

The Role of Electronic Health Records in Enhancing and Threatening Physician Identities: An Identity Theory Perspective

AbhayMishra¹, Catherine Anderson², Corey Angst³, and Ritu Agarwal⁴

Abstract

With the lack of timely and relevant patient information increasingly being linked to adverse medical outcomes, effective management of patient data has emerged as a strategic imperative for the healthcare industry. Healthcare informatics experts have suggested that electronic health record systems (EHRS) can facilitate effective information sharing within and between healthcare stakeholders such as physician practices, hospitals, insurance companies, and laboratories. In this paper, we examine the adoption and use of EHRS in medical practices. Physician practices occupy a central position in the healthcare value-chain and possess a number of unique characteristics that differentiate them from other institutional contexts, including a strong "clan" culture, potent professional identities, and a desire for autonomy. We draw upon social identity theory and self-categorization theory to examine how the nature of impending changes engendered by EHRS can enhance or threaten physicians' social identities, and influence decision-making regarding its adoption and use. We use data from 206 physician practices, spread across the United States, to test our theoretical model. Results suggest that while careprovider identity reinforcement and professional identity reinforcement positively impact the adoption and use of EHRS, professional identity deterioration and governmental influence impact them negatively, and careprovider identity deterioration has no significant impact on them. Theoretical and pragmatic implications of the findings are discussed.

Keywords: Adoption, EHR, Electronic Health Record System, Health IT, Identity, Identity Enhancement, Identity Threat, Physician Practices, Self Categorization Theory, Social Identity Theory

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¹ Georgia State University, Atlanta, GA

² University of Maryland, College Park, MD

³ Notre Dame, University South Bend, IN

⁴ University of Maryland, College Park, MD

Introduction

“In nothing do men more nearly approach the gods than in giving health to men.” ~Cicero

For centuries, society has considered medicine as among the noblest of all professions. Physicians are held in great esteem for the consequential services they provide including saving the lives of other men, women and children. While all professionals such as academicians, consultants, engineers, and attorneys are typically respected by society, physicians have carved a unique niche and status for themselves because of the nature of their work – saving lives – and their specialized training, skills and knowledge. In particular, physicians have enjoyed unprecedented levels of autonomy and independence in the conduct of their profession. Additionally, they have enjoyed strong professional bonds with other physicians, and together as a group, have been relatively immune to external pressures or control.

Even as physicians are overtly protective of their professional identities, policy makers wrestle with identifying potential ways to promote changes they believe will benefit healthcare delivery to patients. Despite being at the forefront of technological, clinical and pharmaceutical innovations, and accounting for approximately 16% of the gross domestic product, the healthcare system in the U.S. continues to suffer from rising costs, unequal access to care, and medical errors that result in serious adverse consequences, including preventable deaths. Thus, it is not surprising that policy makers are eager to find ways to improve care delivery in the U.S. Recently many, including President Obama, have contended that the adoption and use of technological innovations, particularly those that aid information management, can help address some of the problems that continue to challenge healthcare. In fact, the American Recovery and Reinvestment Act (ARRA) of 2009 has provided financial incentives for physicians who adopt and demonstrate “meaningful use” of electronic health records (*HITECH Act 2009*) and disincentives if they fail to do so by 2015.

Although it is commonly accepted that the practice and delivery of healthcare is fundamentally an information-based science (Hersh 2002), and while the healthcare profession has a longstanding tradition of using medical technologies, information technology (IT) adoption and use by clinicians and care delivery organizations for the storage, management, and exchange of *patient* information is still relatively limited (Bower 2005; DesRoches et al. 2008). Consequences of low adoption and usage rates of IT at the point of care include poor quality and inaccessibility of relevant information, which have frequently been implicated for systemic problems in healthcare organizations. Thus, there is considerable interest among policy makers who wish to promote efficiency and standardization to understand

the enablers and barriers to adoption and use. Because of their expertise in examining the adoption and use of IT in a myriad of organizational, industrial and institutional settings, Information systems (IS) researchers are in a unique position to inform the discourse in health IT.

A key enabling technology that facilitates the creation and sharing of better information about patients among different stakeholders in the healthcare delivery system is electronic health record (EHR) systems. An *electronic* health record entails the computerization of health record content and associated processes. EHR *systems* (EHRS) are the software platforms that physician offices and hospitals use to create, store, update, and maintain electronic health records for patients. They represent the primary mechanism through which the highly publicized and much desired interoperability of health information can take place such that stakeholders are able to seamlessly share, exchange, and access relevant patient data (Shortliffe 1999). Indeed, many claim that EHRS are the foundational technology platform for greater digitization of healthcare (Lohr 2006). While anecdotal evidence and limited available research suggests that the benefits of EHRS adoption outweigh the costs (Gans et al. 2005; Miller et al. 2005), the adoption of EHRS has been slow and their usage have been modest in the U.S. (Angst et al. In Press; Bower 2005).

In this paper, we focus on understanding the drivers of adoption and use of EHRS in *physician practices*. Such practices often maintain an independent existence from hospitals and are responsible for the vast majority of care delivery, thus occupying a significant position in the U.S. healthcare system (Schoen et al. 2006). They represent a key link in the care delivery process as they typically have the first encounter with a patient and maintain the relationship for a considerable length of time (Burns 2002). Thus, the capture, storage, and management of patient information through the adoption of EHRS at the practice level is critical to ensuring that the information can be integrated with that of other stakeholders. Surprisingly, however, the IT adoption decision and usage practices of physician practices have not been examined in detail in the literature (DesRoches et al. 2008). To the degree that EHRS exhibit considerable value potential, and in light of the fact that the rate of diffusion of EHRS in the physician practice population is low (Audet et al. 2004; Burt and Sisk 2005), it is clearly important to understand the dynamics underlying this phenomenon.

The EHRS adoption and use decision by physician practices unfolds in a complex milieu. The features of the specific technology when coupled with the idiosyncrasies of a health system that is fundamentally a complex web of connections between clinicians and other stakeholders, create a dynamic that necessitates a reframing of traditional

adoption models (Attewell 1992; Bharadwaj 2000; Chwelos et al. 2001). Indeed, many have argued that the healthcare industry exhibits unique characteristics that constrain its ability to implement technological innovations successfully, and called for greater attention to, and deeper theorizing about, how industry dynamics alter the nature of related decisions, activities, and outcomes (Chiasson and Davidson 2005; Nembhard et al. 2009). Two unique aspects embedded in the physician practice context are particularly important and consequential for theorizing about EHRS adoption and use: physicians' social identities, and the degree of inter-dependence and complexity in the healthcare ecosystem that affects the extent of volition implicit in the EHRS adoption and use decisions.

First, physician decision makers maintain a powerful social identity that drives perceptions, emotions, and behaviors (Adler et al. 2008). An individual can hold multiple social identities; while Plato first noted a duality of identities as exemplified in this quote, "The greatest mistake in the treatment of diseases is that there are physicians for the body and physicians for the soul, although the two cannot be separated" the inseparable identities for physicians we reference are of careprovider and professional. In their role as a careprovider, physicians view themselves as central to patient treatment, and consider themselves an integral part of the physician practice where patients receive care. Despite the preponderance of professionals in the healthcare industry, exercising control over patient treatment and care is fundamental to physicians' identity, and they consider it their *raison d'être* (Chreim et al. 2007; Pratt et al. 2006). Yet, some have argued that doctors must adjust their identity in response to healthcare reform or their practices will suffer (Ramsey 1992). As Ramsey (1992, p. 146) notes, "The purposes of the emerging field of practice management are to empower the physician to control the quality of services within the practice, to facilitate enhancement of the outcomes of the target population, and to ensure that adequate financial resources are generated to ensure the viability of the practice." The inferences drawn from this statement are twofold: 1) physicians must assume dual roles of careprovider and professional manager, and 2) the identity of the physician and physician practice are inextricably linked.

Clinical practices⁵ are characterized by an established hierarchy where the physician is regarded as the source of expertise and all other members, such as nurses and technicians, defer to this expertise (Nembhard et al. 2009), further reinforcing the occupational careprovider identity of the physician (Lichtenstein et al. 2004). In their second identity, physicians consider themselves a part of the extended professional community consisting of physician practices,

⁵ We use physician practices, clinical practices and medical practices interchangeably.

hospitals and medical professionals. Years of stringent medical training followed by grueling rotations typically foster a strong professional sense among physicians and yield enduring bonds with other physicians who have gone through a similar regimen (Freidson 1994; Pratt et al. 2006). This professional identity consolidates their association with “reference others” which represents a collective aspect of self, likely to have a strong influence on self-definition (Scott and Lane 2000), establishes the emotional and value significance of the professional group (Hogg 2001), and separates them from other groups (Brickson 2005; Foreman and Whetten 2002). Thus, their actions are deeply influenced and constrained by those within the same occupation. Studies of the diffusion of innovations within medical practices suggest that physicians, not unlike professionals in other occupational specializations, are strongly influenced by the norms, values, and actions of peers, and relatively immune to other sources of influence (Adler 2008; West and Barron 1999).

A second unique aspect about EHRs adoption and use decisions is that the complexity of the healthcare ecosystem renders them simultaneously volitional and mandated in subtle ways. Nearly all practices have affiliations and/or admitting rights with hospitals and clinics (Madison 2004). Physician practices interact and collaborate with other practices and hospitals to provide care to patients, and as such, are impacted by the technological decisions made by them. In addition, stakeholders such as regulatory bodies, various local, state and federal government entities and insurance companies may overtly or covertly, through rewards and sanctions, compel practices to provide electronic interfaces. Examples include the recommendation to the U.S. Congress by the Department of Health and Human Services and the American Health Information Community to mandate electronic prescribing for Medicare and Medicaid patients, and the incentives offered through ARRA 2009 (*HITECH Act* 2009). Thus, while physician practices may appear to be independent, their interaction and linkages with other organizations such as physician practices, hospitals, insurance companies and governmental bodies can both enable and constrain their roles and identities (Chreim et al. 2007), and have a significant impact on technology adoption and use decisions (La Puma 1996).

In addition to the strong social identities of physicians and the environmental complexity of practicing medicine which likely influence the adoption and use decisions related to EHRs, a number of studies in health informatics have suggested that the introduction of EHRs in the physician practice entails a significant strategic change which can transform clinical and administrative workflows, information availability, and doctor-patient relationships (DesRoches, et al. 2008; Ford et al. 2009; Jha et al. 2009). Simultaneously, the ease of information access enabled by EHRs can also

allow physicians to perform their tasks more competently and efficiently. The changes following the introduction of EHRS may generate substantial interpretation ambiguities and dissonance, and motivate people to engage in sensemaking (Elsbach and Kramer 1996; Gioia and Chittipeddi 1991). Additionally, rapid technological changes can engender significant role transitions and identity reconstruction (Chreim et al. 2007; Ibarra and Barbulescu 2010). These changes can reinforce or threaten the careprovider and professional identities that physicians have created and cultivated. Indeed, much research suggests that environmental shifts can create instability in identities and cause individuals to take action that promotes identity maintenance. Although impending changes associated with EHRS have been widely discussed, the role of perceived changes to identity in determining EHR adoption and use decisions are not well-understood. In a recent study, Tripsas (2009) persuasively argues that while identity and its evolution is critical to understanding organizational innovation, extant research has largely ignored the related concepts of identity and innovation, and calls for more theoretical development in this area.

In this study, we consider the social identities of physicians, draw upon and extend the concepts of identity enhancement and threat, and examine their influence on health information technology-related decisions. Despite significant theoretical work in the field of social identity, identity enhancement and threat have been understudied in extant literature. Additionally, empirical work examining identity and identification is lacking in the literature (Dukerich et al. 2002; Foreman and Whetten 2002). Finally, while identity theories have been applied in a wide variety of contexts, including the healthcare industry (Brewer and Gardner 1996; Dukerich, et al. 2002; Johnson et al. 2006; Pratt and Foreman 2000), their application in examining IT-related phenomena is limited. In this paper, we address these theoretical and empirical gaps in the literature. Grounded in identity theory, we conceptualize physician identity enhancement and threat, and develop a research model that investigates the adoption and use of EHRS through the lens of identity enhancement and threat. We empirically test our research model using practice-level survey data obtained from key informants representing 206 physician practices spread across the U.S.

Theoretical Background

Technology adoption and use has attracted significant attention from the academic community and been studied from a wide variety of theoretical perspectives, such as diffusion of innovations (DOI) (Premkumar et al. 1994), the technology acceptance model (TAM) and its extensions (Davis 1989; Kim 2009; Ortiz de Guinea and Markus 2009; Venkatesh

and Davis 2000; Venkatesh and Davis 2000; Wu and Lederer 2009), learning (Attewell 1992), institutional theory (Teo et al. 2003), social exchange theory (Hart and Saunders 1997), knowledge- and resource-based views (Armstrong and Sambamurthy 1999), rational economics (Brynjolfsson and Kemerer 1996; Saloner and Shepard 1995) and power and politics (Markus 1983). Sabherwal et al. (2006) have summarized this research in their meta-analysis. In the past decade, a significant volume of research investigating various aspects of health IT adoption and use has been reported, the majority of which has appeared in health informatics journals. We briefly summarize the existing state of research on health IT adoption in IS and the medical informatics literatures. This is followed by a discussion of social identity and self-categorization theories, which are particularly suited for the unique aspects of the healthcare context. We then describe the research model and specific research hypotheses.

Prior Research in Healthcare IT Adoption and Use

IS and organizational science research involving healthcare IT has typically examined usage in a case study context. For example, in support of the notion that macro level influences can interact with micro level influences, Davidson and Chismar (2007) found that institutional and technology changes triggered processes facilitating the effective use of health information technology. Reflecting the strength of the physician "clan" culture, physician resistance to EHRs has been found to increase as the perceived threat shifts from one involving solely individual-level conditions to one involving group-level initial conditions (Lapointe and Rivard 2005). The resistance exhibited by physicians when a threat was perceived to be an individual-level condition was essentially uncoordinated, but resistance amongst physicians converged once a group-level condition was threatened (Lapointe and Rivard 2005). The presence of clan culture was also highlighted by Kohli and Kettinger (2004) who studied the implementation of a physician profiling system in a community hospital in the U.S. They suggest that informing the clan becomes legitimized through both internal and external influences. In a recent study, Lapointe and Rivard (2007) examined the implementation of two clinical information systems in three Canadian hospitals. They argue for the need to explore alternative yet complementary models of implementation, which may operate at different levels, focus on different key phenomena, and examine different antecedents to compensate for the limitations of existing research that focuses on a single level, a unitary phenomenon, and one set of antecedents. Vaast and Walsham (2009) examined how information infrastructure - a web-based information system - facilitates learning and knowledge sharing in a network of practice consisting of non-

collocated participants in the environmental health domain in France. This study suggests that the implementation of the system leads to the transformation of practices and peer relationships, triggered by interrelated learning processes that are characterized by engaging with peers based on shared practices, knowledge sharing across different contexts and a trade-off between experience on the job and experience with the system. Collectively, although conducted in settings other than physician practices, these studies underscore the importance of simultaneously considering the institutional, organizational, and professional contexts in decisions about healthcare information technologies.

In contrast to the IS literature where investigations at the level of the physician practice setting are limited, the medical informatics literature reports several case studies and surveys addressing barriers and incentives of EHRS adoption and use (e.g., Miller et al. 2005; Ventres et al. 2006). The majority of informatics research comprises large-scale, survey-based *descriptive studies* which examine the effects of various factors on adoption decisions (e.g., DesRoches et al. 2008; Miller and Sim 2004; Simon et al. 2007b) or the functions for which the EHRS are used (Hsiao et al. 2008). Findings suggest that larger practices and those located within a hospital are more likely to adopt (Simon et al. 2007b). Commonly cited barriers to adoption include high financial costs, perceived losses in productivity and physician attitude toward technology (Miller and Sim 2004; Simon, et al. 2007b). Although informative, these studies are nevertheless not theoretically grounded, nor do they explore the complex determinants that are likely to exist in a dynamic professional, environmental, and organizational setting (Angst et al. *In Press*; Kazley and Ozcan 2007).

In summary, while prior research has examined IT adoption and use in considerable breadth and depth, important opportunities exist for extending it in the context of healthcare industry. In particular, examining the ambiguities and uncertainties inherent in a transformational technology like EHRS, the consequent sensemaking physician decision makers need to engage in and their perceptions about how their careprovider and professional identities may evolve as a result of EHRS offers a rich opportunity to extend the literature. Our study seeks to complement existing work by addressing such issues.

Social Identity Theory and Physicians

The psychology literature defines identity as a cognitive construct of the self, which is self-referential and answers the question of “who am I?” (Hogg 2001; Kreiner et al. 2006). Personal identity focuses primarily on the individuated self – the characteristics of an individual that separate one individual from another. Researchers have noted that in the

contemporary world, however, when individuals define themselves based on their membership in various collectives such as organizations and professional groups, and attach a significant importance to these associations (Dukerich, et al. 2002), such singular focus on just individuals is frequently at odds with their observed behavior in the collectives with which they are associated (Turner and Onorato 1999). Accordingly, researchers in social psychology have conceptualized social identity as “what defines us?”, to examine the individual as a member of a collective, and to explain actions and behaviors by such collectives (Tajfel and Turner 1979).

Social identities are those aspects of an individual's self derived from the social categories or collectives to which one belongs (Hogg and Terry 2000; Tajfel and Turner 1979)⁶. Such associations provide members an avenue to establish relationships with similar others and a cognitive differentiation between in-group and out-group members, and to derive their sense of worth from such social identities (Ashforth and Mael 1989; Brewer and Gardner 1996). People participate in the collectives selectively after considering their current and desired self-image, and determining if membership in a collective can facilitate self-enhancement, external image, status, and reputation (Bartel 2001). An important aspect of social identity is that people can identify with multiple social categories or collectives.

Extant research has drawn upon social identity theory (SIT) and self-categorization theory (SCT) to examine peoples' social identities (Foreman and Whetten 2002; Hogg 2001; Johnson, et al. 2006; Scott and Lane 2000). How an individual sees himself or herself in relation to social groups and whether he or she is likely to adopt the identities of various collectives provides the foundation for these theories (Kreiner and Ashforth 2004). Social identity theory suggests that people define and identify themselves by their membership in various collectives (Bartels et al. 2007; Foreman and Whetten 2002). People create these associations based on perceived overlap between self and collectives. The larger the overlap, the more people prefer the membership of a collective, and the higher their emotional and value significance to these associations. The social identities represent internalization of the identities of the collectives as part of the self and entail the psychological acceptance of the values and norms of the collective (Scott and Lane 2000). Members evaluate such collectives, also called in-group, more positively than other collectives, and expend efforts to establish positive distinctness for the group (Hogg 2001).

⁶ Social identities can be either interpersonal, when derived from interdependence with others, or collective, when derived from membership in more impersonal collectives or categories, and are activated by and become salient depending upon contextual cues (Brewer and Gardner 1996). In this study, our focus is on the collective aspect of social identity.

Self categorization theory posits that people self-select the collectives of which they want to be a member. Individuals tend to identify strongly with collectives that have unique characteristics relative to other groups. These collectives have high social status or other socially desirable features to elevate members' sense of self-esteem (Bartel 2001) and also reduce uncertainty through a relative homogeneity of values and norms (Hogg 2001). Concurrently, individuals have different opportunities to join a collective because accessibility differs for different people (Turner and Onorato 1999). An individual's societal standing, education, income and social network may enable or constrain the choice of memberships available to him or her. In other words, in the process of self-categorization, individuals evaluate the accessibility of a collective, and, in turn, are assessed by it for suitability and readiness (Korte 2007).

As referenced earlier in SIT and SCT, physicians have multiple identities which are fostered by the selection, education, training, and communication processes (Apker and Eggly 2004). In their role as a careprovider - the focal and most consequential player in the medical practice, physicians see themselves as the orchestrator of care delivery and others such as nurses, pharmacists, and technicians as aids that closely follow their instructions. In their role as a part of the extended professional community, physicians identify with their medical specialty and other physicians and medical professionals as a whole (Johnson et al. 2006). In his in-depth analysis of the medical profession, Freidson (1994) characterized it as highly autonomous and controlling of the conditions and content of medical work. Clinicians place a high value on autonomy in decision making and setting the standards of clinical performance (Ford et al. 2009), and acknowledging the deep knowledge and expertise required for the practice of medicine, society has typically granted this autonomy (West and Barron 1999). At the same time, the practice of medicine involves a high degree of uncertainty and ambiguity which leads physicians to rely extensively on one another and their social networks (Mano-Negrin and Mittman 2001; West and Barron 1999). Physicians are educated in a way that fosters a sense of membership in the broader medical profession resulting in a collective social identity. The community feeling is central to the organization and experience of professional work (Adler et al. 2008). Indeed, the profession has been portrayed as a clan (Kohli and Kettinger 2004) where professional identity and group culture are identified as proximal influences of behavior. Prior research in social psychology likewise suggests that attitudes and behaviors are strongly influenced by peers when greater uncertainty surrounds the behavior or decision in question (Bandura 1986). In the medical field, such peer influence has previously been found to be an effective means of enacting changes in physician clinical behavior (Lomas

et al. 1991). Moreover, the medical community's culture is very close-knit and views external attempts at instituting controls as an assault on its autonomy (Ford et al. 2009; Ford et al. 2006).

Physicians' professional qualification process and their tightly controlled supply results in firmly ingrained social identities regarding their roles as careproviders and members of the medical profession. These identities determine their associated work activities; as noted by Ellers et al. (2000, p. 163), "...people's collective selves and social identities may guide their perceptual, affective, and behavioral responses in important ways." For example, physicians may adopt new procedures and therapies based on what other physicians are using and achieve consistency with professional identities and goals (Coleman 1966). While these identities are strong, it is possible that physicians, in response to environmental stimuli that create an inconsistent state between their social identities and expected work practices, can either modify their perceptions about identity or change work activities. It is the influence of the perceived changes associated with EHRs and environmental stimuli on physician practice's adoption and use decision that is the focus of this study.

The Endurance and Evolution of Identities

One of the central tenets of social identity is the ongoing identity comparison where members assess the match between their identity perceptions and their identity expectations (Elsbach 2003; Foreman and Whetten 2002). These comparisons provide a valuable input to collectives to decide if their current identity needs to evolve or it can endure.

Environmental, contextual, and circumstantial shocks may modify people's evaluative schema, change taken-for-granted views and necessitate modifications of identity and image (Elsbach 2003; Gioia and Thomas 1996). According to Gioia and Chittipeddi (1991), disconfirmation of an existing interpretive system, instigated by a significant change, causes ambiguities and uncertainties and requires a revision of the mental schema. However, Scott and Lane (2000) posit that both identity change and identity endurance may occur as a response to adapt to the needs and demands of salient internal and external stakeholders. In other words, despite significant changes taking place in the external environment, a variety of powerful forces such as inertia, power, politics, ease of cognition due to familiarity and social commitments and entanglements may engender the endurance of the existing identities (Tripsas 2009).

Elsbach and Kramer (1996) suggest that identities are the cognitive schema through which people perceive the central and distinctive attributes of the collectives with which they are associated. Chreim et al. (2007) also suggest that professionals such as doctors and lawyers view their role and identity as central in interpreting and acting in work

situations. Thus, changes that potentially result in fundamental modifications in workflows, relationships, balance of power and control dynamics can alter current modes of cognition, and require different modes for getting tasks accomplished (Ibarra and Barbulescu 2010; Tripsas 2009). In this process, if the standing of a person's in-group is compromised, downgraded or attacked, or its relative distinctness and status are compromised due to environmental changes, people experience a threat to their identity (Bartel 2001). The rationale is that such changes are considered a regression, resulting in loss of status and prestige, which may not be socially desirable. Without an explicit threat and an imminent need for self-protection, social comparisons, which are integral to identity, promote the current cognitive schema; whereas when threat is present, people use cognitive tactics to maintain positive perceptions of their social identities (Bartel 2001; Elsbach and Kramer 1996). When the collective identity is under threat, people selectively highlight traits and characteristics prominent from their identities that portray them and the collective in a positive light. People may also resort to abandoning their current membership and highlighting another identity or to reframing the threat so it is consistent with the identity, obviating the need to change the identity (Tripsas 2009).

In an organizational context, top managers' identities tend to overlap significantly with the organizations they lead (Pratt and Foreman 2000). This is even more true for owners of small organizations where the owners identify almost entirely with their organization (Johnson et al. 2006). Thus, it is entirely possible for people to ignore external changes, take steps to reduce the perceived threat to the identity and continue with the current identity due to vested power interests, biased cognition, inertia and a preference for status-quo (Scott and Lane 2000; Tripsas 2009).

Technological developments and environmental changes have been implicated in both threatening and reinforcing identities (Tripsas 2009). For instance, customer relationship management (CRM) systems facilitate the generation of leads for salespeople, make it easier for them to follow-up with current and potential customers, help track various orders that may be under different stages of completion with the organization, and generate more sales. Thus the identity of salespeople – that of revenue generator – is reinforced rather than threatened after the introduction of a CRM. By contrast, to the degree that hands-on computer work is regarded as relatively low-status among top management, the presence of an ERP system that requires production executives to monitor factory throughput on a computer may threaten their professional executive identity.

Physicians and Physician Practices

As noted, SIT and SCT suggest that through self categorization and social identity formation, individuals acquire social-cognitive schema, including norms, values, and beliefs, which guide their behavior at the level of the collective (Korte 2007). Indeed, after social identification has occurred, there is a transition from individual to social identity, and while the potency of social identity varies, it is generally more powerful than individual identity (Hogg and McGarty 1990). Such identities are particularly strong for top managers and owners of organizations (Johnson et al. 2006; Scott and Lane 2000). Additionally, during periods of change and turbulence, which are characterized by uncertainty, ambiguity and reservations, top management performs the critical task of sensegiving (Fiss and Zajac 2006; Gioia and Chittipeddi 1991). Organizational “elites” routinely play a larger role in managing identity by shaping the beliefs of the entire organization (Pratt and Foreman 2000).

In medical practices, physicians are considered the authoritative source of knowledge that is critical to providing better care to patients; they are the key actors in the knowledge-intensive organization of physician practice. Others employed in the practice such as staff assistants, nurses, and technicians simply complement the physician’s performance; they do not generate direct revenues (Adler et al. 2008). Thus, physicians are in a position to exert a significant amount of influence on the practice. Additionally, due to the hierarchical structure of physician practices, the opinions of physicians and physician owners carry significant weight (Johnson et al. 2006), suggesting that the cognitive schema and identity of the physicians is likely to be represented in the actions and behaviors of the physician practice.

In summary, we have argued that the adoption and use of EHRS in physician practices will be determined by how physicians perceive the introduction of EHRS will change the care provision process and whether those changes will enhance or threaten their social identity.

Conceptual Model and Research Hypotheses

Based on the unique nature of the physician professional culture, social identity theories, and the IS adoption and use literature, we propose several hypotheses related to a practice’s decision to adopt and use EHRS. Our research model is illustrated in Figure 1. The focal outcomes of interest in the model are EHRS adoption and use in physician practices. There is an increasing interest among scholars to examine the adoption and use of technological innovations in the healthcare industry (Kennedy and Fiss 2009). Researchers in IS have also examined adoption decisions and extent of use (Cooper and Zmud 1990; Karahanna et al. 1999; Son and Benbasat 2007). Additionally, writers in organization

theory have recommended that both adoption and implementation aspects of new practices and innovations should be studied (Ansari et al. 2010; Cool et al. 1997). Several researchers in health informatics have also issued research calls for more detailed investigation into the adoption and use of technological innovations (DesRoches et al. 2008; Ford et al. 2009; Jha et al. 2009). The rationale of these scholars is that understanding of organizations' reasons for adopting new practices and innovations need to go beyond mere adoption and into actual implementation (Jasperson et al. 2005). In this study, we examine how physician practices that adopt an EHRS actually use it to accomplish various clinical tasks.

[Please insert Figure 1 about here]

Our model includes two categories of antecedents that serve to enhance or threaten physicians' identities. Both sets of antecedents capture the fact that physicians' social identities are grounded in the interactions they have with patients during the provision of care and in the interactions they have with other stakeholders in the broader professional environment. We examine two identity enhancing antecedents – careprovider identity reinforcement and professional identity reinforcement - and three identity threatening antecedents – careprovider identity deterioration and professional identity deterioration in the form of stakeholder influence and government influence. We discuss our hypotheses below.

Identity Enhancing Antecedents

Careprovider Identity Reinforcement

Because of the unique and complex knowledge that physicians possess and the almost complete autonomy they enjoy in patient treatment regimens, they drive a significant proportion of healthcare decisions and costs in the United States. Physicians, in general, consider themselves to be knowledgeable and competent (Chreim et al. 2007; Pratt et al. 2006), and believe that they are central to many of the accomplishments taking place in the physician practice. Thus, to the extent that an EHRS is believed to enhance and augment their self-perception of competence, and to complement physician knowledge, physician practices are likely to be motivated to adopt and use EHRS. In the process of providing patient care, physicians perform two types of activities – information retrieval, and information synthesis and diagnosis. Due to their unique knowledge and skills, physicians' time is a highly valued and scarce resource and indeed, is priced as such in the market. The optimal utilization of this time is in the delivery of care. In traditional paper-based settings, a considerable amount of time is wasted on information retrieval from disparate systems and paper documents. EHRS enable physicians to access all the medical information about patients efficiently at one place, thereby enabling them to

use their time more effectively for synthesizing this information, diagnosing patient problems, and determining treatment regimens for them. Additionally, by giving up routine components of their role and delegating education aspects to other professionals such as nurses and technicians, physicians can use the freed up time to undertake complex problems that provide opportunities for professional growth and where their expertise is most needed (Ibarra and Barbulescu 2010).

From the perspective of patients, the physician is still the source of information – it is the physician who explains to the patients what different disease conditions entail, what test results mean, what medicines they need to take and what precautions are necessary for them. From the perspective of nurses, technicians and pharmacists, it is still the physicians who drive decisions regarding tests, medicines, and surgeries. To the extent that the adoption and use of an EHRS may make the physicians less dependent on nurses and administrative staff for information retrieval and provide them with additional time to enable the provision of more effective and efficient care to patients, their image and identity of being a competent, knowledgeable and autonomous careprovider should be enhanced. Thus we predict:

H1: Perceived careprovider identity reinforcement enabled by EHRS will be positively related to the adoption of EHRS in a physician practice.

H2: Perceived careprovider identity reinforcement enabled by EHRS will be positively related to the extent of use of EHRS in a physician practice.

Professional Identity Reinforcement

The complex and highly specialized nature of medicine frequently requires multiple physician practices to cooperate with one another. For example, in the provision of care for a particular patient, a pulmonary specialty practice may share information with oncology, radiology, and cardiology practices as well as other hospitals in the geographical area.

Physician practices typically hold admitting rights to one or more local hospitals to support the acute care needs of their patients. Due to repeated interactions with other physicians, clinical practices, and hospitals, the actions of these entities and individuals may influence a physician practice because they serve as signals as to what referent others value and have accepted as important. Perceptions that change is being embraced from *within* the referent group can be a powerful motivation for change because it enables the physician to maintain control and autonomy and amplifies affiliation with the in-group (Chreim et al. 2007; Gagne and Deci 2005; Kohli and Kettinger 2004).

As discussed earlier, physicians identify closely with other physicians and their profession, and value their links and connections as they collaborate frequently to provide patient care. The availability of standardized electronic

information may enhance the knowledge of physicians about patients and the quality of care provided to them. Thus, the extent to which other practices and hospitals with which the focal practice identifies and routinely interacts have already adopted EHRS provides an impetus to the focal practice due to the shared values within the peer group (Gagne and Deci 2005). It is important to realize that physicians are likely to experience a significant amount of autonomy and volition in choosing this behavior because it is congruent with the values of the peer group into which they have self-selected, and because the changes are not forced upon the focal practice. If other collaborators have already adopted EHRS and the focal practice has not, it may be motivated to adopt in order to strengthen its professional social identity by keeping pace with its peers and the broader professional community.

Furthermore, through its connections to other practices and hospitals using EHRS, the focal practice can learn about EHRS and associated costs and benefits. The actions of others within a professional community characterized by a strong identity are important signals of the value of the action and improve the likelihood of change within the focal practice (Chreim, et al. 2007; Kohli and Kettinger 2004). In summary, physician practices working in an environment in which other practices, medical professionals, and hospitals with which they interact have already adopted EHRS will be more likely to adopt and use because it is congruent with their professional goals and affirms their professional identity.

H3: Professional identity reinforcement will be positively related to the adoption of EHRS in a physician practice.

H4: Professional identity reinforcement will be positively related to the extent of use of EHRS in a physician practice.

Identity Threatening Antecedents

We examine three categories or dimensions of perceptions that could potentially pose a threat to prevailing identities and thereby diminish physicians' intentions to adopt and subsequently use an EHRS. The first is associated with the physician's perceptions of how an EHRS may negatively influence his or her role of providing care to patients. The second two antecedents are associated with the physician's perceptions of how activities taking place in the broader healthcare professional environment may influence his or her professional identity.

Careprovider Identity Deterioration

Individuals may feel threatened when the central and distinctive dimensions of their identity are devalued or when their perceived positional status is devalued (Elsbach and Kramer 1996). When the status quo is changed drastically, individuals experience cognitive distress and identity dissonance. The dissonance may arise not only from having to

learn new ways to perform tasks, but also from relinquishing certain desirable features of the old role. However, when a person's identity is threatened, his or her primary self-defensive goal is to affirm the integrity of the self rather than seek ways to resolve the particular threat (Elsbach 2003). Bartel (2001) suggests that in such circumstances, people are likely to activate a prevention focus and engage in concerted efforts to preserve the desirable features with which the in-group is identified.

A change that assaults the very fabric on which physicians base their identity – autonomy and competence – and questions or modifies their role in the care delivery process is likely to induce substantial identity threat. A number of researchers have suggested that the introduction of an EHRS entails significant clinical and administrative changes in physician practices, and transformations in the way care delivery would take place (DesRoches et al. 2008; Ford et al. 2009; Jha et al. 2009), signaling to physicians that their social role and identity may be altered significantly. There have also been speculations that because physicians would need to use a handheld device or a computer to enter and access information, they would not be able to focus on the patient and discuss their problems and treatment options, resulting in adverse patient reactions, including dissatisfaction (DesRoches et al. 2008; Ford et al. 2009; Jha et al. 2009). Finally, there may be some fear among physicians that the introduction of a technology that can access patient data and match it with the latest treatment options available threatens the very foundation on which their identity is predicated, the exclusive ownership of valued knowledge and skills, and may render them obsolete.

These changes may appear to compromise the physician-patient relationship and challenge the control physicians have over patient treatment, thereby adversely impacting their careprovider identity. Van Maanen and Schein (1979) have suggested that dissatisfaction with a role leads professionals to redefine it and to take proactive measures to modify the role and circumstances to preserve identity. As discussed earlier, when confronted with threats, physicians are likely to reject activities that are perceived as detracting from their careprovider identity, thus, preserving the status quo and safeguarding their autonomy and source of power. We therefore expect:

H5: Perceived careprovider identity deterioration associated with EHRS will be negatively related to the adoption of EHRS in a physician practice.

H6: Perceived careprovider identity deterioration associated with EHRS will be negatively related to the extent of use of EHRS in a physician practice.

Professional Identity Deterioration

The healthcare industry is among the most regulated sectors in the United States. Many different organizations with varied missions and affiliations wield power and influence and determine the nature of the healthcare industry. Federal, state and local governments regulate various players in the industry to facilitate access to healthcare. In addition, other stakeholders such as technology vendors, insurance companies, and pharmaceutical companies exert pressure on care providers and on each other. Efforts by regulatory bodies and private companies to influence physician decisions through rewards and punishments are treated contemptuously as physicians resolutely guard their autonomy and independence, and are satisfied with their competence (Chreim et al. 2007; Ford et al. 2009).

We distinguish between the identity threats emanating from the actions of governmental agencies and other organizations in the healthcare ecosystem. While these two types of external entities both impact identities, there may be a difference in the nature of threats and in how their activities are perceived. Elsbach and Kramer (1996) have proposed two important dimensions of threat: 1) devaluation of the central and distinctive characteristics, and 2) a challenge to the positional status. Because governments have the power to legislate, their actions and how they are perceived is distinct from that of other players. Governmental edicts may cause fundamental changes in the healthcare industry and compel physician practices to alter the way they provide care, as evidenced by the Healthcare Reform Act of 2010⁷. These changes, which cannot be ignored, may devalue the independence and autonomy which are the central characteristics of physician identity. By contrast, the signals and actions of others, while no less potent, offer physicians with greater choice in how much importance and salience they assign to them. Both sets of organizations threaten identity by virtue of eroding the autonomy and power that physicians have over the conduct of medicine.

The digitization of health information in general and EHRs specifically have recently received a significant amount of attention in the press. In 2004, President Bush issued executive orders to promote the movement toward paperless health records, and issued a directive that by 2014, a majority of U.S. citizens would have electronic health records (Bush 2004). President Obama and the current administration have repeatedly emphasized the role of IT. Such deadlines, surveillance, and evaluations tend to diminish the feelings of autonomy and competence, and prompt a change in perceived locus of control from internal to external. In addition, there are frequent and alarming reports about

⁷ *Patient Protection and Affordable Care Act* of 2010 (PPACA)(Pub. L. 111-148, 124 thru 119), United States of America, p. 906.

medical errors that could have been prevented with better use of technology. All of this attention serves to create a sense of environmental pressure around the EHR adoption and use issue. To the extent that physician practices feel pressure to adopt EHR from external entities such as regulatory agencies, technology vendors, insurance companies or pharmaceutical companies, this influence is not under their direct control. As discussed earlier, physicians “fiercely” value their autonomy and react adversely to attempts to regulate their behavior (Ford et al. 2009). Indeed, much research has demonstrated that clinicians in the United States tend to respond negatively to mandated use policies (Ford et al. 2006; Miller and Sim 2004). Studies of physician decision-making in a healthcare setting find internal influences to be more persuasive than those that are externally imposed (Ford et al. 2006; Kohli and Kettinger 2004).

Thus, the need to conform to governmental mandate and exhortations from other stakeholders may impose pressure on physician practices to adopt EHR which threaten physician’s professional identity. Physician practices are likely to believe that these external influences may unduly and adversely impact their treatment regimen, relationship with patients and ability to deliver care (Ford et al. 2009). The underlying rationale is that influences such as pressure and evaluation can be detrimental to physicians’ identity, creativity, and problem solving behavior. Thus, when faced with externally imposed influence to adopt and use EHR, physician practices may perceive such demands as detracting from their professional identity and resist such exhortations to maintain their identity. Hence:

H7: Perceived stakeholder influence (e.g., insurance companies, pharmaceutical companies, and HIT vendors) associated with EHR will be negatively related to the adoption of EHR in a physician practice.

H8: Perceived stakeholder influence (e.g., insurance companies, pharmaceutical companies, and HIT vendors) associated with EHR will be negatively related to the extent of use of EHR in a physician practice.

H9: Perceived governmental influence associated with EHR will be negatively related to the adoption of EHR in a physician practice.

H10: Perceived governmental influence associated with EHR will be negatively related to the extent of use of EHR in a physician practice.

Research Methods

Sample and Data Collection

Physician practices across the U.S. served as the research setting for this study. To test our research model, we collected survey data from a sample of these practices. We developed the survey instrument based on a thorough literature review and interviews with physicians, administrators, and staff at a multi-facility family health clinic in a

Southern state in the U.S. Based on subsequent feedback from healthcare informatics experts and physicians actively involved in health IT implementations, we refined the preliminary survey instrument. These steps ensured face and content validity of the survey. We pilot-tested this survey with the members of the Center for Practice Innovation (CPI) at the American College of Physicians (ACP). After creating an online version of the survey using Zoomerang (www.zoomerang.com), we sent an email including a link to the survey to all the 34 member-practices of CPI. Twenty-four member practices responded to our survey for a response rate of 70.6%. Statistical tests conducted on these responses led to further refinements in the survey instrument including dropping three items with low factor loadings.

Data were collected in waves with assistance from three health-related member-organizations. In November 2006, the ACP sent its monthly electronic newsletter including a link to the online version of our survey to a randomly selected subset of member recipients. Two weeks after the link was sent, ACP members received an electronic reminder. We obtained a total of one hundred and ninety responses from this wave of data collection. In January 2007, a link to the same electronic survey was sent to a randomly selected subset of the members of the American Medical Informatics Association (AMIA). We received an additional twenty-five responses from this second wave. To protect their membership, ACP and AMIA did not disclose the email addresses or the number of recipients who received our invitation, therefore response rate could not be calculated. Finally, in April 2007, ACPnet, a practice-based research network of ACP that volunteers to examine healthcare processes, allowed us to survey its member practices. Seven hundred and thirty ACPnet member practices constituting the entire population received the electronic survey and we obtained 58 responses for a response rate of roughly 8%. Post data collection interviews with ACP and AMIA officials confirmed that response rate for surveys with no financial incentives tend to stay below 10%. Although we are only able to determine a response rate for one wave of the study due to the nature of our data collection, response rate alone is a poor proxy for study quality as it yields scant information about the presence or absence of non-response bias in the data (Rogelberg and Stanton 2007). Consequently, we conducted several tests to assess non-response bias. We conducted ANOVA tests to: 1) assess differences in responses from the three different sources; and 2) to assess any systematic differences in "early" versus "late" responses. Our tests indicated that there were no systematic differences. We also conducted two-sample T-tests to compare commonly available variables such as the size of 100 randomly

chosen U.S. physician practices and those in our sample. The results of these tests were insignificant. These results provide strong evidence that non-response bias is not a significant problem with our data (Rogelberg and Stanton 2007).

In summary, through three waves of data collection, we gathered data from 273 respondents. An examination of the data deemed observations from 67 practices to be unusable due to key missing values. This scrutiny yielded 206 total responses representing unique physician practices. Practices in the Midwest, West, South and Northeast constitute 17, 20, 28 and 35 percent of the sample respectively. Respondents at these practices had an average tenure of 11.0 years. Their job titles varied, but the vast majority of them (87%) were Practice/Physician Owner, Physician Partner, and Physician President, suggesting that they served dual clinical and managerial roles, an ownership trend that is becoming more common (Adler et al. 2008). Thus, our respondents can be considered well-informed about the state of the practice and its strategic planning efforts, and competent to answer questions at the level of the practice. Physician informants are also used commonly in studies conducted at the practice level in the medical informatics literature (e.g., Simon et al. 2007a). The unique characteristics embedded in physician practices, including highly trained physicians with much autonomy, decision making power, and disdain for external influence (Adler et al. 2008) coupled with frequent interactions with staff such as nurses and technicians who look toward the physician for guidance and direction, suggest that the physician is likely to play an important role in the adoption decision in physician practices, and this viewpoint predominates the overall attitude at the organizational level of the physician practice (Lapointe and Rivard 2007).

Operationalization of Constructs

Due to the relative newness of electronic health records, the limited research on health IT in IS and limited empirical work in social identity theory, several constructs had to be developed specifically for this study. The extensive literature on IT adoption and use served as a guide while developing survey questionnaire items and we adapted these existing measures to the context of healthcare and EHRS in particular. Most constructs were measured with multiple indicators coded on a seven-point Likert scale (see appendix for items and reliability coefficients).

The identity enhancement and threatening constructs were operationalized based on broad review of the medical informatics and IS literature, an appraisal of the popular press, and extensive observational data collection by the authors including site observations, interviews, and focus groups conducted over the course of four years.

Careprovider identity reinforcement (ENH_CIR) is a four item scale assessing the viewpoints of doctors about EHRS

relative to the treatment of patients. We drew on social network research to inform our development of the professional identity reinforcement (ENH_PIR) construct (Deephouse 1999; Teo et al. 2003). In addition we used the popular press and interviews to identify key stakeholders who are likely to exert positive influence on physician practices and these four items make up ENH_PIR.

Careprovider identity deterioration (THR_CID) is a three item scale that assesses the perception amongst clinicians that there may be negative consequences associated with EHRS adoption and use.⁸ To develop the professional identity deterioration (THR_SI) construct, we also drew upon interviews, focus groups, and popular press reports of physician attitudes toward EHRS adoption and use (Agarwal et al. 2010). In this case, we noted the most common entities to which physicians referred when asked who they believed was pushing EHRS adoption because of commercial interest. This resulted in the four item scale shown in the appendix. Finally, the two items used for government influence (THR_GI), which focus on the impact from governmental entities, were derived from prior theoretical work (Deci et al. 1999; Gagne and Deci 2005).

To control for alternative explanations of adoption and use, IT infrastructure (ITINFRA), staff IT skill (SKILL), and patient technology savvy (PT_TECH) were used as control variables and measured using three item scales. Many of these items are based on prior work in IT adoption, use, and capabilities (Armstrong and Sambamurthy 1999; Bharadwaj 2000; Broadbent et al. 1999; Chwelos, et al. 2001). We also control for several contextual and demographic factors that have been found to be influential in prior adoption and use studies including the size of the practice, cost concerns, and gender, position, and age of the respondent (Miller et al. 2005). Details about these operationalizations are in the appendix. Our controls are similar to those used by Devaraj and Kohli (2003) in their study of the link between IT usage and performance in a healthcare setting.

We employ two dependent variables: adoption of EHRS (ADOPT) and use of EHRS (USE). ADOPT is operationalized as a binary variable (Audet et al. 2004; Ford et al. 2006), focusing on initial adoption. As recommended in the literature on IT adoption and use (e.g., Jasperson et al. 2005) rather than a binary measure of use, we utilize a scale that taps into the nature and extent of use. Our qualitative analysis identified USE as a 4-item factor consisting of

⁸ Item-level correlations were extremely small for careprovider identity deterioration indicators. The highest inter-item correlation was only 0.2. Thus, we decided to model careprovider identity deterioration as a formative construct. For our structural analysis, we also modeled it as a reflective construct and our results stayed the same qualitatively.

key functions EHRS provide. The extent of use of these features was assessed using a seven-point scale anchored by "Not at all" to "Extensively," as noted in the appendix. Descriptives, and correlations for constructs are shown in Table 1.

[Please insert Table 1 about here]

Data Analysis and Results

Data were collected from a single key respondent, therefore we checked for common method bias. As suggested by Podsakoff and Organ (1986), we conducted Harman's one factor test. PCA resulted in nine components, accounting for 71.3% of the total variance. The first component accounted for only 17.5% of the variance; hence there was no general factor accounting for over 50% of the variation. The generalized tests recommended by Podsakoff et al. (2003) also failed to detect significant common method bias. These results indicate that common method bias is not a significant problem in our study. Furthermore, one of the dependent variables used in this study – the adoption of EHRS in a physician practice – is an objective rather than a perceptual variable, further limiting the possibility of adverse impacts emanating from common method bias.

The reliability of constructs, as measured by composite reliability, varied from 0.72 to 0.92, suggesting adequate reliability. We assessed convergent validity by reviewing indicator loadings. The loadings varied from 0.24 to 0.934, and were significant ($p < .001$), establishing the convergent validity of the scale (Gerbing and Anderson 1988). We assessed discriminant validity by performing the confidence interval test. For each pair of constructs, a confidence interval was calculated using the estimated correlation plus or minus twice the standard error. None of the intervals included 1.0 (see Table 2), supporting discriminant validity for all the constructs (Gerbing and Anderson 1988).

[Please insert Table 2 about here]

Given we had both a binary and continuous dependent variable in our model, we conducted two separate model implementations. We employed structural equation modeling (SEM) using EQS6.1/Windows. The fit statistics are reported in Table 3. The relative chi square index was below 3.0, which is the acceptable limit (Hu and Bentler 1999). The goodness of fit index and comparative fit index were above or equal to 0.9 which is the acceptable limit (Gefen et al. 2000). Both RMSEA and SRMR were below the recommended limit of 0.08 (Browne and Cudeck 1992).

[Please insert Table 3 about here]

Results

Although we estimated models for adoption and use separately, we report the results as they are ordered in the hypothesis development section for ease of understanding and comparison. In hypothesis H1, we posited that the *Identity Enhancing* construct, Careprovider Identity Reinforcement, would be positively related to both ADOPT and USE. As shown in Figure 1, both path coefficients from ENH_CIR are significant and positive, therefore H1 and H2 are supported ($ENH_CIR_{ADOPT} = .180, p < .001$; $ENH_CIR_{USE} = .132, p < .05$). In H3 and H4 we argued that Professional Identity Reinforcement (ENH_PIR) would be positively related to both ADOPT and USE; we discovered these relationships to be supported as well ($ENH_PIR_{ADOPT} = .105, p < .10$; $ENH_PIR_{USE} = .128, p < .10$).

The three *Identity Threatening* constructs were tested in hypotheses H5-H10. In H5 and H6, THR_CID was argued to negatively impact both ADOPT and USE, but in neither case was this supported ($THR_CID_{ADOPT} = .086, p > .1$; $THR_CID_{USE} = .012, p > .1$). The logic for these hypotheses was based on the expectation that to the degree physicians have a strong careprovider identity, any form of innovation that comes between the clinician and the patient could be viewed as intrusive and therefore unwanted. Contrary to predictions, we did not find this to be the case. On the other hand, we did find that both threats to professional identity and government influence negatively impacted ADOPT and USE ($THR_SI_{ADOPT} = -.164, p < .05$; $THR_SI_{USE} = -.147, p < .05$; and $THR_GI_{ADOPT} = -.118, p < .10$; $THR_GI_{USE} = -.159, p < .05$), therefore H7-H10 are supported.

The total variance explained in the models using ADOPT and USE as the dependent variables is 0.306 and 0.264, respectively. Of the control variables included, only ITINTRA (a positive relationship with adoption and use) and COST (a negative relationship with adoption and use) were significant. Our results are summarized in Figure 2.

[Insert Figure 2 about here]

Discussion

This study was motivated by the observation that although EHRs offer considerable promise in alleviating problems associated with the delivery of healthcare, their adoption and use has been limited. The low adoption and use rates among physician practices is particularly vexing because EHRs can facilitate access to consistent data among a wide variety of dispersed stakeholders in the healthcare value chain such as hospitals, laboratories, insurance companies, and practices. While practitioner-oriented articles have discussed and speculated about the reasons for low adoption

rates, theoretically-grounded academic research examining the adoption of EHRs in physician practices has been sparse. Drawing upon social identity and self-categorization theories, we suggested that identity enhancements and threats both are consequential in explaining the adoption and use of EHRs in practices. To our knowledge, this is among the first studies in IS to use identity theories to examine the concepts of identity enhancement and threat and apply them to understand the adoption and use of technological innovations in the healthcare industry. We thus provide a novel lens that extends extant theory development in IT adoption and use. The strong support obtained for the proposed research model underscores the applicability of the conceptual foundation and suggests that it can serve as a robust basis for researchers to examine the adoption of technological innovations in other professional organizations.

Tripsas (2009) asserts that identity is the core essence, which directs and constrains actions and reflects the totality of capabilities, resource base, procedures, and information filters. Not surprisingly then, individuals and organizations alike actively try to manage their identities by claiming, revising, or totally altering them. A threat to identity may elicit a visceral reaction. Identity changes and evolutions for physicians are particularly noteworthy because such changes can have serious consequences, including life and death implications. Identity changes can be triggered by seemingly small technological shifts (Tripsas 2009), and thus it is critical to examine the evolution of roles and identity triggered by transformational technological innovations such as EHRs that have the potential to strengthen, as well as violate, the core of physician practices.

We posited relationships between two identity enhancing and three identity threatening antecedents on EHRs adoption and use. Our analysis found support for all the proposed relationships except the impacts of careprovider identity deterioration on EHRs adoption and use. In other words, physicians who perceived that their role may be threatened by the adoption and use of an EHRs did not differ significantly from those who did not perceive the threats in their actual adoption and use. By contrast, and consistent with our hypotheses, perceptions of careprovider identity enhancement are significantly related to EHRs adoption and use. The non-significant impact of careprovider identity deterioration on EHRs adoption and use is puzzling and on the surface, counter-intuitive especially in light of extant literature that suggests that professionals take concrete actions to preserve their identity from threats.

Several plausible explanations emerge that can shed light on the insignificant result. First, the physician decision makers may believe that despite the introduction of an EHRs, patients will continue to see them as the font of

knowledge and they will continue to wield asymmetric power and influence. They may feel less threatened by impending workflow changes because, as a result of their power, they can demand that post-implementation workflows be designed and executed around their convenience. In fact, many studies have called for vendors to seek greater physician input so as to lower the resistance to EHRS (Davidson and Chiasson 2005). In most physician practices, technology decisions are made by the physician owners, in consultation with nurses and technicians, but predominantly grounded in physician work practices. There are examples from the U.S. healthcare sector of nurses performing the data entry tasks for the physicians in a variety of settings (Agarwal et al. 2010; Davidson and Heineke 2007). In other words, physicians may believe that the EHRS may threaten their identity, yet over time, they will be able to exercise their autonomy, independence and control over patient care in due course.

Furthermore, as is evident from our results, careprovider identity reinforcement is more significant in predicting EHRS adoption and use than careprovider identity deterioration. In the initial stages of the diffusion of a technological innovation, it has been suggested that the risks of and threats from the innovation tend to dominate perceptions, as the uncertainties surrounding its features and applications abound. In later stages, when organizations have adopted the innovation and used it, there is relatively more certainty about it and they find ways to overcome the risks and threats and create applications of the technology that are uniquely suited to them. Thus, while the higher impact of careprovider identity reinforcement on EHRS use in comparison to careprovider identity deterioration is plausible, its higher impact on EHRS adoption is puzzling. It is possible that for an innovation that embodies both identity affirmation and threat, the affirmation aspects are more consequential drivers of behavior.

Limitations of the Research

Prior to discussing the implications of this study, we acknowledge its limitations. We used three independent samples to gather data, and it is possible that there was some overlap in the samples. In other words, it is possible that a physician practice received our survey multiple times, however, we did not see evidence of this in our dataset. The tested relationships are at best correlational; the cross-sectional nature of data limits our ability to assess causality. Future research can undertake a longitudinal study. Such studies will be particularly useful to investigate the evolution of identities among physicians and to assess if such changes have any impact on their technology adoption and use decisions. Finally, common-method bias and non-response bias are persistent concerns in survey-based research. We

tested for common method bias and found that it was not a significant issue affecting our results. As per the suggestions of Podsakoff et al. (2003), we also: 1) allowed responses to be anonymous and assured respondents that there were no right or wrong answers, 2) attempted to have simpler and more direct questions through iterative pilot testing for ease of understanding, and 3) used different scale measures for variables (e.g., seven-point Likert scale, percentage scale and binary measurements). These steps collectively mitigate the threat of common method bias (Podsakoff et al. 2003). However, future research can circumvent the issue of common method bias by employing data collection from multiple sources, including secondary sources. Further, although our tests demonstrated a lack of substantive non-response bias, future research can take additional measures such as active and passive non-response analysis (Rogelberg and Stanton 2007). Additionally, we are able to obtain a robust sample size and sampling frames were randomized by ACP and AMIA, thereby increasing the likelihood that our sample is representative of the population.

Research Contributions and Implications

This paper makes several useful contributions to theory. We conceptualize two distinct identities of physicians – careproviders and professionals –and demonstrate that expected evolution in these identities caused by a technological innovation impacts whether that innovation is adopted and used. In demonstrating this, we advance the literature in several ways. First, we inform technology adoption and use research by applying social identity theory in the novel context of EHRS adoption and use. While the practice of medicine is known to engender strong identities, especially in physicians, other professions are likely to exhibit equally powerful identities – for example investment bankers, lawyers, and professors. To the extent that our work informs IT adoption and use in the context of potent professional identities, it is likely to provide new insights into organizational behavior when innovations are introduced. We believe that social identity theories hold significant potential for explaining several phenomena of interest to IS and health informatics researchers. Second, while the broad and deep research drawing upon and contributing to identity theories has added significantly to the knowledge base, a vast majority of it has been theoretical, and large-sample empirical research in this domain is very limited. This large-sample empirical study attempts to fill an important gap in the literature.

Third, we adapt and use measures for various components of the theoretical model that are instantiated to the specific context of the physician practice: these measures can serve as the basis for related future research. In

particular, we conceptualize and operationalize physician identity enhancing and threatening antecedents that can be applied to other contexts with relatively minor adaptations.

Several promising opportunities for future work remain. First, drawing upon sociological studies of the practice of medicine and social psychology research, we explored two significant identities that define physicians. However, as underscored in the literature, individuals can hold numerous identities simultaneously. Additions to the physician identity set can be explored through qualitative field work, especially in light of the impending changes to the healthcare system. Second, our focus was on the adoption and use of EHRS by physician practices, but the overarching goal of integration and interoperability in healthcare requires other entities to adopt this technology as well. Theoretical models and empirical studies that examine EHRS adoption by other stakeholders such as hospitals and insurance companies would provide a useful complement to this research. The evolution of organizational identity could be explored for these entities. Further, individual level studies are important to understand the micro-level dynamics of incorporating EHRS into the work practices of physicians, nurses, and other key personnel, and group level studies are important to understand outcomes related to resistance to technology implementation (Lapointe and Rivard 2007).

Finally, despite a significant amount of theoretical and empirical research on IT adoption and use, there is enduring interest among IS researchers to examine the related phenomena (Kim and Garrison 2009; Ortiz de Guinea and Markus 2009; Venkatesh et al. 2008; Wu and Lederer 2009). This interest is partly fueled by the argument that antecedents may impact adoption and use differently (Barki et al. 2007; Cooper and Zmud 1990; Karahanna et al. 1999; Son and Benbasat 2007). Our results show that identity enhancing and threatening antecedents have roughly the same effect on adoption as they do on use. Thus, despite a rather mature and developed IT adoption and use research, opportunities still exist to further advance the theory by bringing the context into consideration. Further studies could help establish the differential role that a particular set of drivers has on adoption and use behaviors across contexts, thereby isolating important boundary conditions for these theories.

Implications for Practice

Our findings have significant practical implications and suggest that care should be taken when implementing policy and designing incentives targeted toward increasing EHRS adoption and use within physician practices. There has been a perception among physicians that the introduction of an EHRS will fundamentally alter the way they practice medicine in

their clinic and provide care to patients. Indeed, considerable negative emotion is being generated among physicians about the impending digitization of healthcare. It is important for IT vendors, policy makers and professional organizations such as the American College of Physicians, American Medical Association, American Medical Informatics Association and Health Information and Management Systems Society to craft messages for physicians and reiterate that EHRS has the potential to reinforce their role as a careprovider. It is just as important for physicians to perceive that despite all the changes that an EHRS may bring, they will still remain the font of esoteric knowledge and specialized skills for patients and staff and that they will remain central to the process of health provision. Policy makers need to carefully manage the negative symbolism of EHRS before a vicious cycle, characterized by resistance and innovation implementation failure takes hold. Professional networks – physicians practices, hospitals and other physicians – with whom physicians associate play a central role in the adoption and use of an EHRS. Identity reinforcing messages from these practices, hospitals and physicians, who have successfully adopted and implemented an EHRS can be particularly impactful on the decision of the medical practice to adopt and implement.

We also find that physician identity is threatened by edicts from various governmental agencies and other organizations impact EHRS adoption and use negatively. We conjecture that such attempts are counterproductive at best, and create downright hostility at worst. While the current carrot and stick approach being used in the HITECH legislation will doubtless spur adoption, there is a legitimate concern that meaningful use will not occur unless physicians truly believe in the ability of these innovations to affirm and reinforce what they view as a source of their self-worth.

Finally, two control variables, which are not the focus of our study, also provide useful directions to physician practices and policy makers. From the perspective of the physician practice, our findings underscore the importance of the IT infrastructure and the existing state of digitization within the organization in facilitating the adoption of new technologies. Often, infrastructure investments are challenging to justify because they do not appear to contribute directly to business outcomes. However, in the absence of a strong foundation, the practice may forgo the “option value” of the infrastructure (Fichman et al. 2005) and find itself unable to exploit critical developments in health IT. As the nearly \$20 billion allocated toward health IT in the American Recovery and Reinvestment Act is being released, it may be worthwhile to remember that IT infrastructure in physician practices has a direct and significant impact on EHRS adoption, and hence a significant proportion of the allocation should be spent on practices that are lagging in IT

infrastructure creation. Additionally, our results show that Staff IT skill has an insignificant impact on EHRS adoption and use. This may be good news for practices where the staff is not technology savvy, because the prior expertise of the staff may not be a significant factor and may not be directly applicable in the new context of EHRS. The rationale is that while the focus of most prior technologies is predominantly internal and the scope limited to a few activities, EHRs focus on internal processes as well as integration with external stakeholders. Consequently, the skills and experience of staff familiar with other technologies may not enable them to be sufficiently agile and responsive and may not be a differentiator in EHR adoption in practices. Thus, while designing training programs for physicians and staff, physician practices and policy makers, relatively more content should be EHRS-specific and not general IT training as the latter may not have a significant impact.

Conclusion

This paper examined EHRS adoption and use among physician practices in the U.S. which, for the most part, has not been studied using perspectives that are strongly rooted in theory. We utilized a novel theoretical lens: that of physician social identity. As policy makers and stakeholders in the healthcare industry endeavor to enhance access to patient information as one mechanism for reducing medical errors and improving quality of care, it will become important for researchers to study the adoption and use of EHRS and a variety of other technologies among physician practices. To that end, this study has contributed to theory and practice by applying the lens of social identity theory and self-categorization theory to understand EHR adoption and use, a context in which it has not been used before. Our research model and results present a fine-grained perspective of the role of perceived physician identity reinforcement and threat on EHRS adoption and use, and extend the empirical research employing social identity theories. Our results indicate which identity enhancements and threats are likely to be consequential in adoption and use, providing levers that managers and policy makers can manipulate. These results contribute to a nascent but emerging stream of literature that investigates various phenomena associated with healthcare IT adoption, use and impacts. We hope that this study stimulates further research to enrich our understanding of health IT and the institutional contexts within which it operates.

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Figure 1. Model of EHRs Adoption and Use in a Physician Practice

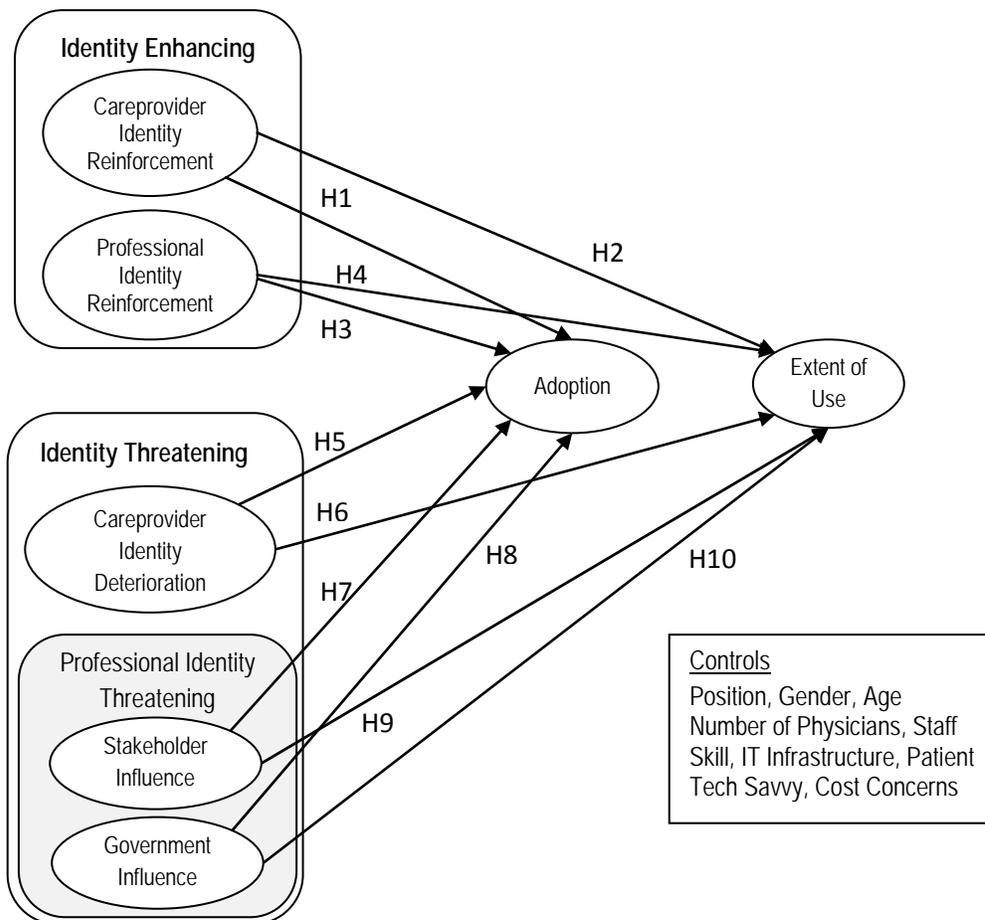
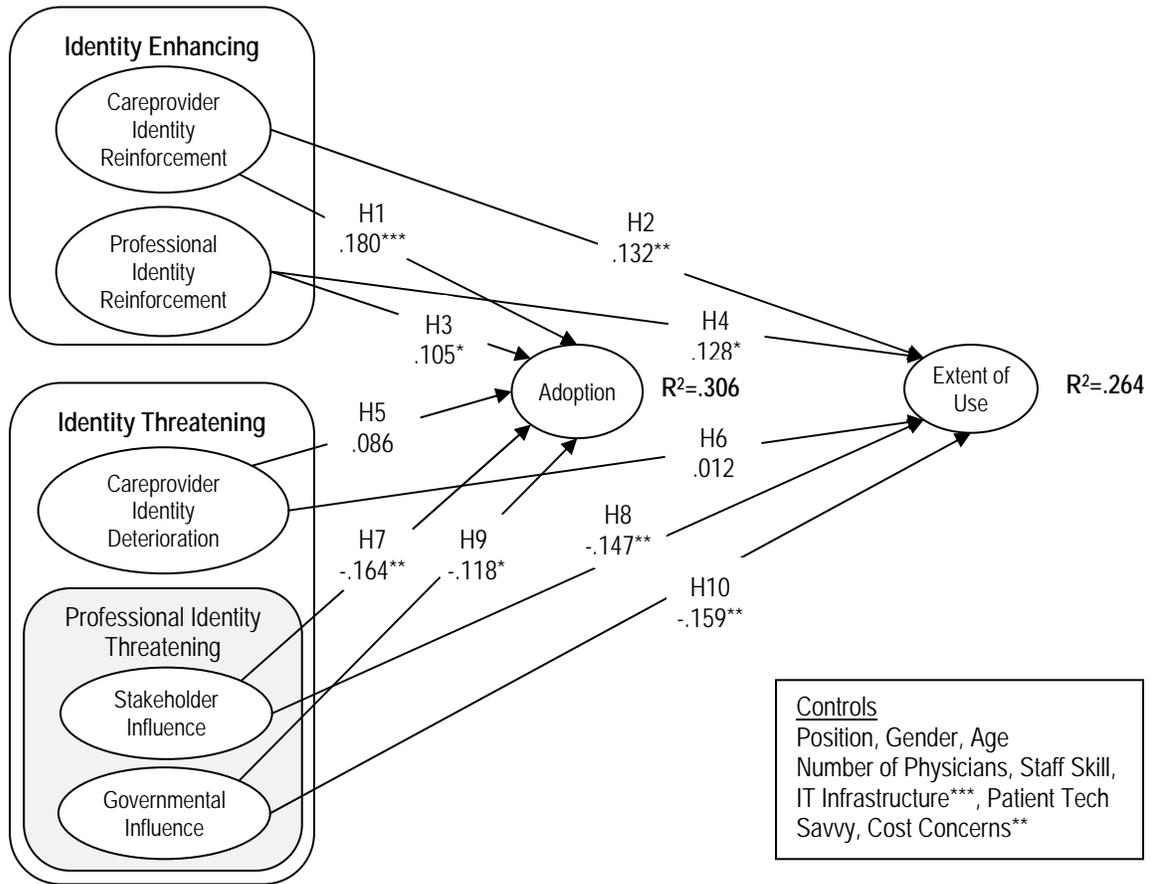


Figure 2. Research Model and Resulting Path Coefficients



* p<.10
 ** p<.05
 ***p<.001

Table 1. Correlation Matrix at the Construct Level

| No. Construct | Mean | StdDev | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|-------|--------|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|-----------------|----------|
| 1 Caregiver Identity Reinforcement (ENH_CIR) | 5.192 | 1.479 | 1.000 | | | | | | | | | | | | | |
| 2 Professional Identity Reinforcement (ENH_PIR) | 4.329 | 1.328 | 0.102 p-val 0.146 | 1.000 | | | | | | | | | | | | |
| 3 Caregiver Identity Deterioration (THR_CID) | 3.751 | 0.985 | 0.185 0.008 | 0.179 0.010 | 1.000 | | | | | | | | | | | |
| 4 Stakeholder Influence (THR_SI) | 3.970 | 1.285 | 0.002 0.975 | 0.518 0.000 | 0.160 0.022 | 1.000 | | | | | | | | | | |
| 5 Government Influence (THR_GI) | 4.720 | 1.605 | -0.190 0.006 | 0.448 0.000 | 0.010 0.887 | 0.500 0.000 | 1.000 | | | | | | | | | |
| 6 Position within Practice (POSITION) | 0.886 | 0.319 | -0.054 0.444 | -0.073 0.307 | -0.023 0.749 | -0.060 0.401 | 0.031 0.661 | 1.000 | | | | | | | | |
| 7 Gender of Respondent (GENDER) | 0.791 | 0.407 | 0.071 0.311 | 0.107 0.128 | 0.097 0.167 | 0.133 0.058 | 0.052 0.460 | 0.084 0.234 | 1.000 | | | | | | | |
| 8 Age of Respondent (AGE) | 2.913 | 0.851 | -0.044 0.532 | -0.093 0.185 | 0.034 0.627 | -0.039 0.583 | -0.032 0.651 | -0.019 0.785 | 0.046 0.515 | 1.000 | | | | | | |
| 9 Number of Physicians in Practice (SIZE) | 3.054 | 2.155 | 0.091 0.216 | 0.024 0.744 | 0.147 0.045 | 0.096 0.194 | 0.086 0.244 | 0.003 0.963 | -0.180 0.014 | 0.003 0.966 | 1.000 | | | | | |
| 10 Staff IT Skill (SKILL) | 5.296 | 1.237 | 0.222 0.001 | 0.001 0.989 | -0.005 0.938 | -0.058 0.410 | -0.054 0.446 | 0.049 0.493 | 0.072 0.306 | 0.037 0.597 | -0.057 0.444 | 1.000 | | | | |
| 11 IT Infrastructure (ITINFRA) | 5.407 | 1.376 | 0.261 0.000 | 0.070 0.321 | 0.098 0.160 | -0.019 0.787 | -0.125 0.073 | 0.090 0.206 | 0.126 0.071 | 0.004 0.949 | 0.019 0.793 | 0.607 0.000 | 1.000 | | | |
| 12 Patient Tech-Savvy (PT_TECH) | 4.217 | 1.411 | 0.067 0.338 | 0.000 0.996 | 0.099 0.160 | 0.094 0.181 | -0.002 0.974 | 0.076 0.286 | 0.064 0.361 | 0.024 0.730 | 0.063 0.393 | 0.349 0.000 | 0.283 0.000 | 1.000 | | |
| 13 Concerns about Cost of EHRS (COST) | 6.300 | 1.274 | -0.194 0.005 | 0.211 0.002 | -0.008 0.907 | 0.223 0.001 | 0.303 0.000 | 0.003 0.966 | 0.066 0.347 | -0.065 0.358 | -0.019 0.793 | -0.207 0.003 | -0.253 0.000 | 0.011 0.878 | 1.000 | |
| 14 Adoption of EHRS (ADOPT) | 0.515 | 0.501 | 0.339 0.000 | 0.034 0.633 | 0.103 0.141 | -0.162 0.020 | -0.230 0.001 | -0.010 0.885 | 0.075 0.286 | -0.066 0.348 | 0.040 0.585 | 0.304 0.000 | 0.456 0.000 | 0.059 0.399 | -0.323 0.000 | 1.000 |
| 15 Use of EHRS (USE) | 2.185 | 2.505 | 0.282 0.000 | 0.027 0.700 | 0.071 0.310 | -0.158 0.023 | -0.240 0.001 | 0.005 0.941 | 0.043 0.541 | -0.030 0.673 | 0.053 0.474 | 0.272 0.000 | 0.431 0.000 | 0.086 0.220 | -0.340 0.000 | na na |

Table 2. Confidence Interval Tests to Establish Discriminant Validity*

| | EHN_PIR | THR_CID | THR_SI | THR_GI | SKILL | ITINFRA | PT_TECH |
|---|------------------------------|------------------------------|------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Careprovider Identity Reinforcement (ENH_CIR) | .102 (.078) [-.054, .258] | .185 (.103) [-.021, .391] | .002 (.081) [-.160, .164] | -.190 (.064) [-.318, -.062] | .222 (.082) [.058, .386] | .261 (.073) [.115, .407] | .067 (.074) [-.081, .215] |
| Professional Identity Reinforcement (ENH_PIR) | | .179 (.093) [-.007, .365] | .518 (.062) [.394, .642] | .448 (.052) [.344, .552] | -.001 (.075) [-.149, .151] | .070 (.068) [-.066, .206] | .000 (.065) [-.130, .130] |
| Caregiver Identity Deterioration (THR_CID) | | | .160 (.053) [.054, .266] | .010 (.043) [-.076, .096] | -.005 (.056) [-.117, .107] | .098 (.050) [-.002, .198] | .099 (.043) [.001, .197] |
| Stakeholder Influence (THR_SI) | | | | .500 (.049) [.402, .598] | -.058 (.073) [-.204, .088] | -.019 (.066) [-.151, .113] | .094 (.063) [-.032, .220] |
| Government Influence (THR_GI) | | | | | -.054 (.091) [-.236, .128] | -.125 (.081) [-.287, .037] | -.002 (.079) [-.160, .156] |
| Staff IT Skill (SKILL) | | | | | | .607 (.050) [.507, .707] | .349 (.058) [.233, .465] |
| IT Infrastructure (ITINFRA) | | | | | | | .283 (.066) [.151, .415] |

Correlation coefficient (Standard Error)
[95% Confidence Interval]

*To support discriminant validity, Confidence Intervals should not include 1.0.

Table 3. Fit Indices and Associated Statistics

| Fit Indices | Dependent Variables | |
|-----------------|---------------------|------|
| | ADOPT | USE |
| CFI | .90 | .90 |
| GFI | .96 | .96 |
| SRMR | .06 | .06 |
| RMSEA | .07 | .07 |
| Chi-Square / df | 2.15 | 2.14 |

Appendix

Identity Enhancing Constructs

Careprovider Identity Reinforcement (ENH_CIR) – The following questions refer to your perceptions about Electronic Health Record Systems (EHRS). Please indicate the extent of your agreement with the following statements on seven-point scale ranging from “strongly disagree” to “strongly agree” (Composite reliability = 0.86)

1. EHRS increase physicians' control over patient care
2. EHRS complement the knowledge of physicians
3. EHRS enable physicians to diagnose patient problems more efficiently
4. EHRS enhance the quality of care provided to patients

Professional Identity Reinforcement (ENH_PIR) - To what extent would your practice's decision to adopt and implement an EHRS be driven by: (Composite reliability = 0.76)

1. Competition (e.g. other practices)
2. Hospitals in your area
3. Medical professionals you interact with
4. Hospitals at which physicians in your practice have admitting privileges

Identity Threatening Constructs

Careprovider Identity Deterioration (THR_CID) – The following questions refer to your perceptions about Electronic Health Record Systems (EHRS). Please indicate the extent of your agreement with the following statements on seven-point scale ranging from “strongly disagree” to “strongly agree” (Formative Construct⁹)

1. EHRS strain the physician-patient relationship
2. EHRS lower the need for specialized skills for patient care
3. EHRS significantly alter the way physicians perform their job

Stakeholder Influence (THR_SI) – The following questions refer to the potential influence of external entities on your practice's decision to adopt an EHRS. Indicate extent of agreement on seven-point scale ranging from “strongly disagree” to “strongly agree” (Composite reliability = 0.72)

1. Regulatory bodies (e.g., Joint Commission of Accreditation of Healthcare Organizations(JCAHO))
2. Healthcare information technology (HIT) vendors
3. Pharmaceutical companies
4. Insurance companies

Governmental Influence (THR_GI) – (Composite reliability = 0.74)

1. To what extent would your practice's decision to adopt and implement an EHRS be driven by the federal government
2. The following question refers to the potential influence of external entities on your practice's decision to adopt an EHRS - How significant is the influence from county, state and federal governments

⁹ While the items appear to reflect the underlying construct (Careprovider Identity Deterioration), the reliability coefficient is relatively low. We therefore tested the model employing the construct as both formative and reflective. Results were largely unchanged.

Dependent Variable

Adoption (ADOPT) – Has your practice adopted an EHR? (Yes/No)

Use (USE) - Please indicate the extent to which your practice uses the following features/components of an EHRS. Seven-point scale ranging from “Not at all” to “Extensively” (Composite reliability = 0.92)

1. ePrescribing
2. Progress Notes and Documentation
3. Electronic communication to others (e.g. pharmacies, other practices) from within the EHRS
4. Receipt and integration of structured lab data from external sources (e.g., reference or hospital lab)

Control Variables

POSITION – What is your position in this practice (i.e. physician, office manager, other)

GENDER – Gender of respondent

AGE – Age of respondent (six categories in 10-year ranges)

SIZE – Number of physicians in practice

COST – Please indicate the extent to which the concerns are relevant for your practice - Cost of EHRS implementation.

Staff IT Skill (SKILL) – The following questions refer to the computing skills of the clinical and administrative staff in your practice. Please indicate the extent of your agreement with the following statements on seven-point scales ranging from “strongly disagree” to “strongly agree” (Composite reliability = 0.76)

1. Our staff has extensive experience with using IT (e.g., the Internet, email, word processing, etc.)
2. A significant portion of our staff is open to using new technologies.
3. The introduction of new IT at our practice is usually actively supported by a key person.

IT Infrastructure (ITINFRA) – The following questions refer to the availability of adequate information technology (IT) infrastructure in your practice. Please indicate extent of agreement on seven-point scale ranging from “strongly disagree” to “strongly agree” (Composite reliability = 0.83)

1. We have an adequate number of PCs in our practice to accomplish our tasks
2. We have a reliable computer network in our practice
3. We frequently use electronic technologies (e.g., Internet browsers, email, etc.) to accomplish our tasks

Patient Tech Savvy (PT_TECH) – The following questions refer to your patient population. Please indicate extent of agreement on seven-point scale ranging from “strongly disagree” to “strongly agree” (Composite reliability = 0.89)

1. Our patients have easy access to the Internet
2. Our patients are comfortable using IT (e.g., email, Internet)
3. Our patients are open to using new technologies to manage their healthcare experience