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Understanding User Resistance to Information Technology in Healthcare: 
The Nature and Role of Perceived Threats

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Abstract: Information technology (IT) in healthcare is here to stay. The United States government has made efforts in the past ten years to harness the power of information technologies in healthcare to improve legibility, lessen medical errors, keep costs low, and boost the overall quality of health care. However, IT user resistance in healthcare is continually cited as a major barrier to achieving desired outcomes. Understanding the nature and manifestation of resistance is clearly a key to successfully managing this industry-wide change, fostering adoption, and realizing positive outcomes. Earlier research has established perceived threats as a significant antecedent of user resistance; but its nature and role has remained vastly unexplored. This study draws from the psychological reactance theory and justice literature, to explain both the nature and relationship of perceived threats and user resistance to IT within the healthcare setting. The theoretical and practical implications of the findings shall be discussed.

INTRODUCTION

By the end of 2015, the United States healthcare sector is expected to have completely transitioned from a paper health record system to an electronic health record system. It is believed that this transition will benefit the nation in improving legibility, lessening medical errors, keeping costs low, and boosting the overall quality of care (Blumenthal & Tavener, 2010). But as some researchers have noted, the effective use of, and beneficial outcomes from information systems are not automatically guaranteed (Lee, Ghapanchi, Talaei-Khoei, & Ray, 2015). As early reports demonstrate, this IT-enabled change is meeting with resistance, not altogether uncommon. Physicians, nurses and other practitioners are resisting this change (Buntin, Burke, Hoaglin & Blumenthal, 2011). Nevertheless, success depends on the effective and efficient use of these systems in getting work done.

Researchers in information technology have recognized user resistance to IT as a salient concept in information systems (IS) implementation literature (Keen, 1981; Lapointe & Rivard, 2005; Lapointe & Rivard, 2012). Investigators have generally taken a two-pronged view of the concept of resistance. While some have viewed it as negative (i.e. as a hindrance to IS implementation), others have considered it to be positive—a feedback mechanism—by which the users’ voice can be heard by system implementers or developers. Notwithstanding, no matter how user resistance has been conceptualized, it is clearly seen as an important reason for the failure of new systems (Kim & Kankanahalli, 2009).

Lapointe and Rivard (2005) conceptualized a generic model to demonstrate the evolution of user resistance to IT. This framework posited that user resistance to an information system results from perceived threats which in turn evolve from certain initial conditions. Lapointe and Rivard (2005) defined initial conditions as a complex interplay of political and interpersonal/group factors resulting from people’s interaction with an IS. Simply put, resistance is caused by perceived threats which results from certain initial conditions. Though user resistance to IT and its critical antecedent, perceived threats, have been clearly acknowledged in literature (Lapointe & Rivard, 2012), only few studies have attempted empirical testing of these two constructs. With the exception of Bhattacherjee and Hikmet (2007), and Kim and Kankanahalli (2009); there is almost a total absence of empirically investigated frameworks. Most of the investigative studies in user resistance to technology reveal an overwhelming dominance of case studies, a clear lack of quantitative validation, and a scarcity of theory-based explanation of user resistance and its antecedents.

This study explores the nature of both user resistance to IT and perceived threats—its well-known antecedent. User resistance to IT is defined as covert or overt behaviors that oppose change towards the use of- or avoidance of an information system manifested as reactance, distrust, scrutiny or inertia (see Knowles & Linn, 2004). Perceived threats, on the other hand, is defined as negative assessments that the users make of the IT implementation. This study
seeks to answer two questions: (1.) what is the nature of user resistance to IT? And, (2.) What is the nature and role of perceived threats in user resistance to IT? To address these two questions, the theory of psychological reactance and key insights from justice literature are explored. The proposed model is then empirically tested within a health care setting, using partial least squares (PLS) structural equation modeling.

This current study contributes to both theory and practice. On the theory end, it enriches our understanding of user resistance through the use of a popular theory of resistance that has heretofore, not been leveraged in information systems literature or in health IT. Hirschheim and Newman (1988) had noted that resistance is a complex phenomenon which defies simple explanation and analysis; thereby requiring well accepted theories or paradigms encompassing the full range of variables associated with an individual user’s resistance to IT (Martinko, Henry & Zmud, 1996). This current research, therefore, fills this gap by providing a new lens through which user resistance to IT and perceived threats can be examined. On the practice side, change managers and project leaders would find the results helpful in detecting and mitigating resistance. Additionally, health IT designers can use the results as a feedback tool that to pay attention to end-user voice.

In the following section, key literature relating to the conceptual background on user resistance to IT is reviewed. Next, the theory and model development is set forth. Third, the research method and analysis are presented. Fourth, the results, discussion are made. Lastly, the conclusions and implications of the research are presented.

CONCEPTUAL BACKGROUND

The concept of user resistance has been a well-echoed theme in IS literature. Many researchers have sought to explain why and how resistance happen. As a consequence, many models have been set forth to explain the phenomenon (Hirschheim & Newman 1988; Joshi 1991; Kim & Kankanhalli, 2009; Lapointe & Rivard, 2005). Earlier research in electronic medical records focused more on the technical than the managerial aspects of implementation; but, user resistance has continually been cited as one of setbacks to IT implementation in the healthcare industry (Lee, Ghapanchi, Talaei-Khoei, & Ray, 2015; Lin, Lin, & Roan, 2012). Since this research builds on the Lapointe and Rivard (2005) model, the literature here summarized based on the conceptual framework proposed by Lapointe and Rivard. The theory of psychological reactance is also discussed, as a theoretical lens through which to examine user resistance. According to this model, five key concepts are salient in user resistance, namely: the object of resistance, the subjects of resistance, initial conditions, perceived threats, and manifestations of resistance.

Object of Resistance

According to Lapointe and Rivard (2005), the object of resistance refers to the target of resistance behaviors. These targets include: the system itself (Wagner and Newell, 2007); system’s effects e.g. in the creation of power imbalances (Markus 1983); and the implementers (Lapointe & Rivard, 2005).

Subjects of Resistance

Defined to be the actor or actors undertaking resistance behaviors, subjects might include: individuals, a group of individuals, or even an organization (see Marakas & Hornik, 1996; Martinko et al., 1996; Joshi, 1991; Lapointe & Rivard, 2005).

Initial conditions

This refers to the characteristics of the environment surrounding the system which interacts with the object of resistance to influence the users of the system make certain determinations. While Hirschheim and Newman (1988) allude to the socio-political environment of the organization that can influence the way the users can look at the situation regarding the new technology, Martinko et al. (1996) posit that the users’ attitudes towards the system are influenced by prior success or failure with a similar system.
Perceived threats

These consist of negative assessments of that system users make of an IT implementation. Marakas and Hornik (1996) propose that covert resistance like sabotage, could be a result of the behavior individuals pose in response to the introduction of a new IT system workplace. Joshi (1991) gives an alternative view based on the equity theory. He explains that individuals may assess the new IT system from the standpoint of fairness or the lack thereof, due to its introduction into the work environment. In either case, perceived threats affect and influence individuals’ response to a new system in the workplace.

Manifestations of resistance

Defined as a set of behaviors carried out by users to display some discontent with the new IT system being implemented. While some manifestations may be more covert like apathy or sabotage (see Keen, 1981; Moreno 1999); some may be more overt and destructive like open rebellion or formation of coalitions (Kim & Kankanhalli, 2009; Lapointe & Rivard, 2005; Ferneley & Sobreperez, 2006).

Many theories have been proposed to explain user resistance to technology over the years. Leading theories include: the interaction theory, the equity implementation theory, the attributional model of reactions to information technology, the status quo bias theory, the IT conflict-resistance theory, and the cynicism theory (see Martinko et al., 1986; Markus, 1983; Joshi, 1991; Kim & Kankanhalli, 2009; Meissonier & Houzé (2012). One theory that has not been well leveraged in IS research is the psychological reactance theory.

The Psychological Reactance Theory (PRT)

The PRT was proposed by Brehm (1966). PRT is built around the notion of “freedoms” and “free behaviors”. The PRT posits that individuals generally believe that they have specific behavioral freedoms. When these freedoms are threatened, individuals are aroused by the motivation to reassert their freedoms. The psychological reactance theory assumes that people’s behaviors are motivated by the desire to protect their “freedom” to carry out a particular behavior in a particular context.

A “threat to freedom”, according to the PRT, refers to the perception that an event has increased the difficulty of exercising a particular freedom. Threats to freedoms have also been thought of to be social—emanating from social interactions or nonsocial—coming from the individual. Additionally, Brehm and Brehm (1981) also asserted that, “a freedom is important to a person when it has unique instrumental value of satisfaction of one or more important needs” (p. 55). Hence, the level of reactance is thought to be proportional to the relevance and number of threatened freedoms.

According to the PRT, resistance is a result of reactance. It is defined as the response to loosing freedom. The source of this resistance has been attributed to the person manifesting the behaviors as well as situation causing the resistance (Knowles & Linn, 2004, p. 6). Knowles and Linn (2004) have identified four different but probably related faces of resistance namely: reactance, distrust, scrutiny and inertia (pp. 7-8).

Reactance is initiated when a person’s choice alternatives are threatened. This view of resistance has been found to be associated with two sides of resistance: the affective (“I don’t like it!”) and motivational (“I won’t do it!”) (p.7).

Distrust highlights the target of the change and general distrust of proposals. Here, the resisting entity questions the motive of proposal and whether the facts are indeed true. This face of resistance underlies the affective (“I don’t like it!”) and the cognitive (“I don’t believe it!”) reactions to influence.

Scrutiny refers to the face of resistance that results when people become aware of the fact that they are a target of an influence and therefore begin attend carefully and thoughtfully to every aspect of the proposal for change. Here, a thorough scrutiny is given to every proposal while each weakness is evaluated, exposed, and countered. This face emphasizes the cognitive (“I don’t believe it!”) element of resistance.
Inertia is described as a “neutral” quality whereby an individual may not necessarily resist the change, but may focus more on rather staying put. To the extent that a “call for change” comes, the inertia personality and attitude frustrates the change through a drag of anchor rather than with a personal antagonism. Hence, inertia is a more covert form of resistance.

The psychological reactance perspective of resistance could very informative given that the PRT’s resistance seems to be a continuum of resistance based on emotional intensity. Perceived as such, we see that the emotional intensity rises from inertia to reactance. The benefit of this type of perspective is that it is likely to inform our understanding about different forms and stages of IT user resistance. For example, there is a possibility that certain types of initial conditions are associated with particular types of resistant behaviors. Also, different phases of implementation are likely to be characterized by particular manifestations of resistance. Such an understanding would then be critical in the development of persuasion messages to mitigate user resistance.

MODEL DEVELOPMENT

The proposed model in Figure 1 builds on the Lapointe and Rivard (2005) framework. The Lapointe and Rivard (L-R) model posits that resistance behaviors result from perceived threats that arise from the interaction between the initial conditions and the object of resistance. The model is presented as a cyclical process in which the consequences of the using a system are fed back into the initial conditions again as triggers, restarting the entire process all over again. Lapointe and Rivard (2005) viewed resistance from a longitudinal perspective of three phases namely: pre-implementation phase, implementation phase, and post-implementation phase. Regardless of the phase under consideration, the L-R model suggests that initial conditions interact with the object of resistance to produce resistance.

![Figure 1. Research model](image-url)
With the L-R model as a starting point, we discuss the proposed model from a matching perspective. First of all, the L-R model is summarized into three major parts namely: *initial conditions* (labelled “A”), *perceived threats* (labelled “B”), and *user resistance* (labelled “C”). This research focuses on the *user resistance* and the immediate antecedent, *perceived threats* (with the exclusion of *initial conditions*).

The overarching theory that informs the proposed model is the psychological reactance theory (PRT), and is based on the following fundamental assertions as proposed by Brehm (1966) that:
1. Human beings generally believe in “behavioral freedoms.” That is, the freedom to perform certain behaviors: when they want it and how they want it.
2. When these freedoms are threatened, an uncomfortable motivational state known as *reactance* is created.
3. The decision to assert one’s behavioral freedoms and to act in a way consistent these freedoms leads to resistance. Given these assertions, we discuss the model in terms of the nature of the *perceived threats* that engender user resistance within the context of a health information technology (HIT).

**User Resistance**

User resistance to information technology in this study refers to covert or overt behaviors that oppose change towards the use of- or avoidance of an information system manifested as reactance, distrust, scrutiny or inertia. Consistent with Piderit (2000) who suggested that user resistance should be viewed as a complex multi-dimensional construct, user resistance in this study is therefore treated in the light of the four faces (reactance, distrust, scrutiny and inertia) proposed by Knowles and Linn (2004). This study further builds on the view that a thorough conceptualization of resistance must cover cognitive, affective and behavioral realms as proposed by Lapointe and Rivard (2005) and Oreg (2006).

**Perceived Threats**

“When a system is introduced, users in a group will first assess it in terms of the interplay between its features and individual and/or organizational-level initial conditions. They then make projections about the consequences of its use: if expected conditions are threatening, resistance behaviors will result.” (Lapointe & Rivard, 2005; p. 461).

Threats may result from perceived inequity (Joshi, 1991), the fear of the potential loss of power (Markus, 1983), stress and fear (Marakas and Hornik, 1996), or from negative or undesirable outcome expectations (Martinko et al., 1996). Previous studies have considered perceived threats as a single construct and an immediate antecedent of resistance. In this study, it is argued that perceived threats are manifested as two related, but distinct threats.

Justice literature had long postulated that people are constantly evaluating change through the lens of fairness (Konovsky, Folger & Cropanzano, 1987). If an individual believes that a particular change is not fair, a state of discomfort and dissatisfaction is created. Folger and Konovsky (1989) distinguished between two distinct types of justice in organizations namely: procedural and distributive justice. Procedural justice refers to the perceived fairness of the procedure while distributive justice focuses on the fairness of the outcomes. In the same way, Oreg (2006) has distinguished between two important elements of organizational change that are responsible for resistance. In his study, Oreg (2006) argued that two types of reactions to organizational change must be distinguished and examined separately namely: “reactions to the change process”—i.e. the procedural component, and “reactions to the outcomes”—i.e. the distributive component (p. 78). Furthermore, Lines (2005) had proposed a model of attitudes towards change based on fairness that argued for the differentiation between the “change process” and the “change content” (p. 12). Consistent with the forgone, it is argued here that perceived threats due to change would be a result of threats from the process as well as threats from the outcomes of the change in question. Again Lapointe and Rivard (2005) had pointed out that the introduction of technology in the workplace is likely to bring about change of routines, roles and even the significance of workplace interrelationships to bring about some sense of threat. Based on the
foregone, two types of threats are distinguished in this research namely: perceived helplessness over process and perceived dissatisfaction with outcomes.

*Perceived helplessness over process* is defined as an individual’s belief that carrying out a new behavior diminishes their ability to maintain control over their current routine. According to the interaction theory (Markus, 1983), resistance can happen when an individual/organization interacts with technology in a given organizational context. The introduction of technology in the workplace is generally accompanied by new processes demanding the change of work routines and task dependencies between employees. These processes have the potential to cause power imbalances that may lead to perceived helplessness over process. The process of change due to the introduction an information system is therefore likely to be associated with reactions to process of change.

*Perceived dissatisfaction with outcomes*, on the other hand, denotes an individual’s belief that carrying out a particular behavior will lead to unfavorable result. Perceived dissatisfaction with outcomes is generally linked to the discontentment with the espoused claims about the capability of the new system. Consequently, this perception is clearly linked to the outcome of change. *Perceived helplessness over process*, in this context, refers to an individual’s belief that carrying out a new behavior diminishes their ability to maintain control over their current routine. Festinger (1957) suggests that people resist change because it is “painful”, or may “involve loss.” Furthermore, he asserts “the magnitude of this resistance to change will be determined by the extent of pain or loss which must be endured” (p. 25). Markus (1983) also suggested that during technology implementation, threats could arise from the dynamics of power and control. She therefore postulated that “power loss” for a group and consequently “power gain” for another will give rise to perceived threats. Perceived threats arise in this case due to the loss of autonomy brought about by these power imbalances. The perception of discontent with the process and loss of control over routine, results in a sense of discomfort described here as perceived helplessness over process. When an individual’s sense of control over the process is threatened, the individual is likely to resist.

Warren et al. (1988) conducted a study in which they measured physician’s perceptions of loss of control over work conditions and clinical autonomy. The results showed that loss of control over work conditions and clinical autonomy, were all significantly and negatively correlated with physician satisfaction. Additionally, this study found out that one of the strongest challenges to physician satisfaction was the yielding their clinical judgment to non-physicians. In fact 44 percent of those who sometimes must yield their clinical judgment to non-physicians were dissatisfied, compared to only 18 percent of those who need not do so. The introduction of technology in the workplace clearly disrupts routines and task management; and threatens clinicians who feel as though they have surrendered their control over work conditions and professional judgment to non-clinicians—in this case, system developers. This threat to clinical control over work conditions and autonomy is likely to contribute to user resistance to information technology in the healthcare setting.

The sweeping process changes in the healthcare system due to the introduction of electronic health records are likely to generate resistance due to the loss of control in autonomy and power over processes. This loss of control is further exacerbated by the government procedural requirements placed on medical professionals (Warren et al., 1988). Since most of these imposed changes impact work routines and task assignments, physicians and other professionals are likely to resist such changes. Hence, it is hypothesized:

**Hypothesis 1:** *Perceived helplessness over process of use of the system will positively affect user resistance.*

Warren et al. (1988) had also established a connection between loss of control over work conditions, clinical autonomy and lack of satisfaction. This study showed that both loss of control over work and reduced levels of clinical autonomy will both lead to greater dissatisfaction with outcomes. Hence, it is hypothesized:

**Hypothesis 2:** *Perceived helplessness over process of use of the technology will positively affect perceived dissatisfaction with outcomes.*

Poon et al. (2006) also observed that the introduction of certain HIT systems is likely to cause employee dissatisfaction due to the negative impact it has on workflows and productivity. Additionally, as the health-care providers’ income is directly tied to their productivity (Poon et al. (2006), any changes that negatively affect this bottom-line are likely to result to dissatisfaction. Consequently, dissatisfaction with productivity and workflows due to implementation of new systems is likely to cause resistance to change.
Alter (1978) pointed to the positive relationship between user dissatisfaction and resistance (lack of compliance). Alter notes that the implementer’s dilemma is: “How can I achieve compliance with minimal disruption and user dissatisfaction?” (p. 40). Doll and Torkzadeh (1989) had also stated that user feelings of greater control due to involvement in decision-making can lead to reduced resistance. Additionally, Martinko et al. (1996) observed that user dissatisfaction with the system is associated resistance towards the system. The introduction of a new system will affect productivity, at least in the beginning, since users must learn how to use the new system. The more users find ways to go around the system instead of actually using them, the more productivity is affected. This impact on productivity contributes to the dissatisfaction with system outcomes. Furthermore, workflow interruptions can also affect dissatisfaction with outcomes such that the greater the number of disruptions, the more dissatisfied the healthcare professional. There is an association between perceived helplessness over process, perceived dissatisfaction with outcomes and user resistance.

Dissatisfaction from the introduction of an information system in healthcare can result from threats to equity in reward systems, productivity and workflow. Regardless of the source of dissatisfaction, this generally leads to resistant behaviors. As Ford et al. (2008) have noted when employees cannot perceive a fair treatment during a change process in the work place, a loss of trust and satisfaction results. This means that the change process can affect can also affect the outcomes. For instance, if an older physician perceives that the outcome of the introduction of a system will inequitably favor a younger physician who has greater computing skills needed to work the system, they may become dissatisfied with the outcomes. This dissatisfaction is then manifested as resistant behaviors that including revenge, sabotage, theft or other aggressive behaviors (Ford et al., 2008). Evidently when employee satisfaction is threatened, resistance is likely to ensue. It is therefore hypothesized:

Hypothesis 3: Perceived dissatisfaction with outcomes of use of the technology will positively affect user resistance.

RESEARCH DESIGN AND ANALYSIS

This study was designed to respond to the study’s objectives and questions. Consequently, a quantitative study design was adopted. Because of the involvement of human subjects, the Institutional Review Board approval was sought and secured. The design of study therefore encompassed three major phases. The first phase involved conducting an extensive literature review to uncover the underlying theories and determinants of user resistance. Once this was done, the determinants were then categorized and incorporated into a preliminary conceptual model. Through more theoretical insight from literature, this model was further refined to obtain a theory-based conceptual model. Second, an instrument and measures were developed to capture the concepts of the model. Lastly, different procedures were administered to accurately collect empirical data and to test this proposed model through appropriate and rigorous data analysis procedures.

Study Participants

Research in information technology resistance within the healthcare sector has often drawn from a broad population including a wide range of medical professionals, such as physicians, nurses, staff and even administrators (Bates, 2005; Bhattacherjee and Hickmet, 2007; Lapointe & Rivard, 2005; Thede, 2009; Timmons, 2003). Because this research measures cognitive and attitudinal perspectives of user resistance to information technology, the sample for the study was drawn from a similar population. The sampling frame Participants in this study include physicians, physician assistants, nurse practitioners, registered nurses, and other healthcare professionals who use electronic health record systems in daily practice. To do this, a variety of organizations and individuals were approached through personal face-to-face contacts, emails and phone calls. The final sample included health professionals from independent healthcare clinics, a nurse practitioner association, a department of nursing in a medium Southwestern university and individual healthcare professionals. These participants represented large, medium, and small healthcare practices drawn predominantly from the Southwestern region of the United States of America. With such a wide range of participants, it was expected that the heterogeneity of the population would increase the external validity of the study.
Instrument Development

Burns and Grove (2010) identified three sources of content validity namely: (1) literature, (2) representativeness of the relevant population, and (3) experts. The determination of whether or not an instrument possesses content validity is subjectively based on the opinions of experts (Nunnally, 1978). It must be noted here that since the questionnaire was intended to be administered in a post-implementation phase, the questionnaire was developed thus, by tweaking the questions to reflect participants’ response in retrospect. Additionally, the ability of the content of a questionnaire to measure the trait of interest and to do so effectively is also influenced by factors such as the wording of item questions. The techniques below were used in this study to improve the instrument’s ability to accurately capture the variables of interest. For instance, Armstrong and Overton (1977) have suggested the use of brief and concise questions that reduce the likelihood to “read into” the question. Schuman and Pressor (1981) cautioned on the ordering of questions to ensure the proper effectiveness of a survey questionnaire. For instance, instead of saying, “I was knowledgeable enough to understand how to use the system”, it was phrased as: “I had the knowledge necessary to use the system”. In the former question, the participant may think that the item is intending to question their prior ability to use the system rather than whether or not they have been provided the right tools (e.g. manuals, online help, etc.) to use the system.

The instrument for this study was developed through a multi-step approach. First, to understand the key determinants of IT user resistance, an in-depth literature review was conducted to identify all the major factors. Second, each of the determinants was then carefully operationalized using existing scales or by creating new ones. Where particular words were used in new contexts, these words were clearly defined through examples. For example, in the equity evaluation constructs section, respondents were asked to compare their “benefits” versus their “stresses” with the introduction of the new system.

Measures

Existing validated scales were adopted where possible and, elsewhere, new scales were developed based on previous literature. All construct were measured on a five-point Likert scale (1=strongly disagree; 5=strongly agree) except for Perceived dissatisfaction with outcomes (PDO) where a five-point Likert scale with range (1=not dissatisfied at all; 5=extremely dissatisfied) was rather chosen. This was so done to maintain a uni-dimensional conceptualization of the construct. In the subsections below, the scales used for each construct in the model are discussed.

**User Resistance (UR).** User resistance is conceptualized in this study as having “four different but probably related faces” (Knowles & Linn, 2004). The four dimensions are namely: reactance, distrust, scrutiny and inertia. Items for all four dimensions we self-derived based on the definition of each individual dimension by Knowles & Linn (2004). Since all four dimensions were defined to encompass elements of affect, motivation and cognition; items from Oreg (2006) three-dimensional resistance model—encompassing cognitive resistance, affective and behavioral resistance—were adapted and modified to fit the Knowles and Linn (2004) definitions. Reactance items (UR11, UR12 and UR13) for example, are conceptualized to reflect the affective (“I don’t like it”) and motivational (“I won’t do it”) perspectives defined by Knowles and Linn (2004). In a similar manner, distrust items (UR21, UR22 and UR23) are conceptualized to depict the affective (“I don’t like it”) and cognitive (“I don’t believe it”) perspectives. Scrutiny, (items UR31, UR32 and UR33), was conceptualized as cognitive (“I don’t believe it”), (“I don’t believe it”). Lastly, inertia is defined as a state of equilibrium with the characteristic of “staying put” rather than actual antagonism. Its items (UR41, UR42 and UR43) are also constructed accordingly.

**Perceived Threat Variables.** Perceived helplessness over process (PHP) made use of two important perspectives. First, it used items from the Langfred (2005) autonomy scales as well as insights from the job characteristics model extension of Hackman and Oldham (1976) and the Maastricht Autonomy Questionnaire (MAQ) (de Jonge et al., 1995). The reason for using these items was to particularly capture the “helplessness” factor which is particularly related to loss of autonomy or control. For instance, we used some of developed items by Langfred (2005) to predict individual- and team-level autonomy influences.

**Perceived helplessness over process.** Items that relate to the freedom of “getting work done” or “scheduling of work” benefited from this scale. The Job control scale (de Jonge, 1995) developed from the MAQ informed the perceived
dissatisfaction with outcomes construct by drawing on elements of the MAQ that deal with “method of working”, “pace of work” and “work goals”.

**Perceived dissatisfaction with outcomes (PDO).** Construct was self-derived with insights from Landeweerd and Boumans (1994) and Bankauskaite and Saarelma (2003). Landeweerd and Boumans (1994) and Bankauskaite and Saarelma (2003) particularly addressed the subject of dissatisfaction with the outcomes of healthcare services; and hence, the items seemed particularly suited for this study. However, because they looked at dissatisfaction with the healthcare services from the patient’s and not the healthcare professional’s perspective, the items had to be reconstructed.

**Data Analysis Strategy**

A pilot study was administered to 50 participant, out of which 44 were received back with valid data. Analyses were conducted to determine the reliability and validity of using PLS version 2.0 M3. Given the characteristics of the proposed model (i.e. with a maximum of 2 arrowheads to a latent variable); it will require a least sample size of 33 to yield a statistical power of 80% at 95% confidence level for a minimum $R^2$ of .50 (see Hair et al., 2014, p. 21). Data from this sample were analyzed for reliability and validity using smart PLS version 2.0 M3. Most of the construct items showed adequate factor loadings of .5 and greater with Cronbach’s alphas that exceeded the recommended .7 threshold level (Hair et al., 2010). Items that did not load were further refined. Each of the three latent variables explained at least 20% of the predictor variables significantly. Overall the sample data fitted the proposed model quite well. Overall, the sample data fitted the proposed model quite well.

The proposed research model required a structural technique for analyzing the relationships. Two structural equation modeling approaches exist to address this (Hair et al., 2010; Hair, Ringle and Sarstedt, 2011). One of such is the covariance-based structural equation modeling (CB-SEM) and the other is the partial least squares structural equation modeling (PLS-SEM). To decide which of the SEM techniques to use, Hair, Hult, Ringle and Sarstedt (2014) have suggested that that the objectives and characteristics that distinguish the two methods be utilized. Consistent with this admonition, the data analysis tool of choice for this study was the PLS-SEM technique based on the considerations described below.

Hair et al. (2014) lay out five rules of thumb for using PLS-SEM technique namely: (1.) when the goal is predicting key target constructs or identifying “driver” constructs, (2.) when formative constructs are part of the model, (3.) when the structural model is complex (many constructs and indicators), (4.) when the sample is small and/or the data are non-normally distributed, and (5.) when the plan is to use latent variable scores in subsequent analyses. Additionally, Chin (2010) has also noted that PLS-SEM is more suited for complex models (i.e. having more constructs and indicators). Given that the objectives of this study, as stated earlier, PLS-SEM was chosen for the analyses.

The final sample of 206 health professionals consisted of physicians, physician assistants, nurse practitioners, and registered nurses in the major categories. Of this total, 156 (76%) were females while 50 (24%) were males. About 87% of the respondents operated in mandatory settings where electronic health record system use was mandated while the remaining 13% operated in non-mandatory settings. Additionally, more than a third of the settings had an installed EHR system within the last two years. Almost all the respondents (96%) had previous paper records use. More than a third of the sample had over five years of experience in their professional roles at the time of data collection. About half of the respondents had an average EHR experience of more than two years. Table 1 shows the sample distribution by profession and gender. Table 2 reveals an alternative sample distribution by profession and years of experience in their current role. The minor professional groups represented in the sample are presented in Table 3.
Table 1: Profession and gender demographics

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<th>Nurses (RNs, LVN, LPN, CNA)</th>
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Table 2: Profession and experience demographics

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<th>Physicians</th>
<th>Physician Assistant</th>
<th>Nurse practitioners</th>
<th>Nurses (RNs, LVN, LPN, CNA)</th>
<th>Other professions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 years</td>
<td>6</td>
<td>&lt; 2 years</td>
<td>44</td>
<td>&lt; 2 years</td>
<td>16</td>
</tr>
<tr>
<td>2-5 years</td>
<td>10</td>
<td>2-5 years</td>
<td>3</td>
<td>2-5 years</td>
<td>30</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>7</td>
<td>&gt; 5 years</td>
<td>3</td>
<td>&gt; 5 years</td>
<td>44</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>Total</td>
<td>50</td>
<td>Total</td>
<td>90</td>
</tr>
<tr>
<td>Sample %</td>
<td>11</td>
<td>Sample %</td>
<td>24</td>
<td>Sample %</td>
<td>46</td>
</tr>
</tbody>
</table>

Table 3: Other professions represented in sample

<table>
<thead>
<tr>
<th>Profession type</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMR technician</td>
<td>2</td>
</tr>
<tr>
<td>Medical assistant</td>
<td>2</td>
</tr>
<tr>
<td>Dental assistant</td>
<td>1</td>
</tr>
<tr>
<td>Dietitian</td>
<td>2</td>
</tr>
<tr>
<td>Pharmacy technician</td>
<td>1</td>
</tr>
<tr>
<td>Office manager</td>
<td>1</td>
</tr>
</tbody>
</table>

ANALYSIS, RESULTS AND CONCLUSIONS

The sample was analyzed using PLS-SEM. The results, conclusions will be discussed at the conference

REFERENCES


