Digitizing Healthcare: The Ability and Motivation of Physician Practices and Their Adoption of Electronic Health Record Systems

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DIGITIZING HEALTHCARE: THE ABILITY AND MOTIVATION OF PHYSICIAN PRACTICES AND THEIR ADOPTION OF ELECTRONIC HEALTH RECORD SYSTEMS

Social and Behavioral Aspects of Information Systems

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Abstract

Electronic health record systems (EHRS) are emerging as one of the most discussed and arguably controversial information technologies of the new millennium. Surprisingly, extant research has yet to examine the barriers and facilitators to widespread use of this technology. In this study, we draw upon an ability-motivation framework and self-determination theory to investigate the adoption of EHRS at the level of the physician practice. Physician practices possess a number of unique characteristics as compared with other organizational contexts, including a strong “clan” culture and a desire for autonomy. We use data from 218 physician practices from a nationwide survey to test our theoretical model. Results suggest that while the ability components exhibit direct effects on adoption, the motivational components and their relationships to adoption are more complex. Although a practice may see the value in adopting an EHRS, this intrinsic motivator can be undermined by extrinsic pressures from external sources including regulatory agencies, pharmaceutical companies as well as peer practices.

Keywords: Electronic Health Record System, EHR, Ability, Motivation, SDT, Adoption
Introduction

Physician practices, defined as one or more physicians practicing together at a single geographic site, occupy a significant position in the US healthcare system. These practices often maintain an independent existence from hospitals and are responsible for the vast majority of care delivery in the US (Schoen, et al., 2006). Although there is agreement that the availability of better information about patients through the adoption of information technology (IT) and the integration of such information with that of other stakeholders in the health care delivery process can have a significant impact on the quality of healthcare delivered to patients in the US, surprisingly, the IT adoption decision of physician practices has not been examined in detail in the literature (Rippen, et al., 2006).

A key enabling technology that facilitates the creation and sharing of better information about patients both inside a physician practice and among different stakeholders in the US healthcare delivery system is electronic health record systems (EHRS). An electronic health record entails the computerization of health record content and associated processes (2006). EHRS are the software platforms that physician offices and hospitals use to create, store, update, and maintain electronic health records for patients, and represent the primary mechanism through which interoperability of health information can take place. While anecdotal evidence and the limited research that is available suggests that the benefits of EHRS adoption outweigh the costs (Gans, et al., 2005; Miller, et al., 2005; Wang, et al., 2003), and that practices can streamline their health delivery processes significantly, the rate of diffusion of EHRS in physician practices has been disturbingly low (Audet, et al., 2004; Burt and Sisk, 2005).

In this study, we investigate the drivers of EHRS adoption in physician practices. We argue that characteristics of the technology, the health system as a whole, and unique aspects related to connections between clinicians and other stakeholders create a dynamic that necessitates a reframing of traditional adoption models (Aluja, 2000; Attewell, 1992; Bharadwaj, 2000; Chwelos, et al., 2001). For instance, nearly all practices – even sole-physician practices – have hospital-physician affiliations and/or admitting rights with one or more hospitals and clinics (Madison, 2004). In the past, physicians who were not a part of a hospital-physician affiliation would have felt little pressure to conform to specific practices of their admitting hospitals (Madison, 2004). Now, with the increased diffusion of EHRS into hospitals, independent practices may realize the benefits of interfacing with the hospitals. In addition, hospitals as well as other stakeholders, such as regulatory bodies and insurance companies, may impart pressure on the practices to provide electronic interfaces. Thus, while doctors may appear to be ‘free-agents,’ decisions about their practice related to technologies such as EHRS will have implications in the health care value web (La Puma, 1996). A second unique aspect of this setting is the strong “clan” culture among physicians who have been reported to be highly influenced by the actions of their peers and relatively immune to other external forms of pressure.

These countervailing forces suggest the possibility of different motivations for physician practices to adopt an EHRS. For instance, a practice that is highly integrated with other practices, area hospitals, medical labs and pharmacies, and insurance companies is likely to have different levels of interoperability needs and the motivation to adopt an EHRS than another practice with low levels of integration. Such varying levels of motivation pertaining to a new IT application have been shown to influence its adoption in organizations (Chwelos, et al., 2001; Grewal, et al., 2001). Additionally, an organization’s ability to use information technology has been found to be significant for the adoption and assimilation of new and innovative technologies (Armstrong and Sambamurthy, 1999; Zahra and George, 2002).

To inform the topic of EHRS adoption at the practice level, we draw upon the motivation-ability framework and suggest that the adoption decision is contingent upon the practice’s ability (i.e. infrastructure and human capital) and motivation (i.e. external pressure and internal beliefs). Researchers have used this framework across multiple levels to explain a variety of phenomena. At the individual level, the framework has been used to predict information processing from advertisements (MacInnis and Jaworski, 1989), while at the firm-level it has been applied to understand the impact of strategic actions on firm performance (Boulding and Staelin, 1995), and IT use in firms (Grewal, et al., 2001). The motivation-ability framework offers an appropriate theoretical lens for examining the adoption of EHRS because both motivation and ability are crucial for adoption and a lack of either may result in adoption barriers. We integrate self-determination theory (Gagne and Deci 2005) and aspects of institutional theory (Dimaggio and Powell 1983) to develop arguments related to the differential effects of various forms of motivation, thereby extending the existing literature on the motivation-ability framework. The ability component of the framework is developed based on prior literature in IS, that has used resource-based and knowledge-based perspectives to link the stock of capabilities to IT adoption. We test our research model using practice-level survey data obtained from key informants representing 218 physician practices spread across the United States.
In what follows, we first present a brief overview of the theoretical foundations for the study and develop the research hypotheses. Next we present the research methodology, describing how the variables are operationalized, and the data collection process. This is followed by the results of the logit analysis used to test the research hypotheses. The paper concludes with a discussion of the findings and their implications for research and practice.

Theoretical Background and Research Hypotheses

Our research model, depicted in Figure 1, is based on the motivation ability framework which has been used in diverse fields including consumer behavior (Aaker and Williams, 1998), organizational behavior (O'Reilly III and Chatman, 1994), marketing strategy (Clark, et al., 2005), and electronic commerce (Grewal, et al., 2001) to understand ad effectiveness, career success, satisfaction with assessment systems and participation in eMarkets. The core assertion of this framework is that attitudes, behaviors, decisions, and actions of a focal entity are dependent on the dual engines of capability and drive. Consistent with this, we theorize that a practice’s decision to adopt EHRS depends on both its ability and motivation. Our conceptual model is further informed by four primary streams of research. First, to elaborate on the ability component of our model, we draw insight from information systems research on technology adoption and value. Second, we rely on the organizational behavior and psychology literature to broaden our theorizing of the interaction of intrinsic and extrinsic motivation and their influences on adoption behavior. Third, institutional theory provides insight into the forces that influence organizations to take actions that can cause them to become similar to one another. Finally, we incorporate findings involving the physician professional culture and physician attitudes from the literature on medical informatics.

As decision making in physician practices is influenced by both organizational and individual physician factors, the motivation and ability framework, which has been successfully applied at both levels, provides a strong foundation for our study. Literature in the organizational sciences suggests that motives, structures, and processes influence firm behaviors (Baum and Oliver, 1992; Schulz, 1998). Therefore, we expect salient motivating, infrastructure, and readiness factors to influence a practice’s decision making behavior with regard to EHRS adoption. Likewise, at the individual level, motivation and ability are core components in the widely accepted and well established consumer information processing theory (Clark, et al., 2005). We expect physicians, like consumers, will process information and make decisions if they are motivated and have the ability to do so. We expand on the motivation component by applying self-determination theory (SDT) which describes a continuum of autonomy that exists with extrinsic motivation being largely controlled externally at one end and intrinsic motivation largely autonomous at the other (Gagne and Deci 2005). Institutional theory provides further insight into categorizations of extrinsic forms of motivation (Dimaggio and Powell 1983). We anticipate an interactive effect of these motivational influences on the EHRS adoption decision in physician practices. Our logic and the relevant literature are described in more detail below.

Ability

The adoption and implementation of IT places considerable and complex demands on an organization’s stock of knowledge, skills and abilities (Attewell, 1992; Chwelos, et al., 2001; Rai, et al., 2006). Organizations differ in the specific routines and processes employed and their abilities possessed to exploit new and innovative IT applications. The ability of organizations to combine, coordinate and employ IT effectively depends upon their extant infrastructure and skills, and the use of related technologies in the past (Armstrong and Sambamurthy, 1999; Broadbent, et al., 1999; Chwelos, et al., 2001). A higher stock of skills, the availability of a robust infrastructure, and prior experience with related technologies facilitate higher technical knowledge in organizations and help them develop capabilities and understanding that are critical for the effective implementation of IT. Such organizations benefit from ease of use and learning and incur lower costs in adopting a new technology. To the extent an organization values IT as a critical part of meeting business objectives, it will invest in building capabilities that can be leveraged for future technology adoptions.

Physician practices are likely to possess different levels of ability based on their unique capabilities and resources that can be brought to bear in the event they choose to implement an EHRS. This baseline level of “stock” is considered during the adoption decision making process. To conceptualize this stock, we draw upon the work of Bharadwaj (2000) where she argues that firms’ unique IT resources enable them to achieve superior performance. Although our focus is not on performance, arguably the adoption and use of the technology is a key mediating link from the possession of resources to performance (Devaraj and Kohli, 2003). Indeed, empirical support exists for the mediating influence of system usage on the relationship between technology competence and firm value (Zhu and
Kraemer, 2005). Following Bharadwaj (2000) we focus on three core IT resources: IT infrastructure, IT related intangibles and physician/staff IT readiness. Collectively these resources reflect the practice’s ability to overcome the technical and organizational barriers associated with complex IT and successfully adopt the new IT.

We define the IT infrastructure as the computers, networks, shared services such as email (Armstrong and Sambamurthy 1999) as well as the standard applications utilized by the organization to integrate and streamline operations (Weill et al 2002). IT infrastructure can be likened to complementary assets - preexisting assets and knowledge that help the firm derive value from new technology - which a number of studies have found to aid technology adoption (Bharadwaj, 2000; Rogers, 1995; Tripsas, 1997). The rationale is that firms with such assets benefit from ease of learning and use, and incur lower costs in adopting the technology. The availability of a robust IT infrastructure provides a platform that practices can leverage to perform controlled experimentation with new technologies which has been shown to enhance innovation (Thomke, 2003), and to integrate the new technology such that it can be used effectively. In a case study of fourteen small practices, Miller et al. (2005) found that the existing state of hardware and support structure in the practices influenced the costs related to the implementation of EHRS which executives are likely to factor into adoption decisions. Practices with better support structures enjoyed lower implementation costs and were more likely to adopt EHRS than those practices with inferior structures. Thus we predict:

**H1:** Superior IT infrastructure is associated with EHRS adoption

A second ability salient in the context of IT-based innovation is superior IT-enabled intangibles. This construct refers to the extent to which an organization is using IT in value-adding ways (Bharadwaj, 2000). For physician practices, if a practice is already demonstrating an ability to leverage IT to achieve intangible patient benefits such
as customizing service or to create synergy by exchanging data electronically with authorized parties, it is
demonstrating a high level of IT capability which makes the practice more likely to adopt new technology that will
further provide such benefits. Such practices are more likely to see the value in adopting a technology that can
enable them to continue along a path to achieving IT related intangible benefits.

H2: Superior IT-related intangibles is associated with EHRS adoption

The third component of a practice’s ability addresses physician/staff IT readiness. A significant body of research in
IT has argued that human capital is a key aspect of successfully leveraging IT within an organization (Mata, et al.,
1995). Consistent with Chwelos et al.’s (2001) concept of readiness, our focus is on the IT-related skills of
physicians and staff. “Readiness” signifies that the presence of skills and experience creates the capability to be
responsive and agile when faced with a new opportunity (Clark et al. 1997). In the EHRS context, it has been
suggested that a key component of clinician technological readiness may be familiarity with commonly used
software due to the template driven nature of EHRS (Amatayakul, 2005). The more the clinical and support staffs
have experience with and use technology, the more receptive they are likely to be to new technology. In a manner
similar to infrastructure, the human resource component can serve as an enabler to innovation and adoption.

H3: Superior physician/staff IT readiness is associated with EHRS adoption

Motivation

Merely having the capability to perform is insufficient; action is strongly contingent upon the drive of the focal
entity. Thus, in addition to ability, motivation is likely to influence the adoption decision. While a practice may
acknowledge the inherent value in adopting EHRS, it also faces pressure from external sources such as regulatory
agencies, insurance companies and pharmaceutical companies as well as other practices and its own patients. Many
of these external pressures may be considered coercive, mimetic or normative isomorphism as described by
institutional theory (Dimaggio and Powell 1983) with direct influences on organizational adoption behavior (e.g.
Teo et al 2003). However, although our model incorporates these direct effects, we focus on more nuanced
relationships between various forms of motivation. We argue that, although our study is at the practice level, the
decisions in a physician practice are strongly influenced by key decision makers and their perceptions. Thus, we use
the literature on organization behavior grounded in psychology for insight into the factors that motivate individuals,
and incorporate allowances for these influences on the organization level adoption decision. In what follows, we
describe the difference between extrinsic and intrinsic motivation and the levels of autonomy and control present in
each and develop the logic underlying our remaining moderation hypotheses.

The literature on motivation and its two sources, intrinsic and extrinsic, is voluminous and although a complete
review is beyond the scope of this work, we discuss the key elements that are relevant to our theorizing. Intrinsic
motivation involves an individual acting out of an internal belief that the activity is interesting, good, satisfying or
right. In contrast, extrinsic motivation involves action propelled by a desire to achieve or gain some external reward
or benefit or to avoid a consequence. Originally, scholars believed that that intrinsic and extrinsic rewards were
additive and that the more intrinsic and extrinsic rewards an individual received, the more motivated he became
(Porter and Lawler, 1968). However, several studies showed that some forms of extrinsic motivation actually
attenuate and undermine intrinsic motivation (Deci, 1971), by diminishing an individual’s feeling of autonomy
(Deci, et al., 1999). Self-determination theory (SDT) explains the undermining effect observed for some forms of
extrinsic motivation by distinguishing between autonomous and controlled motivation (Gagne and Deci, 2005).
Underlying SDT is a continuum of control-to-autonomy. At one end of the spectrum, behavior is controlled by a
sense of pressure while at the other end behavior is controlled autonomously through individual choice and a sense
of volition.

Past work on SDT has focused on employee work outcomes. We extend SDT to the technology adoption setting by
applying it at the level of practices where the influence of one or very few physicians plays an important role in the
adoption decision. Although we are unaware of any previous application of SDT in the realm of information
systems, subtle differences exist between user attitudes and behavior toward technology acceptance in mandatory
versus voluntary settings (Brown, et al., 2002; Venkatesh and Davis, 2000) which suggests variations possibly due
to intrinsic versus extrinsic motivations. Explanations posited for these differences include resistance due to power
and political issues (Brown, et al., 2002). These prior findings in information systems suggest that it is useful to
apply SDT to the context of EHRS adoption.
Prior to discussing the specific motivating factors in the EHRS adoption equation, a brief understanding of the physician professional culture is necessary. The medical profession places a high value on the autonomy of individual clinicians (West and Barron, 1999). However, the practice of medicine involves a high degree of uncertainty and ambiguity which leads physicians to rely extensively on one another, local peer influences and their social networks (Greer, 1987; Mano-Negrin and Mittman, 2001; West and Barron, 1999). Indeed, the profession is often regarded as a clan (Kohli and Kettinger, 2004). An individual’s attitudes and behaviors depend more on peer influence the more uncertainty surrounds the behavior or decision in question (Bandura, 1986). In the medical field, this 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., 2006). Thus, based on the unique nature of physician professional culture, self-determination theory, and the information systems adoption literature, we propose several hypotheses regarding how practices weigh the various factor involved in the decision to adopt EHRS.

**Intrinsic Motivation**

Intrinsic motivation is inherently autonomous and, thus, lies at the end of the SDT continuum at which behavior is characterized by individual choice and volition. This form of motivation tends to yield positive outcomes in terms of job satisfaction, effective performance and feelings of competence (Porter and Lawler, 1968; Ryan, 1982). In the context of our study, if a physician believes an EHRS will enable physicians in the practice to diagnose more efficiently, increase the quality of care provided to patients and complement physician knowledge, she is likely to be intrinsically motivated to adopt EHRS. These beliefs in the intrinsic value of EHRS are similar to the perceived usefulness construct which is an important predictor in individual technology acceptance models (Venkatesh et al 2003). As these beliefs are not thrust upon her by an outside entity, she has a high level of autonomy over them, which is consistent with the professional culture to which she is accustomed. Intrinsic motivation is often associated with not only feelings of autonomy but also feelings of competence which further improve the likelihood of EHRS adoption as self-efficacy has been known to play a role in individual technology acceptance (Venkatesh et al 2003). Similar outcomes have been observed at the organizational level as well. For example, perceived system benefits positively influence adoption of electronic data interchange, indicating that the more an organization believes a technology will provide advantages, either directly or indirectly, the more likely it is to adopt the technology (Chwelos et al. 2001). Thus, in general, the relationship between intrinsic perceived value and EHRS adoption is likely to be positive. However, since perceived system benefits has been found to significantly influence organization level adoption (Chwelos et al. 2001) and perceived usefulness is commonly accepted as a significant predictor of adoption at the individual level (Venkatesh et al 2003), we do not focus on the main effect of perceived value in this study. Rather, we focus on the expected interactions between intrinsic and extrinsic motivation as predicted by SDT and described below.

**Extrinsic Motivation**

According to SDT, while intrinsic motivation is inherently autonomous, extrinsic motivation can vary in the degree to which it is autonomous versus controlled. At the extreme end, there remain some activities that must be externally regulated with highly controlled motivation either due to their mundane or unappealing nature. There are other activities that individuals become motivated to perform not necessarily intrinsically but because they have internalized the value of that activity to some degree (Gagne and Deci, 2005). It is possible to consider the institutional isomorphic mechanisms along this continuum with coercive isomorphism at the externally regulated, highly controlled end and normative isomorphism at the more internalized, less controlled end of the spectrum. Coercive isomorphism consists of both formal and informal pressures exerted by organizations on other organizations in a dependent position (Dimaggio and Powell 1983). Examples of change brought about under coercion which illustrates the lack of control and autonomy characteristic of externally regulated motivation on the SDT continuum include government mandates and parent-subsidiary reporting requirements. In contrast, normative isomorphism often occurs based on socialization or formal education (Dimaggio and Powell 1983) which is more subtle and in which one participates more freely. Behavior motivated in this manner would lie on the extrinsic SDT continuum but would likely be more internalized than a behavior coercively imposed.

Dimaggio and Powell (1983) describe mimetic isomorphism as the process of firms modeling their own actions based on others’ actions. The underlying basis for this influence is that the actions of the more legitimate and successful firms help alleviate the uncertainty associated with the specific organizational action for the focal firm.
Mimetic isomorphism likely falls somewhere in between the two extrinsic motivation continuum endpoints because it is more autonomous than coercive pressures yet less internalized than a normative influence. Mimetic influence is likely to be less potent in the context of the adoption of EHRS by physician practices for at least two reasons. One, the technology itself is fairly well understood, at least in terms of its features and functions, therefore, the “uncertainty” associated with the technology is low. Second, given the relative newness of the technology, it may be difficult for a practice to identify a “model” practice to emulate. Moreover, mimetic forces are likely to be stronger for larger firms as a broader customer base and labor force may further encourage imitation (Dimaggio and Powell 1983).

In the case of physician practices, we focus on the two extreme endpoints of autonomy/control on the SDT extrinsic motivation spectrum as embodied in coercive and normative pressures. First, we address the coercive influence of external entities such as regulatory bodies, vendors, insurance companies on the practice’s adoption decision. Second, we consider the normative influence of peer practices with which the focal practice interacts in the course of providing care to its own patients. In addition, as other studies have focused on the direct effects of normative and coercive pressures on adoption (e.g. Teo et al 2003), we do not posit associated hypotheses here although direct effects are controlled for in our analyses. Rather, we focus on the more nuanced interactive relationships between the motivating factors.

The digitization of health information has recently received a significant amount of attention in the trade press. The president of the US has issued executive orders to promote the move toward paperless health records. There are frequent and alarming reports in the trade press about 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 EHRS issue. To the extent that physician practices feel pressure to adopt EHRS from external entities such as regulatory agencies or technology vendors or hospitals, this pressure is not under their direct control. Institutional theory labels this type of pressure as “coercive” in that it emanates from external fiat and is exerted on an organization by other organizations upon which it depends. In their study of the predictors of intentions to adopt interorganizational linkages, Teo et al. (2003) find that coercive pressure is a significant determinant of the organization’s adoption intention.

Perhaps most relevant to understanding the potential influence of extrinsic coercive pressure as a motivator of EHRS adoption are the studies focusing on pressure and its influence on physician attitudes and decision making. U.S. providers tend to respond negatively to mandated use policies (Ford, et al., 2006; Miller and Sim, 2004). Based on these findings, external EHRS stakeholders are taking “a more positive approach to accelerating EHR adoption rates” such as reward-based systems (Ford, et al., 2006). Consistent with SDT, studies of physician decision-making in a healthcare setting find internal influences to be more effective than those that are externally imposed (Ford, et al., 2006; Kohli and Kettinger, 2004).

Although this extrinsic coercive pressure may be a motivating factor, it is a form of controlled motivation which has been shown in prior studies to undermine the positive influence of intrinsic motivation (Deci, 1971; Deci and Ryan, 1985). It has been suggested that the dampening effect of extrinsic motivation is especially true for complex tasks such as the adoption and implementation of EHRS (Gagne and Deci, 2005). Thus, we hypothesize:

H4: Extrinsic coercive pressure (controlled motivation) negatively moderates the relationship between intrinsic perceived EHRS value (autonomous motivation) and EHRS adoption.

A second form of extrinsic motivation for practices is normative in nature and addresses the question of how many other practices with which the focal practice routinely interacts have already adopted EHRS. For example, in the provision of care for a particular patient, a pulmonary specialty practice may share information with oncology, radiology and cardiology practices. If these three other practices have already adopted EHRS and the focal practice has not, it may feel pressure to adopt in order to conform and keep pace with its peer practices. Furthermore, through its connections to other practices, the focal practice can learn about EHRS and its associated costs and benefits. In a study of interorganizational linkages adoption, normative pressure exhibited the strongest influence on organization-level technology adoption (Teo, et al., 2003).

Although this type of motivation is extrinsic, the perceived value of achieving the same level of technology as the peer practices has been internalized to a degree. When an individual has self-selected into a particular group with which they identify and an activity is congruent with that group’s goals, the activity becomes internalized even if the activity itself may not be of intrinsic interest. In SDT, this is called identified extrinsic motivation. When an individual has internalized the value of an activity in this way, it has become less controlled and more autonomous (i.e. more self-determined). The more self-determined (i.e. less controlled) the motivation, the less likely it is to
undermine intrinsic motivation (Gagne and Deci, 2005). A physician who perceives more practices he interacts with to have adopted EHRS will be more likely to adopt EHRS within his own practice because it is congruent with his own personal goals and identity. Therefore, this form of motivation shares a degree of autonomy similar to that of intrinsic motivation. As such, it may serve to enhance the positive influence of intrinsic motivation (Koestner and Losier, 2002). High intrinsic motivation coupled with the internalization of extrinsic motivation (i.e. a circumstance where extrinsic motivation does not have a negative, offsetting influence on intrinsic motivation), leads to effective performance, positive attitudes, organization citizenship behaviors, increased creativity, cognitive flexibility, persistence, and behavioral change (Gagne and Deci, 2005). We anticipate that similar motivational circumstances will lead to increased EHRS adoption. Therefore, we expect a moderating effect of the identified extrinsic normative pressure on the relationship between intrinsic perceived EHRS value and EHRS adoption.

H5: Extrinsic normative pressure (autonomous extrinsic motivation) positively moderates the relationship between intrinsic perceived EHRS value (autonomous motivation) and EHRS adoption.

As described previously, controlled forms of extrinsic motivation can undermine intrinsic forms of motivation. We anticipate that controlled motivation will also undermine the positive influence of identified extrinsic motivation as it is a form of autonomous motivation with characteristics similar to intrinsic motivation. In much the same way that extrinsic coercive pressure (controlled motivation) moderates the relationship between intrinsic perceived value and adoption, we hypothesize the following relationship:

H6: Extrinsic coercive pressure (controlled motivation) negatively moderates the relationship between extrinsic normative pressure (autonomous extrinsic motivation) and EHRS adoption.

**Research Methods**

**Study Design**

Physician practices based in the U.S. served as the research setting for this study. To test our research model, we collected survey data from physician practices spread across the U.S. We developed the survey instrument based on a thorough literature search and interviews with physicians, administrators and staff at a family health clinic based in Mississippi. Based on input from healthcare IT experts, healthcare informatics professionals and physicians actively involved in the implementation of healthcare IT, we refined the preliminary survey instrument. These steps ensured face and content validity of the survey items. We pilot-tested the modified survey with the members of the Center for Practice Innovation (CPI) at the American College of Physicians (ACP). CPI is a new effort by ACP to address some of the concerns of physician practices regarding clinical quality, patient satisfaction, economics of practice and the adoption of healthcare information technology. After creating an online version of the survey using Zoomerang (www.zoomerang.com), each of the 34 members of CPI received an email including a link to the electronic survey. The members represent physician practices across the US. Twenty-four members 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 as indicated in the appendix.

We conducted our study at the practice level of analysis and physicians served as key informants. Physicians at such practices are extremely knowledgeable on the state of the practice and participate in strategic planning efforts. Thus, physicians are well suited to provide responses to the key constructs and control variables of interest.

The data collection process consisted of three rounds. In November 2006, the ACP sent an electronic newsletter including a link to the online version of our survey to an undisclosed number of recipients who are members of ACP. Two weeks after the first mailing, the recipients received an electronic reminder. We obtained one hundred ninety responses from this first round. In January 2007, in order to broaden the base of respondents, the American Medical Informatics Association (AMIA) sent its members a link to the same electronic survey. We received an additional twenty-five responses during this second round. Finally, in April 2007, ACPnet, a practice-based research network that volunteers to examine health care processes, provided us with permission to survey its members. A large proportion of ACPnet members work for a physician practice. Seven hundred and thirty ACPnet members received the electronic survey. We obtained 58 responses. In summary, through three rounds of data collection, we gathered data from 273 respondents. An examination of the data deemed 53 responses unusable due to missing values. An additional 2 responses appeared to be from the same practice; therefore we retained the

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1 ACP and AMIA did not disclose the number of recipients who receive the newsletter electronically.
response submitted by the most senior physician as indicated by the position reported by the informant. This scrutiny yielded 218 responses representing different physician practices for subsequent analyses.

**Operationalization of Variables**

Due to the relative newness of electronic healthcare records, and the lack of research on healthcare IT in the IS domain, many constructs had to be developed specifically for this research. The extensive literature on IT adoption and use served as a guide while developing survey questionnaire items. We adapted the existing measures to the context of EHRS. Most constructs were measured with multiple indicators coded on a seven-point Likert scale. IT infrastructure and IT-Enabled Intangibles were measured using four items each. 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; Karimi, et al., 2001). Physician/staff IT readiness was measured using two items which were adapted from the IT adoption (Chwelos, et al., 2001) and the medical informatics literature (Amatayakul, 2005). Our operationalizations of IT infrastructure, IT related intangibles, and Physician/staff IT readiness are intended to represent practice-wide properties. We use the key informant method and ask the informant to generalize about the actual state of the IT infrastructure as a whole. The items are worded in collective terms such as “we have” and “we use” and “our staff” to focus the informant’s attention at the practice level when providing responses. As operationalized, these constructs are relatively objective, descriptive, and observable characteristics of the practice and are, thus, suitable to be elicited from a key informant (Klein and Kozlowski 2000).

The items for intrinsic perceived value are also adapted from IT adoption (e.g., Chwelos et al.2001, Iacovou et al. 1995, Premkumar et al.1994) and medical informatics literature (Miller and Sim, 2004). These five items reflect the value that physician practices can expect from the adoption of an EHRS. Six items measure extrinsic coercive pressure by focusing on the influence of external stakeholders on whom a physician practice is dependent. Measures for extrinsic coercive pressure were derived from both theoretical and empirical work (e.g., Abrahamson and Rosenkopf, 1993; DiMaggio and Powell, 1983; Srinivasan, et al., 2002; Teo, et al., 2003). Normative pressure was implemented as a single item measuring the percentage of other practices that a specific physician practice interacts with that have adopted an EHRS. Our rationale is that this percentage accurately reflects the extent to which members of a practice’s social network believe that the adoption of an EHRS is appropriate (Deephouse, 1999; Teo, et al., 2003).

The adoption of EHRS serves as our dependent variable which is binary (Audet, et al., 2004; Ford, et al., 2006). We control for several factors that have been found to be influential in prior adoption studies including the size of the organization and the existence of a champion for the new technology (Miller, et al., 2005). The size of a physician practice was operationalized as the number of physicians in the practice and the presence of a champion was measured as a binary variable. Additionally, we include controls for several factors that may influence adoption yet are not the focus of this study. We control for the number of hospitals to which the physician has admitting privileges and the number of insurance companies the practice honors. It is possible that the greater these numbers, the higher the complexity and resources required to address administrative tasks at the practice, which may influence adoption yet are not the focus of this study. Both of these factors may also serve as indicators of robustness or stability of the practice which may influence adoption. Likewise, the number of professional societies to which the physician belongs may influence her decision making with regard to adoption; however, this is not the focus of our study. 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. Measures for all constructs are shown in the Appendix and descriptive statistics and the correlation between constructs is reported in Table 2.

**Instrument Validation**

Exploratory factor analysis validated our scales. We removed items that loaded on multiple constructs from the study. The reliability of constructs, as measured by Cronbach’s alpha, varied from 0.65 to 0.84. These values suggest that the instrument has adequate reliability (Nunnally 1978). The psychometric properties of the scale were evaluated within the confirmatory approach using AMOS 4.0. The measurement model estimated for this purpose provided a good fit to the data (Relative chi square ($\chi^2/df$) = 1.695, Tucker-Lewis index = 0.983, Comparative fit index = 0.987, Normed fit index = 0.969, RMSEA = 0.057). The relative chi square index was 1.76, below 3.0, which is within the acceptable limit. The goodness of fit indices, Tucker-Lewis index, Comparative fit index and Normed fit index were well above 0.9 which is the acceptable limit. At 0.057, RMSEA was also below the recommended 0.08 limit. Based on all these values, we concluded that the measurement model provides a good fit.
to the data. We assessed convergent validity by reviewing indicator loadings. The loadings varied from 0.437 to 0.939 and were significant (p < .001), establishing the convergent validity of the scale (Anderson and Gerbing 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, supporting discriminant validity for all the constructs (Anderson and Gerbing 1988).

Since data were collected from a single key respondent, we also checked for common method bias. As suggested by Podsakoff and Organ (1986), we conducted Harman’s one factor test. PCA resulted in five components. Principal components accounted for 61.37% of the total variance and the first component accounted for only 23.99% of the variance; hence there was no general factor accounting for over 50% of the variation. These results indicate that common method bias is not a significant problem in our study.

**Data Analysis and Results**

Consistent with the national distribution of physician practice sizes (Burt et al. 2005), 69 percent of the practices in our sample are small (7 or fewer physicians), 20 percent are medium (between 8 and 49 physicians), and the remainder are larger than 50 physicians. The adoption rate across our sample is 41 percent. While our sample is comprised of primarily small practices, our sample adoption rate is consistent with adoption rates reported for medium sized practices in 2005 at which time the data also indicated a significant non-linear upward trend (Burt et al., 2005, Blumenthal et al. 2006). Table 1 presents descriptive statistics for all research variables. We estimated the research model using binary logistic regression with interaction terms. In this approach the model is estimated initially using only main effects, and interaction effects are added to the base model subsequently. The full model estimated can be expressed as:

$$Y_{\text{Adopted}} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_4 X_6 + \beta_8 X_5 X_6 + \beta_9 X_4 X_5 + \varepsilon_1$$

Where $Y_{\text{Adopted}}$ represents the binary dependent variable reflecting whether or not a practice has adopted EHRS. The first three variables represent the ability elements of our conceptual model, $X_1$ is the perceived availability of IT infrastructure at the practice, $X_2$ is the IT enabled intangibles reflecting the manner in which the practice currently uses IT, and $X_3$ represents the physician/staff IT readiness. $X_4$, $X_5$, and $X_6$ represent the motivation elements including the main effects of extrinsic coercive pressure, extrinsic normative pressure and intrinsic perceived value respectively. The remaining elements in the equation represent the interaction effects hypothesized between the motivational elements. The $\beta$ variables represent coefficients to be estimated in our analysis.

<table>
<thead>
<tr>
<th>Constructs and Variables</th>
<th>Reliability (# of items)</th>
<th>Mean</th>
<th>SD</th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
<th>V6</th>
<th>V7</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Infrastructure (V1)</td>
<td>.82 (4)</td>
<td>5.36</td>
<td>1.39</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT-Related Intangibles (V2)</td>
<td>.73 (4)</td>
<td>3.22</td>
<td>1.49</td>
<td>.48</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician/staff IT Readiness (V3)</td>
<td>.65 (2)</td>
<td>2.79</td>
<td>1.69</td>
<td>.31</td>
<td>.47</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extrinsic Coercive Pressure (V4)</td>
<td>.79 (6)</td>
<td>4.00</td>
<td>1.23</td>
<td>.03</td>
<td>.12</td>
<td>.17</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extrinsic Normative Pressure (V5)</td>
<td>n/a</td>
<td>.27</td>
<td>.24</td>
<td>.10</td>
<td>.29</td>
<td>.25</td>
<td>.14</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic Perceived Value (V6)</td>
<td>.84 (5)</td>
<td>5.28</td>
<td>1.17</td>
<td>.21</td>
<td>.31</td>
<td>.22</td>
<td>.07</td>
<td>.05</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>EHRS Adoption (V7)</td>
<td>n/a</td>
<td>.51</td>
<td>.50</td>
<td>.46</td>
<td>.49</td>
<td>.22</td>
<td>.09</td>
<td>.27</td>
<td>.19</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Given the binary dependent variable, we used a logit model as the analytical technique. We first introduced control variables into the specification, followed by main effects, followed by interactions. The Hosmer and Lemeshow test indicated that all the three models have adequate fit because chi-square goodness of fit is not significant. Although
there is no equivalent of R-squared in the binary logit analysis, several indices have been developed to measure the effect size. Two such measures are reported. Results are summarized in Table 2. As predicted in H1 and H2, IT infrastructure and IT related intangibles are both positively associated with EHRS adoption. They both have high beta values and are highly significant (p=.000). Our other hypothesized ability component, physician/staff readiness is not significant. Therefore, H3 is not supported. Past IT adoption studies focused on IT skills, both managerial and technical, and have found positive relationships between IT skills and technology adoption. However, there is typically no significant IT department or dedicated resources for IT support in physician practices. Our measure here was more a physician/staff readiness measure which has been discussed in the medical informatics literature as important in EHRS adoption (Amatayakul, 2005). It may be that physician practices have similar levels of IT readiness; therefore, this variable is not an effective discriminator between practices that adopt EHRS and those that do not.

### Table 2. Logit Analysis Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1: Control variables</th>
<th>Model 2: Main effects</th>
<th>Model 3: Full model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parameter estimates</td>
<td>p-value</td>
<td>Parameter estimates</td>
</tr>
<tr>
<td>Constant</td>
<td>-.985</td>
<td>.113</td>
<td>-2.038</td>
</tr>
<tr>
<td>Practice Size</td>
<td>.000</td>
<td>.947</td>
<td>.000</td>
</tr>
<tr>
<td>Number of Insurance Plans</td>
<td>-.005</td>
<td>.418</td>
<td>-.002</td>
</tr>
<tr>
<td>Number of Professional Societies</td>
<td>-.016</td>
<td>.879</td>
<td>.069</td>
</tr>
<tr>
<td>Number of Hospitals with Admitting Privileges</td>
<td>.100</td>
<td>.437</td>
<td>.015</td>
</tr>
<tr>
<td>Champion</td>
<td>1.029</td>
<td>.065</td>
<td>1.082</td>
</tr>
<tr>
<td>IT Infrastructure</td>
<td>1.355</td>
<td>.000</td>
<td>1.652</td>
</tr>
<tr>
<td>IT-Related Intangibles</td>
<td>1.195</td>
<td>.000</td>
<td>1.465</td>
</tr>
<tr>
<td>Physician/staff IT Readiness</td>
<td>.210</td>
<td>.329</td>
<td>.270</td>
</tr>
<tr>
<td>Extrinsic Coercive Pressure</td>
<td>-.661</td>
<td>.009</td>
<td>-.323</td>
</tr>
<tr>
<td>Extrinsic Normative Pressure</td>
<td>3.035</td>
<td>.008</td>
<td>4.685</td>
</tr>
<tr>
<td>Intrinsic Perceived Value</td>
<td>.108</td>
<td>.639</td>
<td>.745</td>
</tr>
<tr>
<td>Extrinsic Coercive Pressure*Intrinsic Perceived Value</td>
<td>-.761</td>
<td>.023</td>
<td></td>
</tr>
<tr>
<td>Extrinsic Normative Pressure*Intrinsic Perceived Value</td>
<td>-2.484</td>
<td>.047</td>
<td></td>
</tr>
<tr>
<td>Extrinsic Coercive Pressure*Extrinsic Normative Pressure</td>
<td>-2.906</td>
<td>.049</td>
<td></td>
</tr>
</tbody>
</table>

Hosmer and Lemeshow test
Chi-square=12.797, df=8, sig=.119
Chi-square=11.124, df=8, sig=.195
Chi-square=4.388, df=8, sig=.821

Cox and Snell’s R-square
.035
.395
.460

Nagelkerke’s R-square
.047
.526
.613

Regarding H4, we hypothesized that extrinsic coercive pressure would moderate the positive relationship between intrinsic perceived EHRS value and EHRS adoption. As shown in Table 2, the interaction term is significant and the beta value is negative. This serves to attenuate the marginally significant and positive relationship of value on adoption. Thus, H4 is supported.

In H5 we argued that extrinsic normative pressure would positively moderate the effect of intrinsic motivation on EHRS adoption. The logic for this expectation was based on the expectation that to the degree physicians have a
strong professional culture and identity, external pressure from similar others would be positively reinforcing. Contrary to predictions, we find the same negative interaction as with coercive pressure, suggesting that norms within the professional community may not have been internalized to the extent expected. Physicians still perceive the pressure from other physicians as “undesirable” and value their autonomy more.

Finally, we hypothesized that extrinsic coercive pressure would moderate the positive relationship between extrinsic normative pressure and EHRS adoption. As shown in Table 2, the interaction term is significant and the beta value is negative. This attenuates the significant and positive relationship of extrinsic normative pressure on adoption. Thus, H6 is supported.

It is interesting to note that none of the control variables are significant. Given the empirical results related to their significance in prior work, their non-significance in the context of the adoption of EHRS further underscores the distinct and complex nature of this adoption decision.

<table>
<thead>
<tr>
<th>Hypothesis Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: IT Infrastructure → Adoption</td>
<td>Supported</td>
</tr>
<tr>
<td>H2: IT-Related Intangibles → Adoption</td>
<td>Supported</td>
</tr>
<tr>
<td>H3: Physician/Staff IT Readiness → Adoption</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H4: Extrinsic Coercive Pressure*Intrinsic Value → Adoption</td>
<td>Supported</td>
</tr>
<tr>
<td>H5: Extrinsic Normative Pressure*Intrinsic Value → Adoption</td>
<td>Not supported</td>
</tr>
<tr>
<td>H6: Extrinsic Coercive Pressure*Extrinsic Normative Pressure → Adoption</td>
<td>Supported</td>
</tr>
</tbody>
</table>

**Discussion**

We find that EHRS adoption in physician practices is based on a combination of ability and motivation. While the ability components of IT infrastructure and sophistication have a straightforward positive relationship to EHRS adoption, the motivational components and their relationships to adoption are more complex. Although a physician practice may see the value in adopting an EHRS, the positive influence of this intrinsically motivating factor can be undermined by external pressure exerted by outside sources such as regulatory agencies and pharmaceutical companies. In addition, a physician practice can be positively influenced by other practices it interacts with that have already adopted EHRS. Although these other practices are external, they are peer influences which culturally play a strong role in the physician profession. However, if this positive influence is present in combination with the external pressure exerted by outside forces, the positive influence is again undermined.

**Limitations**

Prior to discussing the contributions and implications of our findings, we acknowledge the limitations of the study. We were unable to conduct tests for non-response bias. However, we do have a robust sample size and an overall distribution of practices that is consistent with the population of practices in the US. Our conceptualization of ability was based on Bharadwaj (2000), however, we operationalized the three resources in a different way. This was driven by the nature of the study – we were able to collect primary data in contrast to the prior work that relied on secondary data. We used a single item measure for external normative pressure for which we were unable to compute a reliability statistic. However, as acknowledged by other researchers, a single item measure is appropriate where there is no ambiguity about the type of response that is being sought (Wanous and Hudy, 2001).

**Contributions and Implications**

This paper makes several key contributions to theory and practice. For theory our study makes three main contributions that can fruitfully be extended and applied in future work. First, we inform technology adoption
research by applying the motivation/ability framework in the novel context of EHRS adoption. We integrate self-determination theory (SDT) and aspects of institutional theory (Dimaggio and Powell 1983) into the motivation-ability framework and offer strong support for this extension. The prior literature examining both motivation and ability aspects related to an organization’s IT adoption decision is sparse in information systems (IS), and our research fills an important gap in the literature by the simultaneous examination of the two aspects. Our effort allows us to examine the EHRS adoption decision in a more nuanced manner than if we had considered the motivation or the ability aspects in isolation.

Second, we theorize and test the moderating impacts of the various aspects comprising the motivation construct on the adoption decision which have previously been examined largely as main effects. Existing research implicitly assumes that different motivation aspects have additive impacts on an organization’s decision to adopt IT, however, we find that the nature of such relationships is more subtle than what has been proposed in the literature. Although the need for extending SDT in the IS domain (e.g., Malhotra, 2004) and for theorizing and testing interactions between different aspects of motivation (e.g., Gagne and Deci, 2005) has been suggested, it has been rarely attempted. The interplay between intrinsic and extrinsic motivation is likely to be present in many other adoption contexts and warrants further research. Third, we adapt and use measures for various components of the theoretical model that are instantiated to the specific context of the physician practices: these measures can serve as the basis for related future research.

Our findings also have practical implications and suggest that care should be taken when implementing policy and designing incentives targeted toward increasing EHRS adoption within small and medium-sized physician practices. External pressure can have deleterious effects and must be applied and targeted judiciously. Policy makers need to reconsider how much and what type of external mandates and fiats they wish to impose on the adoption decision. As other researchers have argued, (Agarwal and Karahanna, 2003; Karahanna, 1999) although mandates may yield technology adoption because users do not have any volition, in the absence of intrinsic motivation, they are likely to be less committed to the technology and fail to utilize it to its fullest potential. 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 such a foundation, the practice may forgo the “option value” of the infrastructure (Fichman et al. 2005.) and find itself unable to exploit critical developments in healthcare information technologies.

Conclusion

Our study was motivated by the observation that although EHRS offer considerable promise in alleviating problems associated with the delivery of healthcare, their adoption has been limited. The low adoption rate is a particularly vexing issue in the case of physician practices in light of the fact that the goal of interoperability in healthcare cannot be achieved unless these key constituents adopt the technology. Interoperability is important because it is the mechanism through which not only treating clinicians in various locations can have access to the same data, but it can also potentially provide links to many, if not all stakeholders (e.g., hospitals, laboratories, insurance companies, employers, pharmaceutical and medical device firms, etc.) in the health care value chain. Our study applies theories from multiple levels of analysis to the physician practice adoption decision due to its unique features as a decision making entity and the environment in which the EHRS adoption decision must be made. Although a physician practice is an organization, the key decision-makers in the practice are typically physicians trained in a profession that highly values autonomy. In addition, it is often said that the practice of medicine is not a science but an art which implies a level of uncertainty inherent in its practice. As a result, physicians rely heavily on their peers and social network for advice and information. Thus, a combination of organizational and individual concepts are relevant to our study. Finally, EHRS adoption has garnered attention from policy makers, the media, consumer activists, employers, payors, and citizens all weighing in with their own proposed benefits, concerns and timeframes. This attention creates an environment that is highly charged. These factors describing the physician practice, medical profession and the EHRS environment make technology adoption in this setting unique and an important opportunity for further study. The concepts applied here are likely to be relevant in other small business settings in which individuals have strong decision-making power within the organization and are subject to conflicting motivational influences.

Several promising opportunities for future work remain. Our focus was on the adoption of EHRS by physician practices, but the overarching goal of interoperability in healthcare requires many 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. Further, adoption is only the first stage in an on-going process of technology appropriation within an organizational setting. Studying post-adoption outcomes such as extended and emergent use would offer useful insights into how physician practices can derive maximal value from EHRS. Finally, individual level studies are important to understand the micro-level dynamics of incorporating EHRS into the work practices of physicians, nurses, administrators, and other key personnel within a healthcare setting.

References


Greer, A.L. "The two cultures of biomedicine: can there be a consensus?" *Journal of the American Medical Association* (258:19), 1987, pp. 2739-2740.


Appendix

**Measures**

**IT Infrastructure** – indicate extent of agreement on seven-point scale ranging from “strongly disagree” to “strongly agree”

- We have an adequate number of PCs in our practice to accomplish our tasks
- We have a reliable computer network in our practice
- We routinely use software (e.g. spreadsheets, work processing tools, etc.) to achieve efficiency in our daily operations
- We frequently use electronic technologies (e.g. Internet browsers, email, etc.) to accomplish our tasks
- We use video/tele conferencing to interact with people remotely [Item dropped]
IT Related Intangibles – indicate extent of agreement on seven-point scales ranging from “strongly disagree” to “strongly agree”
- We share patient information electronically with those who are authorized to access it
- We use IT to share documents and knowledge internally and externally (e.g., by using email attachments [Item dropped])
- We use IT to build deeper relationships with patients (e.g. through email)
- We use IT to customize service for individual patients (e.g. through automatic reminders)
- We participate in an electronic health information exchange through which patient data can be shared with other participating facilities

Physician/Staff IT Readiness – indicate extent of agreement on seven-point scales ranging from “strongly disagree” to “strongly agree”
- Our staff has extensive experience using IT (e.g., the Internet, email, word processing, etc.) [Item dropped]
- Our staff uses handheld devices (e.g., Personal Digital Assistants (PDAs) to record information
- Our staff has prior experience using healthcare IT (e.g., Computerized Practitioner Order Entry (CPOE), Clinical Decision Support Systems (CDSS))

Extrinsic Coercive Pressure – indicate extent of potential influence of the following on practice’s decision to adopt on seven-point scales ranging from “not significant at all” to “very significant”
- Regulatory bodies (e.g. Joint Commission of Accreditation of Healthcare Organizations (JCAHO))
- Healthcare information technology (HIT) vendors
- Pharmaceutical companies
- Insurance companies
- Competition (e.g. other practices)
- Hospitals in your area

Intrinsic Perceived Value – indicate extent of agreement on seven-point scale ranging from “strongly disagree” to “strongly agree”
- EHRS increase physicians’ control over patient care
- EHRS complement the knowledge of physicians
- EHRS enable physicians to diagnose patient problems more efficiently
- EHRS enhance the quality of care provided to patients
- EHRS strain the physician-patient relationship (reverse-coded)

Extrinsic Normative Pressure – Approximately what percentage of other practices that you interact with has adopted an EHRS (e.g. 10%, 85%)?

Adoption – Has your practice adopted an EHRS?