While nurses and physicians might engage in work-arounds for short-term objectives grounded in saving time, EHR vendors use this feedback *overtime* to strengthen and economize their system's features. Interviews conducted in the pilot

survey attested to this. DIPS—the EHR vendor used by participants in the pilot survey—was founded by two healthcare professionals who left their previous positions in the Nordland Hospital. They believed they could engineer a more effective EHR system built around their front-line knowledge. Every two years, the top executives in this company conduct research at Nordland Hospital to ripen their understanding of how the system is used in practice and how they can overcome commonly occurring work-arounds. Thereupon, work-arounds can be incorporated into the structure of the system and find a sense of longevity.

Revisiting the connotation of work-arounds. In addition to advancing arguments that work-arounds are not always individually learned, this dissertation provides evidence that these informal performances are not always inherently negative, at least for the employee The results of this study seemingly indicate that work-arounds can be both psychologically and behaviorally profitable. Specifically, work-arounds strongly and negatively predicted employee resistance, and significantly and positively predicted perceptions of change success and relative advantage of the EHR technology. These findings corroborate past research that discovered user-initiated work-arounds ameliorated the inefficient effects in the technology such as missing features and also disclosed new functional affordances and workflow enhancements (Goh et al., 2011).

Albeit as previously discussed, health management and informatics scholars often label the work-around as an ineffective band-aid approach, meaning it deters sharing operational failures and preserves blocks to workflow (Beaudoin & Edgar, 2003; Spear & Schmidhofer, 2005; Tucker, 2004; Tucker & Edmondson, 2003). Work-arounds, they

argue, have negative repercussions when they are individually developed and maintained. Yet although inconsistently applied across different occupational groups, departments, or time-shifts within an organization, work-arounds might be *consistently* applied *within* each of these groups. This idea reinforces Wakefield and colleagues (2001) argument that conditions in the immediate work group heavily influence employees and what they think is important in their organization. Therefore— as adaptive structuration theory posits and the current research affirms—work-arounds can also be socially learned from coworkers with whom one profoundly interacts and can denote mutual sensemaking. This concept battles the individualistic reputation of the work-around, and thus, questions its stereotypically negative nature.

With that said, work-arounds must be treated with extreme caution, and their consequences should be systematically assessed. Immediate work groups, or an employee's surrounding coworkers, are indeed influential and can appropriate EHR use in ways that are advantageous for their own efficiency, memory, and skill base, but deficient in patient safety. For the integrity of this research, it is pivotal to emphasize that this study found work-arounds led to positive *employee perceptions* of the relative advantage of EHR technology and implementation success. Other metrics of EHR implementation success were not measured. Employee perceptions of implementation success and the relative advantage of a technology do not necessarily parallel actual implementation success or relative advantage of EHR. This study reveals nuances of end users socially constructed reality in regards to this technological change, but other perhaps more accurate or less biased realities are not represented. Thus, while work-

arounds appear to engender positive results in this study, we must acknowledge how the variables were operationalized in addition to the make-up of the study sample.

Still, despite the common predisposition to treat work-arounds with extreme caution or naturally equate them with threats to system reliability, some scholars are beginning to transform and revitalize how they conceive of and define these unconventional behaviors. For instance, Morath and Turnbull (2005) characterize work-arounds as "work patterns an individual or group of individuals create to accomplish a crucial work goal within a system of dysfunctional work processes that prohibits the accomplishment of that goal or makes it difficult" (p. 52). Hence, the following question is posed: is the work-around dysfunctional and the system practicable, *or* is the system dysfunctional and the work-around practicable?

Additionally, recent studies have discovered that psychological safety at work and continuous quality improvement are antecedents to the work-around, thus providing more compelling evidence for its healthier portrayal (Halbesleben & Rathert, 2008). Other scholars have even gone so far as to claim that acts like work-arounds can be a viable approach to radically improving system safety (Vicente, 1999). In brief, they give workers a vehicle through which to adapt and grant front-line employees the opportunity to help finish designing the system. This is critical because there are limitations to automation and designer's foresight, and as such, designers must design for the unanticipated. Consequently, work-arounds can culminate in giving systems more flexibility and functionality.

Moreover, as we forge into the future, computer systems will indubitably become more dense and complicated and the dynamic environments into which they are negotiated will become more unpredictable. As such, designers' premonitions might become less scientifically accurate. Still, Vicente (1999) argues, change is inevitable, and thus work-arounds are consequently essential. He claims, "requirements cannot be comprehensively identified once and for all before the program begins…there is a strong need for continuous response to changing environments" (Vicente, 1999, p. 356). Blum (1996) adds, "because learning, responding, and expanding do not cease once a product is delivered, design must be recognized as a continuing activity that is never completed" (p. 198).

Work-arounds, then, can be conceptualized as the basic unit of analysis in analyzing this change and predicting future development. Front-line system improvement efforts wherein employees collectively address small, but important problems that managers fail to address can provide a competitive advantage to organizations (Bagian, Lee, & Gosbee, 2001; Tucker, 2007; Victor, Boynton, & Stephens-Jahng, 2000). Moreover, personal innovativeness and the ability to communicate new pathways to accomplishing tasks have been celebrated as critical to guiding organizational change processes (Goh, Gao, & Agarwal, 2011; Pentland & Feldman, 2007). If we conceptualize work-arounds as change reinvention, itis important to take the following quotation, pulled from research on disseminating innovations in healthcare into consideration:

> Many leaders seem to regard reinvention as a form of waste, narcissism, or resistance. It is often none of these. Reinvention is a form of learning, and, in its

> own way, it is an act of both creativity and courage. Leaders who want to foster innovation should learn to differentiate between reinvention and mere resistance, assuming the former until proven otherwise, and should showcase and celebrate individuals who take ideas from else- where and adapt them to make them their own (Berwick, 2003, p. 1974).

Of course, in the healthcare environment, we must make sure that these work-arounds are thoughtful, constructive, and ethical before we can celebrate them for their creativity.

The work-around's powerful mediating role. This study also parallels past healthcare literature that disputes top-down "technology push" change models and questions their repercussions. In other words, this dissertation's results support the ideology that centrally-driven EHR implementation with inflexible, commercial goals will not lead to successful, deep-seated change (Greenhalgh et al., 2008). On the contrary, the success of technological change in organizations is contingent upon micro-social contexts, human agency—as compared to universally reacting to environmental stimuli—and to a certain degree, identification through action, experimentation, and internalization (Goh et al., 2011; Knoblich & Sebanz, 2006; O'Reilly & Chatman, 1986).

This observation stems from the substantial mediating role work-arounds played in this research, which was perhaps one of its most insightful and instrumental findings. Whereas coworker social influence positively predicted employee resistance ($\beta = .39$) and negatively predicted perceptions of changes success ($\beta = -.46$), the direction of these relationships inverted when the work-around was introduced as a partially mediating variable. Moreover, social influence did not have a direct effect on perceived relative

advantage of the EHR system. Rather, the relationship between these two variables was fully mediated by work-arounds, or change reinvention (See Figures 5.4 and 5.5 below).

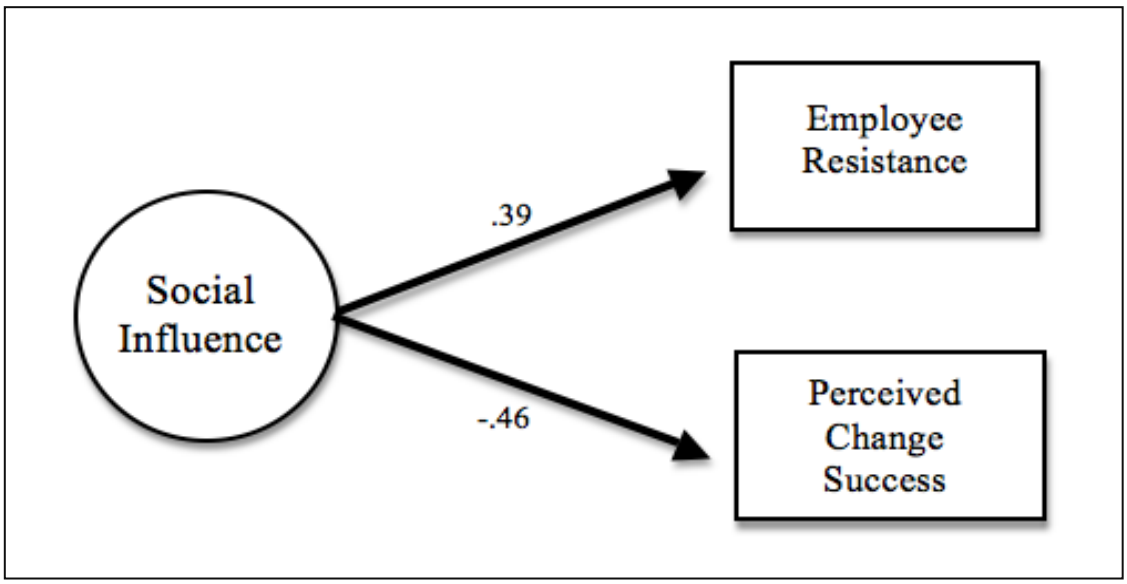

Figure 5.4. Relationship Between Social Influence and Outcome Variables.

In other words, systematic empirical investigation revealed negative effects of coworker social influence on change efforts. However when re-directed through work-arounds, employees' perceived relative advantage of EHR and perceived change success significantly increased and measurements of employee resistance significantly decreased. These findings substantiate previous arguments that the act of customizing, or reinventing, a technology increases its

acceptance in localized settings.

But, why do work-arounds lead to more change acceptance by employees? To elaborate, mandated technological change in which the government is largely depicted as

the change agent can perceptively take the form of a battle between standardization and individualization.

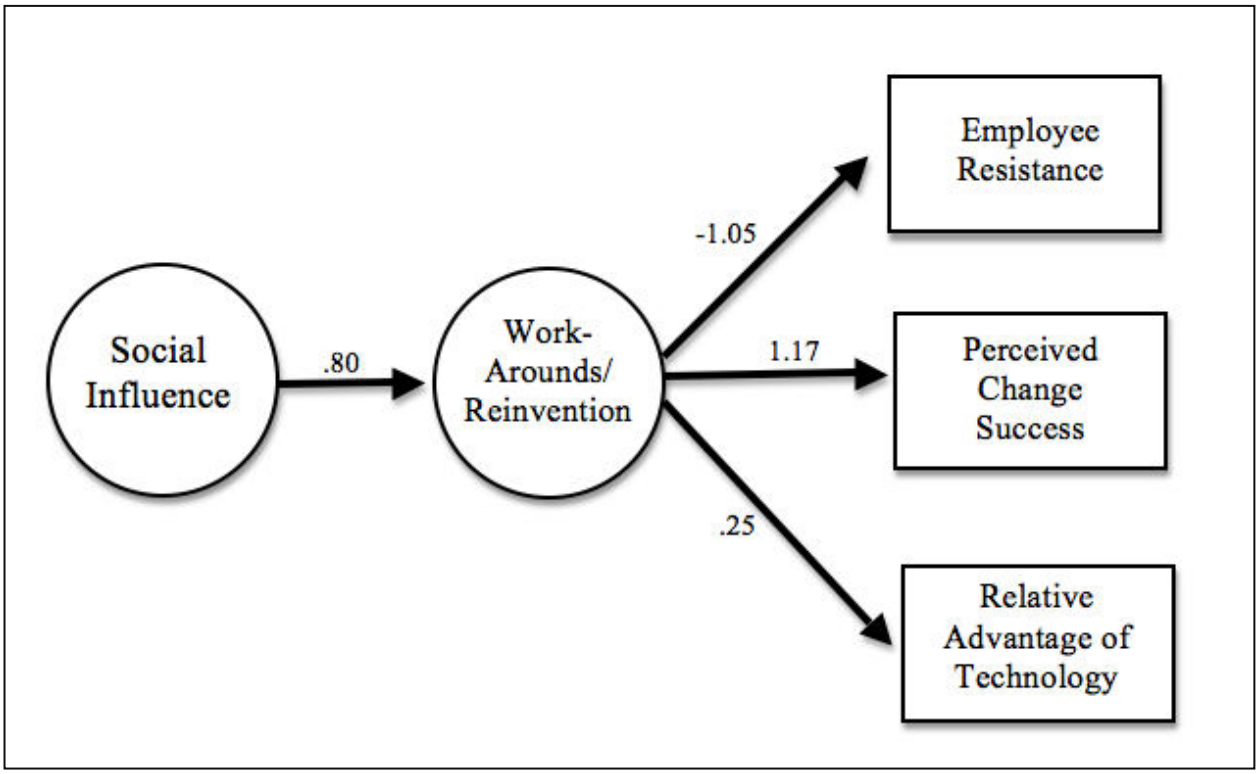

Figure 5.5. Social Influence and Outcome Variables with Work-Arounds as a Mediator.

Physicians, for example, who are meticulously trained to be autonomous and confident thinkers, will likely not instantly comply with external commands on the alleged best way to run their self-made practice or record their patient's health. During the interviews I conducted for the pilot survey, I observed elaborate color-coded paper filing systems that had been perfected over time. Yet now these intricately specialized records were forcibly abandoned for seemingly cookie-cutter, one-size-fits-all technology. To relinquish levels of resistance, health professionals—physicians in particular—must have the opportunity

to put their local stamp of approval on these standardized frameworks, thus branding it with a discriminating organizational identity. According to a 2002 report by the *Institute for the Future*, reinvention is a necessary step for technologies implemented in complex social environments, such as hospitals, for equally complex cognitive reasons:

> Most hospitals will insist that their administrative procedures are unique, and a standardized information system will not fit the local culture. In fact, 70 to 90 percent of the transactions and procedures typically are very similar to those of other hospitals, and only a small degree of customization is required (p. 17).

Still, in order to be approved and normalized, technologies must be individualized by being re-interpreted in the hands of practicing health professionals, even if only minutely.

There is an abundance of scattered research in the healthcare, psychology, and behavioral science fields that also speak to this idea of identifying with a technology through experimentation or slightly revising its use. For example, Jensen and colleagues (2009) apply Weick's (1979) work to a healthcare setting to demonstrate that employees must first interact with a novel technology to make sense of it. To elaborate, when healthcare employees are first introduced to new information technologies, their uncertainty is escalated and consequently so is their desire to engage in both intellectual and *hands-on* sensemaking.

Throughout these acts of sensemaking, employees develop knowledge, expectations, and dispositions about how the technology is to be utilized. To put it differently, they *enact* a reality about the technology that will guide their future actions with it. Thus, work-arounds allow employees to actively identify with a technology by enacting a reality for its localized use. Furthermore, this act of identification, or

internalization, can eventuate in states of employee psychological attachment with the once seemingly foreign technology (O'Reilly & Chatman, 1986).

Additionally, other scholars have hailed the process of simultaneously learning and doing, or learning how to refine and enhance a technology during work execution. Spear (2005) acknowledges, "as a number of hospitals and clinics have discovered, learning how to improve the work you do while you actually do it can deliver extraordinary savings in lives and dollars" (p. 1). Thus, managers and supervisors should encourage a climate of experimentation in which their subordinates feel comfortable to "design, improve, and deploy such improvements" (Spear, 2005, p. 3).

As Goh and colleagues attest (2011), the more exploration a user engages in, the greater the chance he or she will be able to determine which features of a system work most effectively in a given situation (p. 579). In other words, exploration of technological systems through work-arounds can potentially lead to increased system efficiency. The transformed positive outcomes associated with work-arounds in this dissertation shed new light on the technological narrative that using is designing, and designing, to a certain extent, is emergent (Pentland & Feldman, 2007). The ability for employees to work-around, or actively localize their use of the technology while using it, was the integral link connecting social influence to positive change outcomes in this study. These performances unearth a "fit" between EHR features and the exclusive social features of each healthcare environment (Ludwick & Doucette, 2009). Thus the role of "fit" and mutual adaptation in health information technology implementation should not be overlooked.

However, we must keep in mind that the work-arounds produced via experimentation and for the purpose of finding fit *must* indeed signify *improvements* and be *shared*. Thus, communication and open discussion surrounding the work-around is the essential component in discerning its constructive value. To clarify*, this positions the work-around literature as a rich area of scholarship to be expanded upon by communication scholars.* Accordingly, this dissertation advocates using a human communication perspective of information technology use in the healthcare and organizational change fields.

Drawbacks of social influence and coworker support. Finally, results in this study reported that informal social influence in EHR use, measured as coworker social support and feedback, was significantly and positively related to employee resistance (β = .39) and significantly and negatively related to employees' perceptions of change success (β = -.46). This finding was somewhat unexpected in that receiving feedback and social support when encountering uncertainty is often portrayed as beneficial. For example, past research has found that social support structures buffer the negative impact of receiving life-threatening diagnoses and enduring stress-related events (Cohen & Wills, 1985; Thoits, 1995) and positively influences psychological well being (Cohen & Wills, 1985; Ell, Nishimoto, Mediansky, Mantell, & Hamovitch, 1992).

Yet in the mid 1980s, scholarship began to contrastingly theorize about the adverse, unconstructive effects of informal social support and feedback; those effects that counteracted the concepts' preceding academic reputations for enhancing quality of life and psychological prosperity (La Gaipa, 1990; Leeuw, Graeff, Ros, Hordijk, Blijham, &

Winnubst, 2000). For example, Leeuw and colleagues discovered that received social support was associated with more depressive symptomatology in head and neck cancer patients post surgery and/or radiotherapy (2000). The scholars attributed this finding to two possible origins: 1) those individuals who were more depressed sought out more social support, thus recorded higher levels, or 2) social support has a side of effect of victimization. In other words, too much social support can interfere with a person's perceived autonomy (see also Brickman, Rabinowitz, Karuza, Coates, Cohn, & Kidder, 1982).

Similarly, Silverstein, Chen, and Heller's (1996) research on intergenerational social support and older parents found that when social support surpasses moderate levels, it erodes personal competence. In fact, several studies have noted the social, psychological, and professional expenses with receiving social support, especially when it is sought out rather than unsolicited (Greenberg & Westcott, 1983; La Gaipa, 1990; Wills, 1983).

Applying these scholars' work to the results of this study, we can start to unravel why coworker social support and feedback with EHR technology potentially degrades implementation of organizational change. To clarify, perhaps we see a positive relationship between social support/feedback and employee resistance because the most stifled and resistant professionals sought out increased support from their colleagues. This act of this social support could have also manifested in a threat to their independence. Or perhaps the act of continually asking for support/feedback in regards to EHR use caused employees to suffer social costs and generally feel less competent.

Hence, they were more resistance to the EHR technology and reported lower levels of perceived change success.

Still, social support is a multi-dimensional (Barrera, 1986), and it's conceivable that employees who reaped higher levels of it were still not receiving the type of support they desired (La Gaipa, 1990). For instance, employees might have craved instrumental support—"just do it for me"—but instead received mostly informational. Likewise, employees receiving regular emotional support could have felt patronized as they truly thirsted for informational support that further mobilized their apprehension of the technology.

Going in a different direction, it is also possible that social influence resulted in reduced perceptions of change success because end-users of the EHR technology lacked the temporal luxury to attain a detailed knowledge of the system's architecture, features, and interface design. As a result, the information and techniques that are shared among coworkers in regards to EHR use might not reflect the system's greatest potential in usability (Johnson, 2006). Past research also suggests that increased social influence amongst coworkers could create a toxic environment in which cynicism for the new technology quickly and contagiously spreads (Wachter & Pronovost, 2009). In a sensitive healthcare environment, this cynicism could not only jeopardize patient safety, but also eventuate in a symbolic convergence of pessimism toward organizational change—thus creating more worker resistance.

INTEGRATING ADAPTIVE STRUCTURATION THEORY AND MEDICAL WORK-AROUND RESEARCH.

The study of (HIT) in the health informatics literature is extensive, yet research in this domain is not consistently theoretically grounded and instead seeks mainly to investigate empirical associations (There are exceptions, of course. For a recent example, see Stephens, Goins, & Dailey, 2014). Consequently, there is a still a strong need to establish a clear philosophical and scientific understanding of the mechanisms comprising successful HIT implementation (Chaudhry, Wang, Wu, Maglione, Mojica, Roth, Morton, & Shekelle, 2006; Goh et al., 2011). Scholars in the other fields—such as information systems research and information technology—have begun using theory to guide their hypotheses and suppositional work in the area of HIT implementation. For example, Goh and colleagues (2011) use the analytical device of narrative networks (Pentland & Feldman, 2007) to underscore the "dynamic, process model of adaptive routinization of HIT" (p. 579). Arguing that the institution of healthcare is heavily routinized through protocols, the scholars use narrative networks to highlight micro-level processes of implementation. Their results contend that the "key to successful implementation is to manage the co-evolution process between routines and HIT to actively orchestrate a virtuous cycle through agentic action" (Goh et al., 2011, p. 565).

Providing a more systematic prospective of the change process, Jensen, Kjaergaard, and Svejvig (2009) employed a combination of institutional theory (Powell & DiMaggio, 1991) and sensemaking theory (Weick, 1995) to analyze HIT implementation. The authors claim that each of these theoretical bases has an integral, yet

distinct type of explanatory power in this HIT context. Merging the two, then, provides a richer, more comprehensive understanding of the multiple levels of analysis in the implementation environment. Institutional theory, they argue, highlights the larger contextual issues influencing and driving HIT implementation, such as normative, regulative, and cultural-cognitive institutional pressures to assimilate. However, the theory overlooks the powerful impact of intra-organizational group dynamics and human agency. Organizational sensemaking theory, on the other hand, devotes special attention to how localized individuals and groups enact technology in their social environments. In doing so, its tenets emphasize how humans respond to and reform institutional practices. Collectively, this binary theoretical structure addresses the EHR implementation phenomenon from three levels: the organizational field, the organization/group, and finally the individual/socio-cognitive level.

These examples provide a sampling of the assorted theoretical platforms used to establish patterns and predictions in the ever-changing field of organizational communication and healthcare technology. With that said, adaptive structuration theory provides a competitively efficient and insightful theoretical scope through which to analyze this branch of organizational research. As delineated, the theory concentrates on the recursively influential relationship between the structures—or institutionalized routines—directing organizational behavior and the significance of ongoing, situated human action. Thus, it provides a simultaneous, more vibrant and interactive account of the macro *and* micro processes facilitating organizational change. Moreover, the theory offers an ideal mixture of the objective and interpretive theoretical paradigms. It couples

deterministic relationships—social structures influence technological ones and vice versa—with the role of free will to delineate the flexible, yet predictable nature of technology appropriation. Hence, it encompasses a compelling case for soft determinism as a result of human agency.

It's true that adaptive structuration theory—and other technological theories in the social constructionist paradigm—have received praise for their ability to capture emergence and change in technology use. With that said, they have also received shades of criticism. Most prominently, Orlikowski (2000) has debated the theory's proposition that technologies "embody" social structures because this "situates structures within technological artifacts." Instead, she claims that technological structures are enacted, or "emergent" (p. 406). To substantiate her thesis, Orlikowski dips back into Giddens (1984) original work, which claims that structures only have a *virtual* existence and are instantiated in social practice. Technological artifacts, she argues, have a material/symbolic existence and are independent of human agency and interaction—thus they are not structures. However, when technological elements materialize into voting systems, interfaces, and/or stored data that are "routinely mobilized in use," they are then interpreted as structuring human action. At this point, these external technological artifacts transform into constituted rules and resources that are implicated in recurrent social practices (p. 406).

For illustration purposes, Orlikowski (2000) cites examples of the countless software programs that are installed on desktops and corporate mainframes worldwide, yet are never used in ongoing human (inter)action within these organizations. She

explains that until these technological artifacts are used in recurrent social practices, they cannot be rightfully attributed with the process of structuring.

While Orlikowski's (2000) contention is indeed warranted, the theoretical goals and conceptualizations guiding the current research project are not jeopardized by her aforementioned critiques. Unlike superfluous workplace technologies that sit on desktops collecting virtual dust or Internet technologies utilized for enjoyment, EHR technology use is mandated. Moreover, stipulations of "meaningful use" require that the technology be integrally utilized with high frequency and high quality across all healthcare facilities. This is why it has generated a considerable shift in workflow in the healthcare industry and acted as a hot spot for research therein. Its obligatory and heavy use requirements position the technology as indefinitely entangled with the social practices of organizations.

Furthermore, the technology is still generally in its infancy in the U.S. healthcare system. Because of this, researchers are still primarily investigating how the features initially "inscribed" or designed into the technology are shaping human action by assisting certain outcomes and hindering others. For instance, this dissertation spotlights the social nature of the work-arounds that occur due to technological inadequacies. To put it differently, EHR research generally centralizes how *embodied* technological structures are being appropriated—and thus alter social, temporal, and procedural norms at work in addition to perceptions of implementation efforts. Yet according to Orlikowski's (2000) extension, we should instead adopt a practice lens and conceptualize technological structures as *enacted*—or emerging though employees' "technologies-in-

practice" narratives (p. 407). This is undoubtedly the future of EHR research and an empirically ripe area of organizational change scholarship. (See again Figure 5.3).

SUMMARIZING THE CONTRIBUTIONS OF THIS DISSERTATION

In short, this dissertation extends organizational change and communication research by emphasizing the dynamic role informal social influence plays in the emergence and variation of psychological and organizational outcomes of change. Moreover, it empirically explores change reinvention, and its capacity to serve as a pivotal variable in the realization of these change outcomes. A driving goal of this research was to further understand how reinvention transforms employees into partners of change initiatives. In achieving this objective, this dissertation specifically uncovered the antecedents and outcome variables related to reinvention, or work-arounds, that are grounded in communication. Thus, it fills a hole in extant organizational change scholarship.

In the final sections of this dissertation, I reflect on the limitations to this study and provide new directions for research based on this study's results. Specifically, I encourage future researchers to explore certain attitudinal variables that could be added into the model, thus providing new insights into EHR resistance and perceptions of the technology's advantages. In doing so, this future research agenda calls for cross-pollinated scholarship in healthcare work-arounds, adaptive structuration theory, and organizational change and communication research.

LIMITATIONS

After measuring the antecedents and outcomes of technological appropriations in two contemporary healthcare organizations, this dissertation challenges current beliefs that depict the work-around as idiosyncratic and impractical. Rather, the results herein provide support for the potentially powerful, multi-dimensional, and communicative role of work-arounds in facilitating organizational change. Still, every study has its limitations and this one is no different. In this section, I will delineate SEM directionality issues, survey response bias, epistemological, and collected sample limitations to the research found in this dissertation.

As I briefly mentioned in the literature review section before I posed the first two hypotheses, SEM is not a statistical analysis that provides a basis for inferring causality. In other words, inferences in direction amongst SEM pathways cannot be drawn from the assumptions of the statistical model. Rather, directionality is imposed in the specification of the model—which is grounded in previous scholarship, a thorough understanding of theoretical arguments, and logical reasoning. Bollen (1989) and Hoyle and Smith (1994) offer an extended and concise review of the conditions for establishing causality using SEM, respectively. Consequently, while I interpreted the direction of effects in my model one way, it is possible that the opposite direction is accurate. For example, I interpreted coworker social influence as a factor that positively predicts work-arounds; however, it could be that the act of work-arounds brings coworkers closer together and thus positively predicts coworker social influence. With that said, the SEM hypotheses posed in this study were founded in robust and abundant multi-disciplinary literature. While the

question of directionality is not a statistical one, it *is* a theoretical one. Moreover, I switched the directional paths between social influence and work-arounds and between work-arounds and each of the outcome variables—resistance, perceived relative advantage of EHR technology, and perceived change success—and it should be noted that each of the resulting, alternative, models included insignificant paths and/or explained a smaller percentage of the variance in the model's variables.

Secondly, the extant research in the work-around literature, as previously discussed, has indeed typically branded work-arounds with a negative connotation. Nurses have especially been documented for trying to conceal their work-arounds as a strategy to retain their perceived professional competence (Tucker & Edmondson, 2003). Consequently—although anonymity was clearly communicated to participants in this study—it is possible that some participants did not feel comfortable answering work-around items with complete honesty and accuracy. Indeed, work-arounds are often depicted as taboo in the healthcare industry because they can also involve undermining or bypassing safety procedures, such as hoarding supplies or disabling alarms. Thus, it is conceivable that self-report bias played a factor in this research because health employees felt apprehensive presenting themselves in an unfavorable light.

On the other hand, missing data was certainly not an issue in survey data collection. As mentioned in Chapter 4, it comprised less than 1% of the data set. This is somewhat surprising given that past research has docked paper surveys for slower time completion and more missing data (Van Selm & Jankowski, 2006; Wright, 2005). Yet past survey design research also acknowledges generally higher response rates for paper

verses web surveys (Yetter & Capacciolo, 2010; Shih, T., & Fan, X., 2009)—unless, of course, you are researching a college student crowd (Carini, Hayek, Kuh, Kennedy, & Ouimet, 2003). This finding was reaffirmed in this dissertation, as the overall response rate for the surveys was 61%. This clearly surpasses the 50% mark, which is typically cited as an acceptable response rate in social science research (Baruch, 1999).

Interestingly, postal surveys—which comprised 37% of the completed surveys in this study—have been cited as especially challenging in healthcare research because their form does not complement the vulnerability that is often associated with health topics. One study claimed that because the surveys are received cold—meaning there is no previous contact between the researcher and respondent—it is not abnormal for postal surveys to have response rates of lower than 20% (Kelly, Clark, Brown, & Sitzia, 2003). Luckily, this was again not the case in the current research, as the response rate for the postal survey portion of the collected data was 46%.

Beyond response rate and accuracy, one could also argue that this study did not effectively capture the emotional and experiential phenomena that contextualized work-arounds. This is of course due to the quantitative framework I chose to underpin this dissertation. Similarly, the results of this research did not conclusively answer questions of *why* work-arounds occurred or support rich and robust stories of specific work-arounds that emerged in EHR system use. However, I contrastingly view the epistemological choices driving this research as a strength. Most other studies in the past work-around literature have focused on qualitative findings through method of case studies, interviews, or descriptive research.

Fourthly, while the pilot survey conducted in this research enhanced the pertinence and clarity of the primary survey by ensuring instructions were clear and identifying problematic instruments/responses, it was not tested on individuals in the main study's sample population. To clarify, the pilot survey was conducted at a hospital in Bodo, Norway using an electronic record system commonly known as DIPS, whereas the main study data was collected in the U.S. and investigated the EpicCare EHR system. In addition, the pilot survey, which was conducted online, utilized a different data collection procedure from the main study. That is, the pilot survey used a web survey while the main study used a paper one. Some scholars question the validity of this approach—claiming that it debilitates the pilot survey's functionality to shed light on the potential problems with the main survey (Kelly et al., 2003).

Finally, while organizational experience levels and occupations were well represented in this dissertation's data, there were noticeably more females (67%) than males (33%) in the primary study sample population. In addition, groups older in age were less represented. (See table 5.1 for a frequency table across age groups). Given that males and older participants are demographical groups that have been associated with higher levels of change resistance, it is possible that levels of resistance would have been elevated if these groups were better represented in the study. (In the current sample population, the mean for resistance was 2.4/5).

Table 5.1. Representation of Age Groups in Study Sample.

Age Group	Frequency	Percent	Valid Percent	Cumulative Percent
18-29	71	20.9	20.9	20.9
30-44	134	39.4	39.4	60.3
45-59	102	30.0	30.0	90.3
60-75	31	9.1	9.1	99.4
76 or older	2	.6	.6	100.0
Total	340	100.0	100.0	

FUTURE RESEARCH AGENDA

While the current research begins to unravel the social antecedents to work-arounds and EHR implementation outcomes, there are many other antecedents that should also be granted attention by health and organizational communication scholars. For example, future scholars should explore how EHR protocols affect communication during the medical interview. Do healthcare professionals work-around EHR protocols in order to safeguard communication with their patients and maintain quality patient care? Moreover, do health professionals' perceived impact of EHR use on patient-provider communication cause increased resistance toward using the technology? Finally, does EHR's propensity to alter medical professional's time orientation at work create more resistance to using the technology? These future directions are ripe for investigation and are explored in the last section of this chapter.

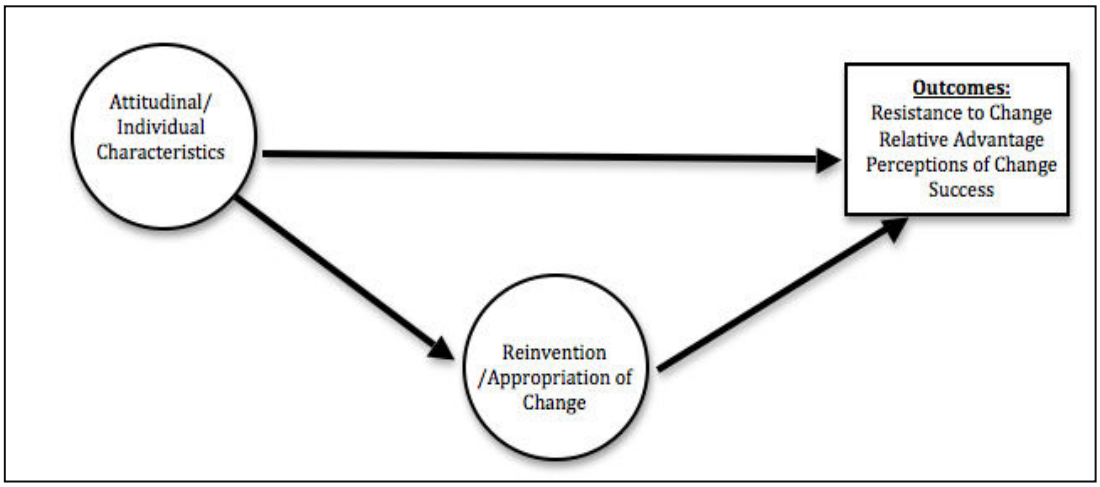

Figure 5.6. Attitudinal Variables and Future Research.

Connecting and Disrupting: The Impact of EHR Protocol on Communication Patterns during the Medical Interview

Electronic medical records exemplify a series of lists, and the standardization of medical information, means-end consistency, and sense of accountability and certainty this new and far-reaching information system provides is in some instances undeniable (see Browning, 1992).

Moreover, the investigations of medical scholars have yielded results that emphasize the aptitude of electronically documented health records to reduce medical errors associated with deficiencies in interpreting the handwritten notes on paper records (Bates, Leape, Cullen, Laird, & Seger, 1998; Hippisley-Cox, Pringle, Cater, Wynn, Hammersley, & Coupland, 2003).

Still, along with the technical superiority an electronically stored, multi-user record extends to health professionals, this effort to enhance the depth and breadth of an information system has repercussions for interactive, intraorganizational communication.

Temporarily diverting attention from a patient's story, EHR protocols continuously interrupt the duration of a medical interview with periodic obligations to consult a computer, electronically checking items off of a list, designating a patient to a demographic or diagnostic "box", and fulfilling additional requisites that collectively meet the standards specified for "meaningful use". One of the primary concerns of healthcare professionals in the present phase of EHR implementation is to key in and electronically store data, which oftentimes must be accomplished while the patient is still in the consultation room. Yet the very nature of this precept might have debilitating consequences for the quality of the interactions between the patient and medical provider. Scholars have often pointed to the fact that a medical personnel's use of a computer during consultative meetings with a patient can impact the communicative dynamic in a medley of ways.

For instance, research has suggested that physicians using EHR proactively assume a more exertive role in clarifying information, asking questions, and ensuring the completeness of the record, but are less likely to explore psychosocial or emotional issues such as how health problems affect a patient's life (Makoul, Curry, & Tang, 2001). Others have discovered that EHR protocols help physicians with information-intensive tasks, but make relationship-oriented aspects of communication a challenge (Patel, Arocha, & Kushniruk, 2002). Still other scholars have even suggested that incorporating EHR protocols into medical interviews interrupts and disturbs the temporal sequence patients use to communicate their illness. This temporal sequence is critical because it

builds a chronology on which accurate diagnoses may hinge (Hsu, Huang, Fung, Robertson, Jimison, & Frankel, 2005).

Equally important, is the type of computer used—laptop/portal versus stationary—and the office spatial design arrangement. For example, is the computer the doctor is using to input EHR records blocking his/her view of the patient? Is the doctor's back towards the patient as he/she is attempting to simultaneously input data and asking the patient questions? Demonstrations of nonverbal immediacy and nonverbal communication can be greatly disadvantaged by the regulation of EHR-facilitated behaviors into healthcare offices and exam rooms (McGrath, Arar, & Pugh, 2007). This is problematic for several reasons. For one, studies in interpersonal communication routinely find that nonverbal immediacy cues—such as direct and sustained eye contact, close spatial proximity, hand gestures, body orientation, and the forward lean—are associated with perceptions of social readiness, availability, openness, positive affect, and liking (Anderson, 1985; Burgoon & Hoobler, 2002; Patterson, 1995; Wiener & Mehrabian, 1968; Woods, 1996). Furthermore, health communication researchers have distinctively discovered that patients disclose less information when physicians frequently break eye contact (Duggan & Parrott, 2001), and the emotionality of physicians' facial expressions is directly related to higher ratings of perceived quality care (DiMatteo, Taranta, Friedman, & Prince, 1980).

Indeed, the question as to whether the intricate data-storing requirements of EHR methodically detract from provider-patient interaction is a key concern. Furthermore, it is likely somewhat responsible for providers' inhibitions in fully embracing the demanding

andrepetitively taxing system. Medical informatics scholars have gone so far to suggest that:

> Systematic and logically structured medical knowledge…may be very useable for purposes that involve the gathering of similar information from very different sources—but such static and reified terminology do not suit the everyday communication amongst caregivers and their cases (Berg & Tousissant, 2003, p. 228).

Hence, "moving from the fluid professional knowledge and information as it exists in everyday work-practices to these static schemes is an act of translation" that might have unforeseen, eviscerating consequences (Berg & Tousissant, 2003, p. 228). As a result, future scholars should investigate healthcare providers' perceptions of how EHR use impacts their quality of verbal and nonverbal communication with patients. Moreover, how do these perceptions influence their engagement in work-arounds and change resistance?

EHR Use and Shifting Workplace Time Orientations

In his article excogitating the taken-for-granted role of time in organizational change, Purser (2011) poses a perplexing question: are organizational members really resistance to the change? Or are they in fact resistant to time? He then explores the assumptions of time in the event of change more deeply as well as organizational members' social constructions of time during this high uncertainty transition.

Table 5.2. Research Questions to Guide Future Studies.

RQ1a: To what extent do healthcare providers report that EHR use impacts their quality of verbal and nonverbal communication with patients during consultations?
RQ1b: How are these perceptions of EHR's impact on verbal and nonverbal immediacy related to healthcare providers' engagement in work-arounds, perceived relative advantage of EHR technology, and change resistance?
RQ2a: To what extent do healthcare providers report that EHR use impacts their time orientation at work?
RQ2b: How are these perceptions of EHR's impact on time orientation at work related to healthcare providers' engagement in work-arounds, perceived relative advantage of EHR technology, and change resistance?

According to Purser, change positions us in the fleeting present moment. He elaborates:

> Positioned as bystanders, time is felt as an external force—something that we cannot effectively control or master. While we depend on time for structuring and making sense of our experience, we are also threatened by time's power to erode away our tentative position and structures (2011, p. 50).

Thus, he claims, "time always seems to have the upper hand" (Purser, 2011, p. 50).

With the implementation of EHR, the temporal order of healthcare facilities will inevitably shift, as new technologies continuously restructure time, and re-negotiate the relationships of different groups within an organization as well as workflow (Dubinskas, 1988).

For example, in his study accentuating the intimate association between the technological and temporal structure of an organization, Barley (1988) demonstrated that the introduction of an x-ray/ultrasound machine jolted temporal orders and caused the two professional groups working with the machine—X-ray technicians and

radiologists—to become discordant. As a result, the x-ray machine discouraged regular interaction in this department and further differentiated and frustrated interdependent occupational groups. When new technologies are assimilated into a workplace, they often facilitate status differences and procure a hierarchy of authority, as individuals must be trained to interpret and utilize the innovative features of the machine (Barley, 1988).

In this specific case, radiologist actually received extra years in schooling so that they could extract diagnostic information from ex-ray films, yet X-ray technicians, whose primary tasks were to manage patients and produce the films, could not read the films or interpret signs of pathology. Thus, Barley accredited the new X-ray technology with producing qualitatively different forms of communication and making the temporal structure of the department asymmetrical. Technicians also spent a large portion of their day in a desperate search for a radiologist—who never seemed to be in their office—to read patients' films and refrain from keeping them unanswered and waiting. This drove the wedge of resentment further between these two working groups.

Yet in his analysis, Barley mentions that new technologies can also have the opposite effect. That is, in another instance, this new technology "enhanced the complementarily of temporal structure and thereby diffused interpretations that might warrant contention and conflict" (1988, p. 157). The X-ray machine accomplished this by situating the radiologist in the same physical space with a different occupational group-those working in special procedures. Thus, anytime a special procedure staff needed an X-ray film read or a patient de-briefing, the radiologist was usually right around the corner. Essentially, in this case, the technology re-synchronized two

previously asymmetrical temporal worlds by decreasing the temporal gaps in communication.

Similar to Barley's logic, EHR implementation will likely have both positive and negative effects on the temporal order of healthcare workplaces that implement them. EHR has the potential to close the physical space between two individuals and abridge aggravating gaps in communication without stipulating that two entities actually be co-present Through EHR systems, healthcare employees can electronically send and locate films, health records, and prescriptions via an online system. Thus, health professionals are less likely to have to wait for or chase others around the facility.

On the flip side, the implementation of computerized patient records has also disrupted the social practices of the physician order genre, thereby shifting or disrupting workflow in the office or hospital and the doctor-patient relationship (Baron, Fabens, Schiffman, & Wolf, 2005; Crossman, Stroebel, Scott, Stello, & Crabtree, 2005; Valdes, Kibbe, Tolleson, Kunik, & Peterson, 2004). In fact, one study found that the primary reasons why physicians choose not to implement EHR are not only grounded in financial concerns. Of equal concern are productivity barriers, such as the timely nature of entering data into a computer (Menachemi, 2006). In fact, several physicians interviewed in my pilot survey claimed that they treated far fewer patients after EHR implementation because their time was now largely spent in the computer.

As argued, new HITs have the capacity to revitalize the socio-temporal patterns of hospitals and hospital employees in and outside of organizational boundaries. Thus, the questions persists: what effect will these new technologies, and EHR in particular, have

on the rhythm, mesh, tempo, and pace of the healthcare industry altogether (McGrath & Kelly, 1986)? Moreover, are work-arounds created to assuage these discrepancies in the socio-temporal environment and thus preserve the traditional temporal order of the healthcare facility?

In addition, with the price of healthcare skyrocketing, patients and consumers are demanding reform, and not just economically (Schoen, Osborn, Squires, Doty, Pierson, & Applebaum, 2011). Patients are starting to insist that doctors communicatively and emotionally fulfill their needs as well, or they have no problem taking their money elsewhere. With a renewed focus on the patient-doctor relationship, recent reports from practitioners and academics alike have predicated that *new technological advances* will be responsible for successful healthcare reform including improved health outcomes and reduced costs (Ahern, Woods, Lightowler, Finley, & Houston, 2011; Ruxwana, Herselman, & Conradie, 2010). Yet with these new technology orders come new expectations of how it should be utilized.

In his work, Bluedorn (2002) has differentiated between the two contrasting ends of the human temporality continuum. On one end, he positions a fungible conception of time, in which time is measured by an external apparatus and is independent of persons and their activities, behaviors, and relationships. This type of time, often measured by calendars and schedules and driven by project deadlines, has no qualitative differentiation. One unit is the same as another. Epochal time, on the other hand, is measured and defined through certain events and the identities and relationships that are formed between individuals in a group. In the epochal conceptualization, "the time is *in*

the events, the events do not occur *in* time," thus units of time are distinctive as they sequentially pass (Bluedorn, 2002, p.31). In the context of EHR implementation, one could presume EHR protocols and their insistence on catering to an engineered list are more representative of fungible, or absolute time. On the other hand, the patient's story, which is competing for the physician's attention in the medical interview, is representative of an epochal, or relational, conceptualization of time.

Thus, physicians and other health professionals are not only tasked with the difficult undertaking of balancing their verbal and nonverbal communicative behaviors during the medical interview; they also must balance their orientations towards time during this extremely sensitive, vulnerable, yet heavily consequential event. While written records have always been an underlying element deterring the interactive process, reports claim that EHR records are more time-consuming and exacerbate already existent interruptions (McGrath, et al., 2007).

Interestingly, McGrath and colleagues (2007) discovered that EHR restrictions caused doctors to take several "break points" in the medical interview, in which they turn their attention fully away from the patient and direct it towards the computer, and then back again. Patients actually reported higher degrees of satisfaction when doctors proceeded in this manner, as the doctor was able to maintain steady eye contact while speaking to the patient. Physicians who attempted to multitask simultaneously share their concentration—that is, talk to the patient and type in information in one temporal sequence—were the most penalized in patient evaluations. Consequently, future scholars should investigate how healthcare providers perceive EHR use impacting their workplace

time orientation. Moreover, how do these perceptions influence their engagement in work-arounds, perceptions of the relative advantage of EHR technology, and resistance to change? (See Table 5.2)

CONCLUSION

In conclusion, perhaps the most fascinating contribution of the current research is that organizational employees undergoing change reported negative change outcomes with increased informal support and feedback. Offering high levels of support and feedback in regards to EHR use was not enough to persuade employees to buy into the relative advantage of the technology or to defy the inertia of change resistance. However, introducing work-arounds, or change reinvention, reversed the direction of these relationships. That is to say, when employees received high levels of EHR support and feedback from their colleagues *and* thereafter engaged in work-arounds, they 1) perceived the technology as more advantageous, 2) were considerably less resistant, and 3) reported enhanced perceptions of change success. Consequently, this study demonstrates the opportune properties of work-arounds during organizational change if they are willfully explored and, first and foremost, *communicated* with others in employees' social networks.

Appendices

Appendix A: Survey Tool

Section 1: Coworker Communication about EHR

Instructions: *The following 17 statements are designed to examine the level of support and feedback you receive from your coworkers at work in regards to EHR use and implementation. Indicate the degree to which your coworkers support your work with EHR use by circling a number below.* ***PLEASE CONSIDER YOUR COWORKERS TO BE THE PEOPLE SURROUNDING YOU AT WORK ON A DAILY BASIS WHO ARE NOT YOUR SUPERVISORS.***

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

Support

1.) My coworkers listen to my problems with EHR. 1 2 3 4 5

2.) My coworkers appreciate the work I do with EHR. 1 2 3 4 5

3.) I feel comfortable asking my coworkers for help if I have a problem with EHR. 1 2 3 4 5

4.) When I'm frustrated with EHR use/policies, my coworkers try to understand. 1 2 3 4 5

5.) If my duties and responsibilities with EHR become very demanding, my coworkers will take on extra work responsibilities to help me. 1 2 3 4 5

6.) My coworkers can be relied upon when I need help with EHR policies. 1 2 3 4 5

7.) My coworkers share useful ideas or advice with me in regards to EHR. 1 2 3 4 5

Feedback

8.) The performance feedback I receive about EHR from my coworkers is helpful. 1 2 3 4 5

9.) I value the EHR feedback I receive from my coworkers. 1 2 3 4 5

10.) When I do a good job implementing/ using EHR, my coworkers praise my performance. 1 2 3 4 5

11.) I frequently receive positive feedback about my EHR use from my coworkers. 1 2 3 4 5

12.) My coworkers tell me when my work performance with EHR does not meet organizational standards or policies. 1 2 3 4 5

13.) When I make a mistake with EHR, my coworkers let me know. 1 2 3 4 5

Section 2: Organizational Communication about EHR.

Instructions: Everyone has different opinions, experiences, and preferences concerning how much communication they need in order to do their job. Please place an "X" on the scale below to indicate your opinion specifically regarding the communication surrounding electronic health records training and the implementation of newer versions/modifications to the system.

Communication Quality

14.) To what extent do you feel communication surrounding the implementation/use of EHR (from all sources) is:

Untimely: __:__:__:__:__:__:__: Timely?
Inaccurate: __:__:__:__:__:__:__: Accurate?
Inadequate: __:__:__:__:__:__:__: Adequate?
Incomplete __:__:__:__:__:__:__: Complete?
Not credible: __:__:__:__:__:__:__: Credible?

EX: To rate timeliness of communication as moderate:

Timely: __:__:__: X:__:__:__: Untimely

Section 3: EHR Implementation Outcomes and Effects of Use

Variation in Employee Use of EHR and its Intended Use

*Instructions: Tell us about your **actual use** of electronic health records (EHR) at work as compared to how you were **formally** taught to use the system by those who designed it. For each item below, please circle the number that best indicates your opinion on the following scale.*

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

15. I sometimes use EHR improperly (not in compliance with my formal training) 1 2 3 4 5

16. The formal developers of EHR might view my use of the system as inappropriate. 1 2 3 4 5

17. I sometimes fail to use EHR as it "officially" should be used. 1 2 3 4 5

18. Sometimes I do not use EHR in the most "appropriate" fashion. 1 2 3 4 5

19. I have created work-arounds to satisfy some EHR protocols (I use the system in a different way than formally instructed to either keep the system from being disruptive to my work or make it more beneficial to my work). 1 2 3 4 5

20. Members in this organization are able to reach a consensus on how to use EHR in our daily tasks. 1 2 3 4 5

21. Overall, members of our organization use EHR congruently. 1 2 3 4 5

22. There is no conflict in our organization regarding how we should incorporate EHR into our work. 1 2 3 4 5

23. Our organization has reached a mutual understanding on how we should use EHR to perform our task(s). 1 2 3 4 5

24. Members in our organization differ (argue) about how EHR should be used in our work. 1 2 3 4 5

Perception of EHR Success

25. Please indicate how successfully you think EHR has been implemented into your healthcare organization.

Not at all	A Little	Somewhat	Successfully	Very Successfully
1	2	3	4	5

26. Please indicate how successfully you believe your organization has coped with this technological change.

Not at all	A Little	Somewhat	Successfully	Very Successfully
1	2	3	4	5

27. Please indicate how successfully you believe this new organizational technology has been used in this organization.

Not at all	A Little	Somewhat	Successfully	Very Successfully
1	2	3	4	5

Please indicate the degree to which you agree with the following statements:

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

28.) Using EHR enables me to accomplish work tasks more quickly.

1 2 3 4 5

29.) Using EHR improves the quality of the work I do.

1 2 3 4 5

30.) Using EHR makes it easier to do my job.

1 2 3 4 5

31.) Using EHR enhances my effectiveness on the job.

1 2 3 4 5

32.) Using EHR gives me greater control over my work.

1 2 3 4 5

33.) Using EHR increases my productivity.

1 2 3 4 5

34.) Overall, I find the EHR system to be advantageous to my job.

1 2 3 4 5

Attitudinal Reactions to EHR and its Implementation:

Instructions: Please indicate to what extent you agree with the following statements.
(Please consider the "change" to be EHR use as compared to paper records).
1=Strongly Disagree 2= Disagree 3=Neutral 4= Agree 5= Strongly Agree

35. I am excited about this change.	1	2	3	4	5
36. I was/ am stressed by this change.	1	2	3	4	5
37. I complain/have complained about this change to my colleagues.	1	2	3	4	5

38. I present/have presented my objections regarding the change

to management/administration.	1	2	3	4	5
39. I speak/ have spoken highly to others in support of this change.	1	2	3	4	5
40. I believe that the change has or will harm the way things are done in my heath care organization.	1	2	3	4	5
41. I think that this change is negative.	1	2	3	4	5
42. I believe this change benefits the organization.	1	2	3	4	5
43. I believe that I personally benefit from this change.	1	2	3	4	5

Section 4: Demographic Information

*Instructions: Please fill in or mark the appropriate blanks below. We will **NOT** use or report information in such a way as to identify individuals based on their demographic characteristics or otherwise*

1.) I am:
___ 18-29 ___30-44, ___45-59, ___60-75, ___76 or older.

2.) I am:
_____male _____female

3.) I am a(n):
___ physician ___nurse ___technician ___administrator ____physician assistant ____ nurse assistant ____clinical social worker ____dietician ____ medical transcriptionist ____other (please specify:_____)

4.) How much experience do you have in your current occupation?
___ 1-5 years ___ 6-10 years ___10-15 years ___15- 20 years ___20 or more years.

5.) How comfortable do you feel using computers for work or personal purposes?

1 Very Uncomfortable
2 Somewhat Uncomfortable
3 Neutral
4 Somewhat Comfortable
5 Very Comfortable

6.) How much experience do you have using computers for data storage purposes at work and/or home?

____Under a year ____1-2 years ___3-5 years ___6-10 years ___More than 10 years

THANK YOU FOR YOUR PARTICIPATION. Your participation in this survey will result in both practical and theoretical findings that will make a contribution to scholarship in the organizational and health communication field.

Appendix B: Mail-out Cover Letter to Physicians and other Healthcare Professionals

Dear Healthcare Professional,

My name is Ashley Barrett, and I am a Doctoral Candidate (ABD) at the University of Texas at Austin. I am currently working on my dissertation and could *really* use your help in collecting my research and ultimately helping me to graduate with my Ph.D. in Communication Studies.

I know healthcare workers are over-surveyed and your time is more than precious, but if you could spare ten minutes, I would be very grateful.

My dissertation is situated in organizational change and focuses specifically on the implementation of electronic health/medical records in public and private healthcare facilities. I am very driven to learn more about what makes this implementation successful, the challenges that are encountered in its use, the general sentiment towards the technology, and if work-arounds are emerging that help physicians cope with using this new technology.

I have included in this envelope a copy of my survey (I have kept it as brief as my dissertation committee would allow), an informed consent form, and also a stamped and addressed envelope for the survey and consent form's return.

Although your responses with be kept anonymous and in no way tied back to your name, I will be sharing the aggregated data with specific EHR/EMR vendors. Beyond helping me out immensely as a young academic, it is my hope that the time and effort you spend will have practical value as well.

So far, I have encountered many challenges collecting data in time-stressed healthcare organizations and from the professionals therein—many more than I could have imagined whilst naively walking into my doctoral studies. Please consider aiding in my research. I will be happy to share my results with you once my dissertation is completed.

Wishing you the very best,

Ashley Barrett

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