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Communications of the Association for Information Systems

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Media Reinforcement for Psychological Empowerment in Chronic Disease Management

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Abstract:

Although information technology (IT) is often argued to have the potential to enable greater patient participation in healthcare delivery, how IT empowers patients to take charge of their own health is a less explored area. This study explores how IT-enabled communication plays a significant role in shaping the patients' psychological empowerment for managing a chronic disease—diabetes. Psychological empowerment reflects a patient's cognitive response and motivation to manage the disease. Two dimensions of psychological empowerment relevant in the context of chronic disease management (e.g., meaning as manifested through perceived education benefits and self-awareness to enable self-efficacy for effective management) are suggested to have positive effects on life changing interventions and patient satisfaction. We argue that the medium of communication between the patients and providers influences the psychological empowerment. Media reinforcement is, thus, hypothesized to impact the relationship between self-awareness and life changing interventions. The conceptual model is tested using archival data collected from a survey of seventy-eight patients that were involved in diabetes management education programs. The results indicate that rich media enabled by IT can play a significant role in patient empowerment, and influence the outcome of chronic disease management.

Keywords: psychological empowerment; diabetes; chronic care education; patient satisfaction; life changing interventions; information technology; IT-enabled communication; media reinforcement

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I. INTRODUCTION

Chronic diseases contribute to significant healthcare costs in the United States (US), with diabetes as the most prevalent example. The economic burden of diabetes was estimated as \$174 billion to the exchequer in 2007, including \$116 billion in direct medical expenses, \$58 billion from reduced national productivity, and 200 percent higher medical expenditure to each patient [American Diabetes Association, 2008]. Characterized by high levels of sugar in the blood, diabetes is caused by too little insulin and/or resistance to insulin [Goldie, 2008].¹ Diabetes without proper treatments leads to several short- and long-term complications, such as hypoglycemia (abnormally diminished glucose in blood), cardiovascular diseases, chronic renal failure, retinal damage, and leg amputations [Fradkin, 2012]. In 2011, almost 26 million people in the United States were diagnosed with diabetes, accounting for 8.3 percent of the country's population; in addition, the CDC predicted the number of diabetes instances would double in the next decade [CDC, 2012].

Most chronic disease management activities happen outside the premises of a hospital or a doctor's clinic; for instance, exercise and diet to control sugar levels in the case of diabetes occur at the patient's home. Many argue that the patient's active involvement in taking charge of his/her own chronic disease improves the outcomes [Ueckert, Goerz, Ataian, Tessmann and Prokosch, 2003]. Patient involvement leads to a high level of objective rationale to encourage individuals to actively participate in their own care. Information flow across providers and patient empowerment then enable the patient to make knowledgeable decisions to manage a disease [Wilson, 2009]. The healthcare delivery system in the United States is transforming into a patient-centric model, with an underlying focus on patients emerging as a necessary prerequisite to empower patients and enable chronic disease management [Alpay, van der Boog and Dumaij, 2011; Gianchandani, 2011]. Against these arguments, it is seen that patients generally take actions to curb an episodic disease, such as flu or fever. But, how far can managing a chronic disease using information and guidance from providers motivate patients? This question remains a concern in the drive toward patient-centered health care.

Abating the concern of chronic disease, diabetes is manageable and curable due to its progressive nature. Studies show that people who lose weight, increase their physical activity, and manage their diet can maintain a normal blood glucose level [Bloomgarden, 2004; Hussain, Claussen, Ramachandran and Williams, 2007], with clinical evidence that these efforts help curb diabetes [Hayes and Kriska, 2008; Sanz, Gautier and Hanaire, 2010]. Industry reports estimate the adoption of national-level diabetes control programs that emphasize lifestyle interventions could result in savings of up to \$250 billion over the next ten years. These estimates include up to \$144 billion in potential savings to the federal government in Medicare, Medicaid, and other public programs [UnitedHealth, 2010].

We pose two research questions in this study: (1) how psychological empowerment influences the chronic disease management process, and (2) how communication media between provider and patient help strengthen the influence of psychological empowerment on the disease management process. Psychological empowerment reflects on a person's inherent cognitive response to a task or effort, so that an individual's action is based on his/her internal willingness, rather than an external force [Zimmerman, 1995]. The significance of psychological empowerment pivots on the concept that an individual needs internal conviction to translate providers' inputs into disease management-related actions. We build on four dimensions of individual-level psychological empowerment discussed in existing literature: (1) autonomy, defined as the degree of choice an individual faces in doing work; (2) meaning, which represents the value of a goal or purpose, judged in relation to an individual's own ideals or standards; (3) self-efficacy, which is an individual's belief in his/her ability to perform activities with skill; and (4) impact, which is the degree to which an individual can influence outcomes [Doll and Deng, 2010; Kirkman and Rosen, 1999; Spreitzer, 1995; Thomas and Velthouse, 1990]. We consider meaning and self-efficacy as two salient factors that reflect on some variability in an individual's diabetes management process, and operationalize the two constructs as: (1) meaning reflected through education benefit perceptions, and (2) self-efficacy manifested through self-awareness of disease complications.

¹ In type 1 diabetes, there is an absolute insulin deficiency due to destruction of islet cells in the pancreas; whereas type 2 diabetes is a metabolic disorder that is characterized by high blood glucose due to insulin resistance and relative insulin deficiency. Type 2 diabetes makes up about 90 percent of diabetes cases. The remaining 10% is attributed to type 1 and gestational diabetes.

We use life changing interventions as the final measurable impact that reflects actionable objectives of the disease management process. Life changing interventions for diabetes include following a strict medication guideline and adhering to an exercise regime and diet-control guidelines to live healthier and longer with diabetes [Ciechanowski, Katon, Russo and Walker, 2001; Quinn et al., 2008]. We use patient satisfaction as an interim measure in the process of managing diabetes. Patient satisfaction measures the extent to which a patient is satisfied in managing the disease, getting medical attention, and receiving doctor's attention in his/her diabetes management process [Rosenstock, Cappelleri, Bolinder and Gerber, 2004; Wiggers, Donovan, Redman and Sanson-Fisher, 1990].

We argue for positive effects of the two dimensions of psychological empowerment in disease management (e.g., meaning—reflected through education benefit perception—and self-efficacy—manifesting through self-awareness of the condition, medication, issues, and challenges of diabetes). In addition, anchoring to the concept of media richness in information systems literature [e.g., see Lee, 1994; Lengel and Daft, 1989], we define and operationalize media reinforcement. Media reinforcement is the use of effective media by a provider to follow up, provide educational material, and guide the patient to deal with the disease management process. Secondly, we take into account that richer media have a significant influence on communication between the provider and patient during the disease management process. We hypothesize for a complementary effect of media reinforcement on the relationship between self-awareness and life changing interventions. Finally, we hypothesize for a patient satisfaction mediated effect of education benefits and self-awareness on life changing interventions, grounding our arguments in extant research that suggests that patient satisfaction is an important outcome in healthcare delivery, albeit in an interim stage of the disease management process.

Our empirical analysis uses a unique archival data set collected from a survey of seventy-eight patients. The survey was conducted between December 2009 and January 2010 by a consulting firm engaged in monitoring diabetes patients in a hospital located in the southwestern region of the United States. The data analysis is conducted using structural modeling approaches and path analysis techniques. The results of this study indicate that psychological empowerment of patients, as reflected in the two dimensions of meaning and self-efficacy, influences the life changing interventions for diabetes patients. Further, we also find that media reinforcement has a complementary role in strengthening the relationship between patient self-awareness and life changing intervention.

This study contributes to information systems literature by examining the impact of two components of psychological empowerment on chronic disease management. Emerging discussions around patient-centered health care demand rich and effective communication media using emerging IT tools and artifacts. The findings of this study suggest a significance of IT-enabled communication on patients' health management process. We contribute to healthcare management literature as one of the first empirical studies exploring psychological empowerment for disease management, and the role of IT in enabling the process.

II. LITERATURE REVIEW

Patient-Centered Health Care and Psychological Empowerment

Patient-centered health care is a focus area of current healthcare transformation efforts in the United States. It encompasses different aspects of medical practice to target the individual patient's needs and concerns [Bardes, 2012]. Proper incorporation of patient-centered health care into new healthcare designs involves shifts in control and power from care providers to patients [Berwick, 2009]. Many argue that IT inherently plays a greater role in initiating and managing the shift toward patient-centered care in providing a plethora of communication- and coordination-oriented technologies—such as telemedicine, visualization on demand, virtual doctors, smart sensors, computer visions, and robotics—that consist of the widely discussed health information technology (HIT)-centered transformation in health care [Alpay et al., 2011; Gianchandani, 2011].

Accelerated adoption of health information technologies (HITs), such as the electronic medical records, and the value derived from HITs are enhancing the productivity and quality of health practices and healthcare organizations [Agarwal, Gao, DesRoches and Jha, 2010; Kohli and Kettinger, 2004; Menon, Lee and Eldenburg, 2000]. However, some raise the concern that simply implementing an electronic health record in itself is not patient-centered care or management. More than digital transformation, HITs must strengthen the patient-clinician relationship, promote communication about issues that matter, enable patients to learn more about their health, and facilitate disease-related involvement in the patient's own care [Epstein, Fiscella, Lesser and Stange, 2010]. Research suggests that placing emphasis on patient-centered communication is a necessary component of high-quality health care for better healthcare delivery outcomes [Epstein et al., 2005]. Information systems research has addressed concerns related to HIT adoption, assimilation, implementation, and value propositions for both healthcare providers and patients [for a review of information systems and healthcare studies, see Chiasson and Davidson, 2004; Romanow, Cho and Straub, 2012]. However, IT-enabled patient empowerment is less explored in existing literature [e.g., Ueckert et al., 2003; Wilson, 2009].

Adding to the concerns of IT-enabled patient-centered care, a longstanding unanswered question in the healthcare system is whether patients are motivated enough to take control of their own health management process. In this regard, a stream of literature in the health management area explores how motivation enables bridging the gap between intention and health change behavior. For example, higher motivational self-efficacy (either voluntarily or by design) may serve as an important parameter in transforming individual intentions to health-related actions [Lippke and Ziegelmann, 2008; Sutton, 2008]. Self-efficacy is a prominent construct in social cognitive theory that reflects on the sense of control over one's environment and behavior [Bandura, 1977, 1982]. Several studies extend Bandura's concept of self-efficacy, and explore employees' perceptions or cognitive states regarding psychological empowerment in the work place [for a review on psychological empowerment research, see Maynard, Gilson and Mathieu, 2012]. The central theme in existing studies is that motivated individuals (or teams) must believe in being psychologically empowered to perform work [Conger and Kanungo, 1988]. A few studies apply the concept of self-efficacy to understand the role it plays in diabetes patients' motivations to manage the disease [Plotnikoff, Lippke, Courneya, Birkett and Sigal, 2008] and how self-efficacy mediation (digital and non-digital) can fulfill the gap between health action-intention and behavior [for a review, see Kroeze, Werkman and Brug, 2006]. However, the concept of psychological empowerment has not been applied in the health management context. We address this gap in literature in our study.

Richness of Media in Patient-Provider Communication

To the extent possible, patient empowerment demands that providers enable patients to take control of their health management process [Wilson, 2009]. However, in the current healthcare system, guidelines to make health decisions are centered on evidence-based science practiced by providers. Therefore, to empower patients, providers need to guide and direct patients to manage a disease [Gianchandani, 2011]. The guidance for episodic diseases is achieved through a number of patient and provider meetings and interactions. Extensive guidance is provided to patients for chronic diseases like diabetes. Often diabetes management involves keeping track of day-to-day activities, eating habits, medication plans, blood glucose level, and exercise regimes [Koenigsberg, Bartlett and Cramer, 2004; Luszczynska and Tryburcy, 2008]. In other words, for chronic diseases, the guidance and management extends to the patients' home and space, beyond face-to-face interactions at the providers' facilities, and preferably at the convenience of the patient's schedule. Such extension of space and time for chronic disease management demands that providers employ and maintain an effective communication process with patients. Therefore, communication plays a significant role in chronic disease management.

Prior studies indicate that the richness of communication media influences the cognitive process, perceived presence, and the overall outcome of the communication; they, in turn, have a positive role on patient empowerment [Carlson and Zmud, 1999; Robert and Dennis, 2005]. Establishing the appropriateness and outcomes of richer media, researchers assert that the more ambiguous and uncertain a task is, the richer the format of media that suits the task. Moreover, richer media are more effective for communication of equivocal issues than leaner or less rich media [Daft, Lengel and Trevino, 1987; Lengel and Daft, 1989]. Studies on media synchronicity reflect that individuals should use multiple media for different parts of their communication, depending on the purpose and task involved, such as providing instruction-based or a shared understanding-based communication [Dennis, Fuller and Valacich, 2008]. Instruction-based communication is conceptualized as "conveyance communication," and shared understanding is "convergence communication." For example, patients need to believe that they have a "say" in managing their disease and in influencing their own health-related outcomes [Car and Sheikh, 2004a, 2004b], using both conveyance and convergence communications with the provider. Nevertheless, convergence communication demands the use of richer media than conveyance communication. In this regard, studies argue that digital communication media are richer than non-digital forms of communication. For instance, Lee [1994] established that electronic mail is a superior medium for executive communication than a postcard or letter. As such, telephone or email is a better communication avenue than personal static media such as a memo or a letter [Lengel and Daft, 1989]. Recent studies reiterate the high degree of richness of email in different contexts, such as for communication involving extensive review and revise actions [Lee and Panteli, 2010], knowledge-building and learning experiences [Timmerman and Madhavapeddi, 2008], organizational communications [Watson-Manheim and Bélanger, 2007], and tasks involving a high degree of cognitive processing [Robert and Dennis, 2005]. Furthermore, researchers report emerging trends to use digital media rather than non-digital media in communication, due to the appropriateness, convenience, trust, and efficacy of information exchanged in digital media channels [Choudhury and Karahanna, 2008]. Overall, existing research suggests that as the trend of IT-enabled media is emerging, the perception about the appropriateness of digital media is evolving, partly with time and experience of users (see Te'eni [2001] for a review of studies related to communication process and media choice). Consequently, users are often inclined to substitute the older media with the emerging IT-enabled richer media [King and Xia, 1997].

Specific to the context of chronic disease management, a few studies explore the effectiveness of media richness for health management. Houston, Sands, Jenckes, and Ford [2004] report that patients experience a positive impact of digital communication (emails and online forums) on their treatment process and handling issues. White, Moyer,

Stern, and Katz [2004] suggest that emails are very helpful in non-sensitive and non-urgent contexts (as in the case of chronic disease management), including providing information updates and following up on inquiries related to health management over longer periods. Patt, Houston, Jenckes, Sands, and Ford [2003] found that doctors preferred emails to communicate with patients for effective chronic disease management. Email communication improved continuity of patient care and increased the care provider’s flexibility in responding to non-urgent issues of patients. Some doctors in their study reported: “patients send emails with their sugar levels and change their treatment according to what is recommended”; and of “patients sending in their home blood pressures, glucose monitors, ordering tests, making sure their tests get ordered before their visit, sending information back and forth to get stuff done” [Patt et al., 2003, p. 4]. These chronic disease management examples suggest that emails work in an integrated manner with the workflow of disease management in creating seamless delivery of patient care. Further, Roter, Larson, Sands, Ford, and Houston [2008] conclude in their article that “beyond the accomplishment of tasks, emails are used to express and respond to emotions and to build a therapeutic partnership.... Email messages may reflect a pattern of communication control, content, and tone that is different from traditional medical dialogue” [Roter et al., 2008, p. 346]. Patients at home formed a relationship with doctors and got emotional support to manage their disease. Other studies show that richer media can be an effective substitute to face-to-face patient-provider encounters [Andreassen, 2011], with email and text messaging-based communication serving as better aids to follow up in the case of elderly rheumatology patients [Hughes, Done and Young, 2011]. In this article, we extend the literature in exploring the impact of media richness for psychological empowerment to manage diabetes.

III. THEORETICAL FRAMEWORK

The theoretical framework of this study anchors to two streams of research: (1) the concept of psychological empowerment in existing management literature, and (2) media richness theory in the current information systems literature. We provide a conceptual model for our theoretical framing in Figure 1.

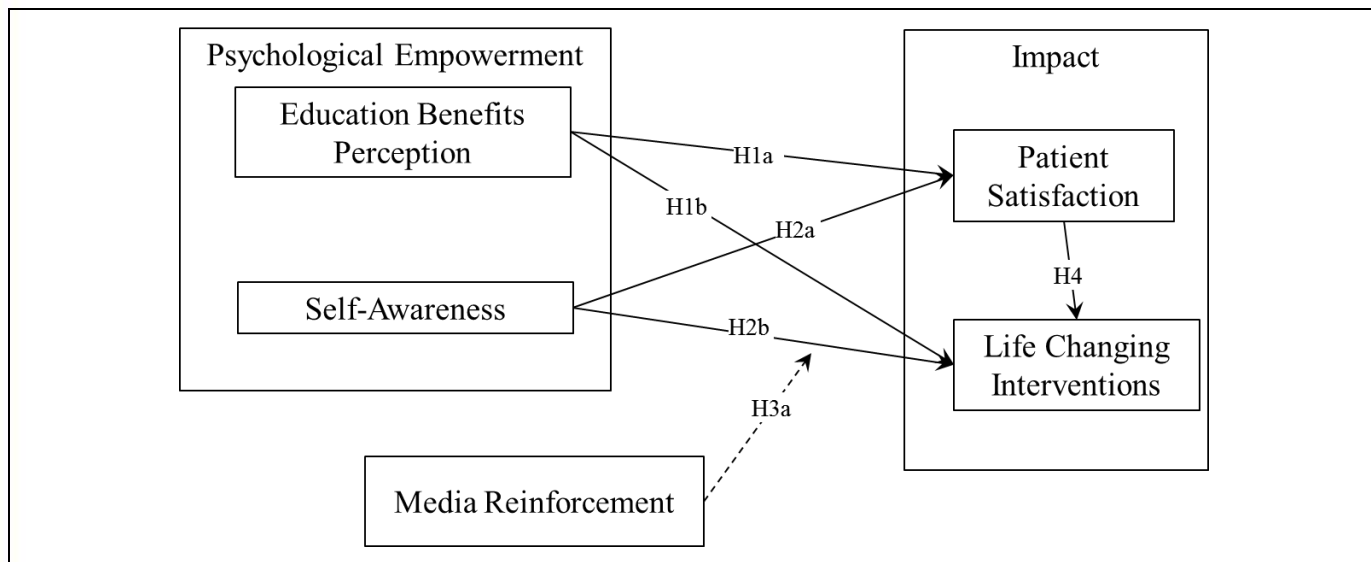


Figure 1. Conceptual Model

We build on Zimmerman’s [1995] conceptualization that “empowerment is a process by which individuals gain mastery and control over their lives”; and “psychological empowerment is an integrated perception of personal control, a proactive approach to life, and a critical understanding of the environment.” The conceptualization of psychological empowerment is further extended and refined as a measurable multidimensional construct in current literature. Although there is considerable overlap across studies on the specific dimensions of psychological empowerment, four dimensions have been highlighted for assessment of individual-level effort-based psychological empowerment, which were previously discussed in this article (e.g., autonomy, meaning, self-efficacy, and impact) [see Doll and Deng, 2010; Kirkman and Rosen, 1999; Thomas and Velthouse, 1990].²

² The four dimensions of psychological empowerment have been refined across studies, as noted by the review by Maynard et al. [2012]. For example, Thomas and Velthouse [1990] suggested meaning, competence, self-determination, and choice as four dimensions for psychological empowerment. Spreitzer [1995] further refined the items and proposed meaning, competence, self-determination, and impact as four dimensions in the context of an assessment of individual-level psychological empowerment. Doll and Deng [2010] adapted the four dimensions to engineering work context, and suggested autonomy, meaning, enjoyment, and impact as four dimensions.

We posit that in the context of chronic disease management, the patient and provider (or doctor) linkage translates into the organizational continuum for empowerment of the patient, to act on the interventions that enable him/her to manage the disease. Arguably, unless an individual is psychologically empowered through the tenets of having autonomy, deriving meaning, improving self-efficacy, and creating an impact, he/she does not act on recommendations made by the provider or doctor. We suggest that meaning and self-efficacy are two salient factors in the context of psychological empowerment for management of a chronic disease for two reasons. First, the autonomy is relatively constant in this context, as the patient is free to act. Second, the lifestyle changes reflect impact, and in reality are the outcomes of the disease management process. Adapting the other two constructs, we argue for two factors that motivate a patient. These factors include (1) the perception of education benefits to derive meaning about the disease management and (2) developing self-awareness that he/she can manage the disease (e.g., higher self-efficacy).

In addition, we posit that the process of cognitive development for psychological empowerment is a dynamic process. This dynamic process can be managed or enhanced by an external motivating factor, such as a follow up mechanism using communication media. While chronic disease management demands a set of self-managed activities, the follow up mechanism may provide a degree of improvement (or confidence) on the patient's self-efficacy to better manage the disease. Media richness theory [Daft and Lengel, 1986] reflect that richer media improve the communication process and result in higher cognitive impact on an individual; we conceptualize and argue for a media reinforced (moderated) enhancement for self-efficacy on the disease management process.

We use two outcomes to measure the impact of a disease management process: (1) life changing interventions and (2) patient satisfaction. Research establishes life changing interventions as a construct to measure the outcome of the disease management process for diabetes [Ciechanowski et al., 2001; Quinn et al., 2008]. Prior studies also note that patient satisfaction is an important outcome, albeit at an interim stage for complete disease management, which influences patient motivation to adhere to medication or life changing interventions [Rosenstock et al., 2004; Wiggers et al., 1990]. Thus, while life changing interventions reflect on the final actionable objective of the disease management process, patient satisfaction reflects on deriving gratification, and is an interim stage in the process.

The Meaning of Disease Management

The diabetes management process involves several steps. First, the patient needs to know the level of disease progression. Second, the patient should understand what must be managed, such as controlling glycemic levels in the body [Norris, Lau, Smith, Schmid and Engelgau, 2002]. Education shapes intentions toward management of the disease [Sutton, 2008]. In other words, education enables the patient to derive meaning for the disease management. Prior literature suggests that patients may slowly alter health-related behaviors [Piette, Schillinger, Potter and Heisler, 2003]; however, with higher perception, they can explore more meaning in the disease management process, and patients might be motivated to manage their disease better [Weinstein, Rothman and Sutton, 1998].

Perceptions of education benefits play an important role in increasing a patient's competence in decision-making abilities regarding disease management [Bodenheimer, Lorig, Holman and Grumbach, 2002; Warsi, Wang, LaValley, Avorn and Solomon, 2004]. Patients who understand the benefits of an education program attend several sessions or meet care providers to manage critical parameters. Further, patients involved in such programs would feel empowered with their knowledge of the disease [Anderson and Funnell, 2005]. Such patients experience less anxiety about the ill-effects of the disease, discover a higher cure-accomplishment motive, and make more use of preventive services. In other words, in so far as the diabetes education programs are known to improve a patient's understanding and knowledge, the perception that such programs are needed would motivate the patient to participate and learn of actions that help manage the disease [Coulter and Ellins, 2007]. Greater understanding of the causes, outcomes, and measures to control the disease encourage patients to follow interventions that better manage their disease. Based on these discussions, we hypothesize:

H1a: The perception about the benefits of diabetes education positively influences patient satisfaction.

H1b: The perception about the benefits of diabetes education positively influences life changing interventions.

The Self-Efficacy Manifested Through Self-Awareness

A patient's self-awareness regarding a disease relates to the extent of knowledge that he/she carries about the disease [Hernandez, Bradish, Rodger and Rybansky, 1999]. Undoubtedly, disease awareness and knowledge increase an individual's self-efficacy to manage the disease. Prior studies note that self-awareness increases the mindfulness of a person's actions, with a positive impact on the way an individual acts to a situation or context [e.g., see Brown and Ryan, 2003; Richards, Campenni and Muse-Burke, 2010]. Knowledgeable individuals will focus on

opportunities rather than on obstacles when tackling challenging goals [Bandura, 1998; Bourbeau, Nault and Dang-Tan, 2004].

Specific to diabetes, once patients know that sugar might be a critical factor in managing the disease, they may shift to low-calorie sugars or available sweeteners, compared to the lack of knowledge that sugar is a concern. Furthermore, when the appropriate regime for a disease is followed, patients also derive satisfaction in managing the disease and become keen on following the interventions needed for management of the disease. In other words, individuals with greater self-awareness about the disease derive higher satisfaction from their efforts and will be able to accomplish the challenging goals with ease [DeVellis and DeVellis, 2000].

Thus, increasing self-awareness about the disease complications will lead to higher self-efficacy goals. Knowledgeable and/or mindful individuals will focus on opportunities, rather than on the obstacles to meet goals (e.g., joining a low-fat diet group at the workplace, rather than thinking that one needs to eat high-fat burgers given in each meeting). Therefore, we hypothesize:

H2a: Self-awareness of the disease complications positively influences patient satisfaction.

H2b: Self-awareness of the disease complications positively influences patient's life changing interventions.

Media-Reinforced Enhancement for Self-Efficacy on Life Changing Interventions

We build on media richness theory in existing literature [Daft et al., 1987; Trevino, Lengel and Daft, 1987] to define and operationalize media reinforcement. Media reinforcement (MR) signifies use of appropriate and effective media by a provider to follow up with the patient, provide educational material, and offer overall guidance regarding the disease management process. Based on the established hierarchy of media (in increasing order of richness), we categorize generic/untargeted documents as lean media, personal documents such as letters or memos as comparatively richer media, and telephone calls and face-to-face interactions as being in the higher order of richness (e.g., see El-Shinnaway and Markus, 1992; Lee and Panteli, 2010; Lengel and Daft, 1989; Trevino et al., 1987). The concept of media reinforcement (MR) extends the patient-provider communication scope beyond the face-to-face interactions, to a patient's own time and space continuum.

Existing literature argues that digital media is richer than non-digital media [Choudhury and Karahanna, 2008; King and Xia, 1997; Rice, 1993]. We follow this hierarchy, to place emails at the highest order of richness, followed by a set of media choices that use wikis, blog sites, or websites for announcements (e.g., e-announcements). This hierarchy also supports the claim that emails are richer for information exchange and asynchronous conversation than other media choices [Wagner, 2004]. Further, we argue that telephones are leaner media than digital media, due to the lack of information content and richness of a telephone conversation, followed by postcards that are not rich enough in communicating disease-related guidance to patients or enabling follow up with them. The hierarchical categorizations assert that the reason for richness differences across diverse media includes the medium's capacity for immediate feedback, the number of cues, channels used, personalization, and language variety [Panteli, 2002]. Email allows flexibility to its users, choice of the language to use, ability to provide immediate feedback, and options for selecting how best to present messages to recipients. Placing e-announcements next to email in the context of chronic disease management makes sense, especially from the perspective of content's richness and informative (educational) value. The simplicity of a handwritten postcard or letter may be effective as a reminder or follow up tool for its simplicity and the possible intimate feelings associated with the postcard's legacy value. However, it cannot be rich enough in communicating educational content. A similar reason applies to communication via telephone.

We argue for richer media's significant role in disease management (e.g., medication, controlling diet, exercise), and specifically in influencing the self-awareness tenet of the patient's psychological empowerment, because of two reasons. First, a richer medium such as an email or electronic communication helps remove a patient's personal inhibitions and is effective for non-sensitive and non-urgent communication on diabetes management. This occurs while maintaining the positive impact of the provider on the patient's treatment process. Second, richer media allow physicians to respond flexibly while seamlessly integrating the communication process with their workflow of disease management [Patt et al., 2003; Roter et al., 2008]. Face-to-face communication involves a specific appointment or time, while keeping track of patients' glucose levels through emails does not require physical presence of the doctor. Furthermore, while disease management can be frustrating for the patient [Geiss et al., 2010], periodic visits to the doctor may act as an additional burden. In contrast, constant follow-up using emails or discussions from the provider can alleviate patients' frustration to enable an effective disease management process [Koenigsberg et al., 2004].

In so far as richer media provide a better avenue for immediate feedback, use a higher number of cues and channels, and provide seamless support to patient-provider interactions, the patient's conviction to follow

appropriate medication, diet, and exercise regime increases. As a result, the patient will be encouraged to take actions for life changing interventions. Therefore, we hypothesize:

H3 Reinforcement mechanisms using rich media enhance the impact of self-awareness of the disease complications on life changing interventions.

Patient Satisfaction Mediated Effect on Life Changing Interventions

Management of chronic diseases can often be a frustrating experience, unless patients get results. Specifically, in the case of diabetes, the results of disease management do not manifest quickly, and it takes a while to realize effects [Buse et al., 2009]. The benefits of education and subsequent management of disease on life changing interventions are contingent on the patient's satisfaction level. Unless a patient is satisfied with his or her progress on disease management, it is likely he/she will deviate from the interventions periodically. Prior studies show that the effect of patient satisfaction on the quality and progress of chronic disease management determines a patient's motivation levels to achieve disease abatement goals [Wiggers et al., 1990]. Studies on diabetes management find that a systematic approach to the intervention process (such as glycemic control using insulin or follow ups for timely care) increase patient satisfaction and related outcomes [Clark, Snyder, Meek, Stutz and Parkin, 2001; Rosenstock et al., 2004]. Based on these arguments, and with the rationale that satisfaction increases the motivation to act with conviction, we hypothesize:

H4 The influence of perceived educational benefits and self-awareness on life changing interventions is positively mediated by patient satisfaction.

IV. METHODOLOGY

The Sample

We obtained archival data for this study from a survey of diabetes patients in a southwestern U.S. hospital during December 2009 and January 2010. The patients were followed up by the hospital through a diabetes management program. A consulting firm tracked the patients and conducted the survey, with face-to-face meetings, following a structured protocol. The survey instrument was designed to seek information from the patients to evaluate the effectiveness of the diabetes management program. We obtained de-identified data from the consulting firm and coded the variables as reflective constructs from the survey items. Table 1 shows the survey questionnaire and the coding scheme. The demographics of the respondents are provided in Table 2.

The data contains responses from eighty-three patients, out of the 201 patients followed by the hospital during the survey period. Due to missing values, there were seventy-eight usable responses, thus leading to an overall response rate of approximately 39 percent. More than 55 percent of the patients in the sample had diabetes for more than five years—reflecting the chronic conditions of the patients as the appropriate setting for our conceptual model. The consulting firm reported that the majority of the patients were reluctant to share their chronic conditions with third parties, and the hospital was legally bound not to disclose such information without the patient's consent. Within these constraints, the unique sample of seventy-eight patients that met the requirements of the study setting is noteworthy, and is consistent with similar size samples in prior studies [for example, McKay, King, Eakin, Seeley and Glasgow, 2001] to understand the impact of interventions on health-related outcomes among diabetes patients. Out of the seventy-eight patients in our sample, thirty-two were male and the remaining were female; thirty-five patients were educated to degree levels, and others were less educated. There were forty-two White/Caucasians, seven Black/African-American, twenty-eight Hispanic/Latino, and one of another race. The household income reported by thirty-eight of the individuals was greater than \$34,500, whereas the others earned less. The survey instrument did not capture the age of each individual patient to preserve anonymity conditions, and noted that all patients in the sample were in the age group of thirty-five to fifty.

Measurement Instruments

Table 1 includes a description of variables. The main dependent variable, life changing intervention (LC), is measured with four items. Amongst the independent variables, self-awareness of the disease complications (SA) is measured with three items, and perception about education benefits (EB) is measured with four items. The mediating variable, patient satisfaction (PS), is measured with three items. All these measurement items use a five-point Likert scale where 1 represents "strongly disagree" and 5, "strongly agree."

The media reinforcement (MR) construct refers to the use of effective and richer media to provide educational material, and follow up to the patient regarding diabetes management. The survey question for media reinforcement is: "What is the best method of providing you with educational material, and easier follow up to attend classes, regarding life changing interventions for diabetes?" Following the existing discussions on hierarchical categorization

of media based on their richness [e.g., see El-Shinnaway and Markus, 1992; Lengel and Daft, 1989; Trevino et al., 1987], and contextualizing our study to patient-provider coordination that extends beyond face-to-face interactions, we operationalize media reinforcement as a four-category-based construct, consisting of a hierarchical increasing order of (1) postcards, (2) telephone calls, (3) e-announcements sent through the Internet, wiki, blog sites, or websites, and (4) emails.

As noted earlier in the paper, prior studies establish that email is a richer communication medium than telephone [Lee, 1994; Lee and Panteli, 2010; Panteli, 2002], and telephone communication is richer than postcards [Lengel and Daft, 1989]. A handwritten targeted postcard or letter may be effective to serve as a reminder or a follow up tool for its simplicity and the possible intimate feeling; however, in comparison to telephones and digital media, it is not rich enough in communicating educational materials. E-announcements are new in the category and refer to digital and collaborative content including wikis, blog sites, or websites. While the e-announcement forms of media may not be synchronous, as prior studies mention, they are highly interactive, rich, and collaborative in terms of message cues, conversational technologies, and information exchange platforms [Wagner, 2004]. Therefore, placing e-announcements next to email in the context of chronic disease management is highly relevant, especially from the perspective of content's richness and informative (educational) channel. Consequently, we rank e-announcements higher in the hierarchical order of media categories than telephones and postcards, but lower than emails, because they are not as synchronous and bidirectional as emails. We therefore code media reinforcement (MR) as a four-scale categorical single-item variable, in the order of emails, e-announcements, telephones, and postcards.

Table 1: Survey Questionnaire for Main Variables and Coding Scheme

Variable	Definition and measurement items
Self-awareness (SA)	The extent to which an individual is aware of the symptoms, complications, and basic reasons of the disease.
	<ol style="list-style-type: none"> 1. I am aware of the symptoms of diabetes. (SA1) 2. I am aware of the complications with diabetes. (SA2) 3. I know that diabetes means an increased glucose level in my blood. (SA3)
Education benefits perceptions (EB)	The perception of an individual about the benefits of the education related to the disease management.
	<ol style="list-style-type: none"> 1. I have been told by my doctor what the insulin or tablets do to my blood sugar. (EB1) 2. I have been referred by my doctor to a diabetes education class. (EB2) 3. Diabetes education has improved my quality of life. (EB3) 4. It is important that I regularly check my blood sugar. (EB4) 5. Note: EB1 and EB4 were dropped due to convergent validity and discriminant validity issues.
Patient satisfaction (PS)	The extent to which a patient is satisfied with the management of the disease, in his/her own terms, through the interactions with doctors and healthcare providers.
	<ol style="list-style-type: none"> 1. I am satisfied with the way my diabetes is managed, in that my condition is under control and I feel comfortable with my lifestyle. (PS1) 2. The frequency I visit my healthcare provider, or seek medical attention, is adequate. (PS2) 3. The length of time I spent with my doctor is adequate. (PS3)
Life changing interventions (LC)	The interventions that a patient feels are appropriate and actionable for managing the disease.
	<ol style="list-style-type: none"> 1. I understand the following interventions to manage diabetes and have taken actions regarding them. 2. Diabetes is a serious condition that needs a change in the way I lead my life. (LC1) 3. Exercise is crucial to combat my diabetes. (LC2) 4. Managing sugar is an important way to manage diabetes. (LC3) 5. Altering my diet will improve my diabetes condition. (LC4)
Media reinforcement (MR)	Use of effective and richer media to provide educational material and follow ups to a patient regarding disease management.
	<ol style="list-style-type: none"> 1. What is the best method of providing you with educational material and easier follow up to attend classes regarding life changing interventions for diabetes? (The instrument had a few examples to explain the following terms.) 2. Email (coded as 4) 3. E-announcements (i.e., announcements sent through any electronic media, such as the Internet, wiki, blog sites, or websites) (coded as 3) 4. Telephones (coded as 2) 5. Postcards (coded as 1)

Table 2: Demographics Questions and the Results

Label	Question	Results (with % of respondents in brackets)
Gender	Is your gender:	1. Male [41.03%], 2. Female [58.97%]
Education	What is the highest level of education that you have completed?	1. Some School [10.25%], 2. High School [37.75%], 3. Vocational School [7%], 4. Associates Degree [14%], 5. Bachelor's Degree [9%], 6. Master's Degree [9%], 7. Doctoral Degree [1%], 8. Other [12%] These categories were coded into two groups for comparison: without degree (N = 43) and with degree (N = 35).
Disease duration	How long ago was your diabetes diagnosed?	1. 0–2 years [6.4%], 2. 2–4 years [33.65%], 3. 5–9 years [30.5%], 4. 10–14 years [10.25%], 5. 15 years or more [19.2%].
Ethnicity	What is your ethnicity?	1. White/Caucasian [53.85%], 2. Black/African-American [8.65%], 3. Native American [0%], 4. Hispanic/Latino [36%], 5. Asian/Pacific Islander [0%], 6. Other [1.5%].
Income	What is your household income?	1. > \$25,000 to < \$30,000 [23.1%], 2. > \$30,000 to < \$35,000 [28.2%], 3. > \$35,000 to < \$40,000 [20.5%], 4. > \$40,000 [28.2%]. These categories were coded into two groups for comparison: household income > \$34,500 and household income < \$34,500.

Empirical Analysis

A two-step process [Anderson and Gerbing, 1988] was followed to analyze the data. First, we assessed the measurement model with SPSS and LISREL and reported the descriptive statistics, reliability, convergent validity, and discriminant validity of the variables/factors. Second, we examined the combined structural model with SmartPLS version 2.3 [Ringle, Wende and Will, 2005] and reported the results of the hypotheses testing.

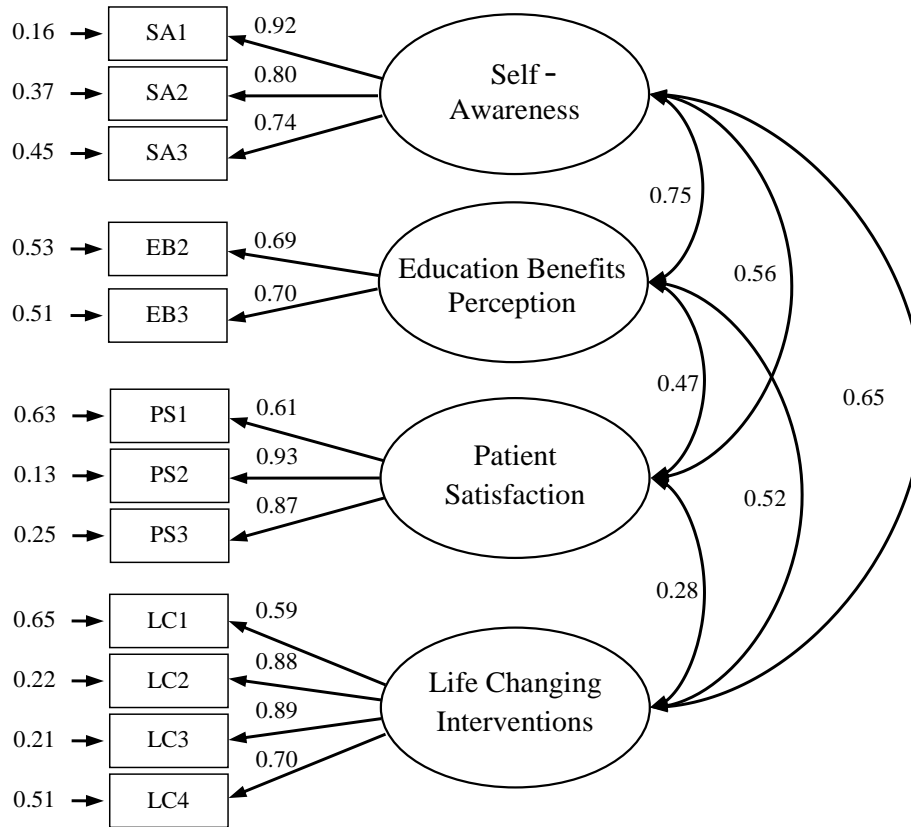
Measurement Model and Validation

The descriptive statistics of the four factors are reported in Table 3. The means of the four factors range from 3.79 to 4.56 and the standard deviations from 0.52 to 0.97. All Skewness values (from -0.90 to -0.45) are within the limit of minus 2 and plus 2 and all Kurtosis values (from -0.14 to 1.41) are less than 5.0. The results provide evidence that factor scales are normally distributed [Ghiselli, Campbell and Zedeck, 1981]. A four-factor correlated measurement model was tested with LISREL (see Figure 2). The values of χ^2 , RMSEA, NNFI, and CFI were used to assess the model-data fit [Bentler, 1990; Bentler and Bonnet, 1980; Joreskog and Sorbom, 1989; Steiger and Lind, 1980]. The measurement model has a good model-data fit with an χ^2 value of 57.56 for 48 degrees of freedom, chi-square per degree of freedom is 1.2, p-value 0.1623, RMSEA 0.051, NNFI 0.97, and CFI 0.98. Standardized item-factor loadings of the model range from 0.59 (t-value = 5.50, $p < 0.001$) to 0.92 (t-value = 9.99, $p < 0.001$). One major cross loading was from patient satisfaction item 1 (PS1) to education benefits perception (EB) with modification index equal to 7.96 and expected change 0.42. The error term of PS1 is correlated with that of EB3 with the modification index equal to 10.70 and expected change 0.26. With the caution of the cross loading and the correlated error term, we decided to continue the examination of the reliability and validity of the measurement model.

Scale reliabilities are assessed with Cronbach's [1951] alpha (α). The value of 0.7 or above is considered acceptable [Nunnally, 1978]. All measures except education benefits perception (EB) have sufficient reliabilities with the α values equal to or greater than 0.81. The α value for EB is 0.63, which is marginal but acceptable considering the reflective measure of the factor [Peterson, 1994].

Convergent validity assesses how well measurement items load on their latent variable in the model. Item-factor loadings equal to or greater than 0.60 indicate good convergent validity [Bagozzi and Yi, 1988]. Item-factor loadings are above 0.60 except item LC1 (value of 0.59). Average variance extracted (AVE) has also been suggested as an alternative measure of convergent validity. An AVE score of 0.50 or higher indicates that the variance captured by the items measuring the intended factor is greater than the variance due to the measurement error and, thus, suggests convergent validity [Fornell and Larcker, 1981]. The AVE scores were 0.68, 0.48, 0.66, and 0.60 for self-awareness (SA), education benefits perception (EB), patient satisfaction (PS), and life changing interventions (LC), respectively. SA, PS, and LC have AVE scores above 0.50. EB has a marginal AVE score for convergent validity. The scores of item-factor loading and AVE provide evidence that the measurement model has adequate convergent validity for all four factors.

Discriminant validity is assessed by examining whether the measurement items share more variance with their intended factor than any variance that the factor shares with other factors [Fornell and Larcker, 1981]. Following this



Chi-square = 57.56, df = 48, p-value = 0.16230, RMSEA = 0.051, NNFI = 0.97, CFI = 0.98

Figure 2. The Measurement Model (Standardized Solutions)

approach, a factor has discriminant validity if the square root of its AVE score is greater than the correlations between this factor and other factors. The square roots of AVEs for SA, EB, PS, and LC are 0.823, 0.695, 0.815, and 0.775, respectively. These square roots are all greater than the correlations between the focal factor and other factors (see Table 3), providing evidence of discriminant validity.

Table 3: Descriptive Statistics, Reliability (α), Average Variance Extracted (AVE), and Correlations (N = 78)

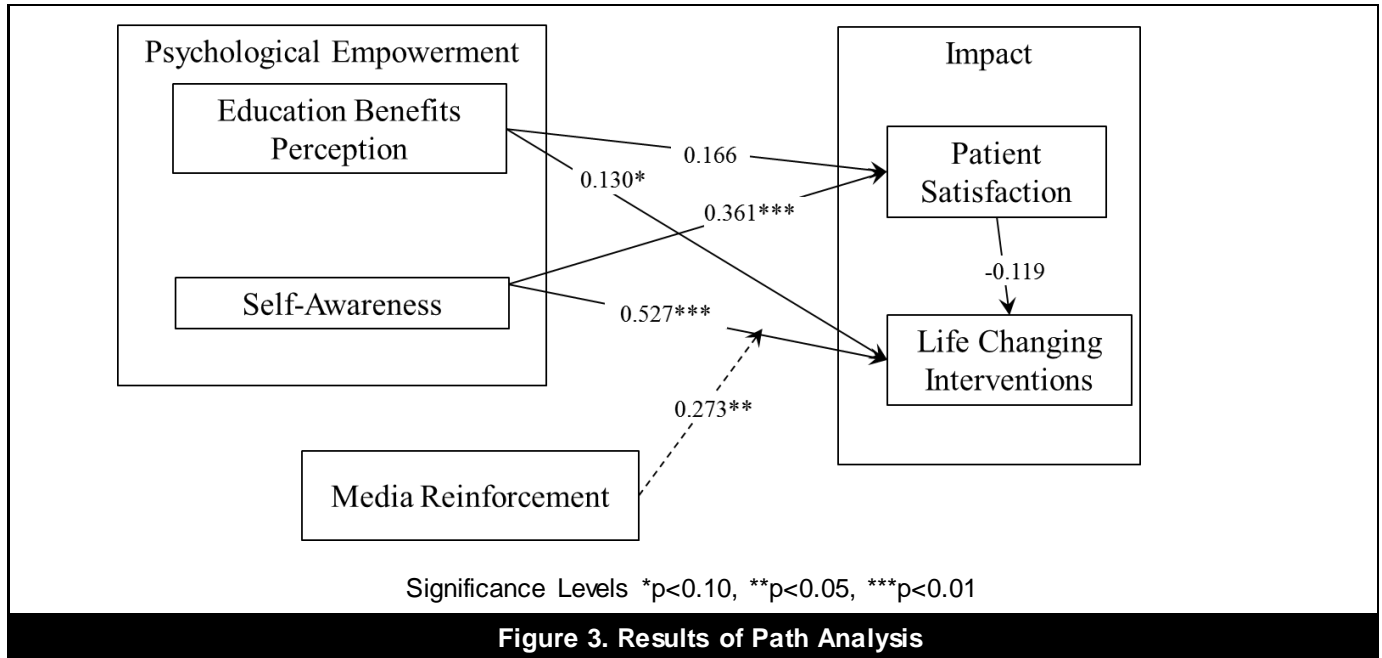
	Self-awareness (SA)	Education benefits perception (EB)	Patient satisfaction (PS)	Life changing interventions (LC)
Descriptive statistics				
# of indicators	3	2	3	4
Mean	4.47	3.79	3.87	4.56
Std. Dev.	0.59	0.97	0.81	0.52
Skewness	-0.73	-0.45	-0.85	-0.90
Kurtosis	-0.23	-0.75	1.41	-0.14
α and AVE				
Reliability (α)	0.85	0.63	0.81	0.84
AVE	0.68	0.48	0.66	0.60
Correlations				
SA				
EB	0.55			
PS	0.46	0.45		
LC	0.56	0.39	0.22*	
* All correlations are significant at $p < 0.01$ except the one between PS and LC, which is not significant (0.051).				

With the acceptable levels of reliability, convergent validity, and discriminant validity of the measurement model, we decided to proceed with hypotheses testing. Hypotheses were tested using SmartPLS software version 2.3 [Ringle

et al., 2005]. SmartPLS is a partial least square (PLS) technique that uses a component-based approach for estimation with bootstrapping option for the standard errors [Gefen and Straub, 2005].

V. RESULTS

Figure 3 provides the results of the hypotheses testing. The path coefficients with their significance levels are presented in Table 4 (see column 1 of Table 4). We find that the influence of education benefits perception (EB) is not significant on patient satisfaction (PS), thus providing no support for hypothesis H1a for the overall sample. There was a slightly significant effect of education benefits perception (EB) on life changing intervention (LC) ($\beta = 0.130$, $p < 0.10$), thereby supporting hypothesis H1b. We also find that self-awareness (SA) influence is both significant and positive on patient satisfaction (PS) ($\beta = 0.361$, $p < 0.01$) as well as on life changing interventions (LC) ($\beta = 0.527$, $p < 0.01$). These results support hypotheses H2a and H2b.



In regards to the complementary effect of media reinforcement (MR) on the relationship between self-awareness (SA) and life changing interventions (LC), we find a significant and positive influence ($\beta = 0.273$, $p < 0.05$). This result supports hypothesis H3; that is, media reinforcement (MR) increases the positive impact of self-awareness on life changing interventions. This was evident from the change in R-square value or explained variance in the main dependent variable, life changing interventions (LC); variance explained in LC increased by 11.3 percent (51.3 percent in the MR-moderated model from 40 percent in the direct effect model). We found that patient satisfaction (PS) does not have a significant effect on life changing interventions (LC). Hence, H4 was not supported.

Table 4: Path Coefficients of Estimation Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Base model	Gender		Education		Ethnicity		Income	
Hypotheses	All patients N = 78	Male N = 32	Female N = 46	Without degree N = 43	With degree N = 35	White Caucasian N = 42	All other ethnicity N = 36	<\$34,500 N = 40	>\$34,500 N = 38
EB → PS (H1a)	0.166	0.443**	0.244	0.157	0.349**	0.169	0.384**	0.185	0.384*
EB → LC (H1b)	0.130*	0.111	0.031	0.198*	-0.100	0.014	0.208	0.291*	-0.168
SA → PS (H2a)	0.361***	0.144	0.377**	0.406**	0.239	0.309	0.365**	0.489**	0.076
SA → LC (H2b)	0.527***	0.424**	0.643***	0.615***	0.492**	0.659***	0.532***	0.456**	0.700***
SA x MR (H3)	0.273**	0.031	0.342***	0.350***	0.240	0.276	0.326	0.222	0.338***
PS → LC (H4)	-0.119	0.005	-0.095	-0.202*	0.113	-0.244*	0.091	-0.148	0.173

*** p<0.01, ** p<0.05, * p<0.10

Extended Analysis

Contextually, health management behavior may vary depending on the demographics of patients, including gender, education, and ethnicity [Lutfey et al., 2008]. We performed a sub-sample analysis by gender (male versus female),

education (degree versus non-degree), ethnicity (Caucasian versus other), and income (\$34,500 and below versus over \$34,500). We present results of our analysis based on sub-samples of the patients in columns 2 to 9 of Table 4, whereas column 1 shows the results of the base model.

Results show that the effect of education benefits perception on patient satisfaction was significant for male patients ($\beta = 0.443$, $p < 0.05$), but not significant for female patients. Self-awareness of diabetes for males was found to be inconsequential to satisfaction with disease-related care. For females ($\beta = 0.377$, $p < 0.05$), it was otherwise (i.e., self-awareness has a positive impact on satisfaction). Increased awareness about diabetes improved action for life changing interventions in both males ($\beta = 0.424$, $p < 0.05$) and females ($\beta = 0.643$, $p < 0.01$) in the sample. Presence of media was found to be significant in reinforcing the association between patient self-awareness and actions taken to manage diabetes only among females ($\beta = 0.342$, $p < 0.01$). Similar to the results obtained with respect to the base model, patient satisfaction with disease management did not impact a male or female patient's actions on life changing interventions.

With respect to education, we compared results across patients with and without a degree. We found that the effect of education benefit perception on patient satisfaction is significant ($\beta = 0.349$, $p < 0.05$) for educated patients (with a degree), but had no impact among less educated patients (without a degree). Perception of education benefits seemed to motivate individuals with less education to take actions to manage their diabetes ($\beta = 0.198$, $p < 0.10$), but did not motivate patients with a higher education. Self-awareness increased satisfaction ($\beta = 0.406$, $p < 0.05$) for patients with a degree, but no such impact was found for individuals without a degree. Self-awareness had an impact on life changing interventions for educated as well as less educated patients (i.e., for patients with degree $\beta = 0.615$, $p < 0.01$; and patients without degree $\beta = 0.492$, $p < 0.05$). The complementary effect of media reinforcement on the relationship between self-awareness and life changing interventions ($\beta = 0.350$, $p < 0.01$) was significant among people without a degree, but had no significant effect for individuals with a degree. Contrary to the base model, patient satisfaction had a significant negative impact on motivations to participate in health-related change behaviors ($\beta = -0.202$, $p < 0.10$) among those that do not have a degree, although it was not significant for individuals in the sample with a degree. Plausibly, less educated patients elude the life changing intervention actions, once they feel that they are satisfied with the disease management process. Results indicate these patients did not understand the complexity and continuing nature of a chronic disease, thus emphasizing the role of disease education for less educated groups of patients.

A White Caucasian's perceptions about education benefits did not influence his/her satisfaction with diabetes care. For individuals representing all other races in the sample, education influences satisfaction levels ($\beta = 0.384$, $p < 0.05$). Self-awareness about diabetes did not impact satisfaction with disease treatment among White Caucasians. On the contrary, individuals in the sample representing all other races ($\beta = 0.365$, $p < 0.05$) did seem to think positively about the nature of their diabetes treatment when made aware of the causes and consequences of diabetes. Self-awareness had an impact on life changing interventions for both White Caucasians and the sample of individuals belonging to all other races in the sample (i.e., for White Caucasians, $\beta = 0.659$, $p < 0.01$; and patients belonging to other races, $\beta = 0.532$, $p < 0.01$). Further, in the case of White Caucasians, the effect of patient satisfaction on life changing interventions was found to be significant and negative ($\beta = -0.244$, $p < 0.10$), indicating the laid-back effect to manage diabetes when patient satisfaction increases. Education benefits have a significant positive effect on a patient's satisfaction with treatment among individuals with an income of \$34,500 or higher ($\beta = 0.384$, $p < 0.10$), but is not significant among individuals earning less than \$34,500. This difference indicates that richer people derive higher satisfaction by seeking more knowledge about the disease. Among the lower income ($< \$34,500$) group, there was a significant impact of education benefits on life changing interventions ($\beta = 0.291$, $p < 0.10$), but no significant impact for the higher income group. For the lower income group, self-awareness improved satisfaction ($\beta = 0.489$, $p < 0.05$), but not for the higher income group; whereas the linkage between self-awareness and life changing interventions was significant for both the groups (i.e., lower income, $\beta = 0.456$, $p < 0.05$; and higher income, $\beta = 0.700$, $p < 0.01$). The influence of media reinforcement in motivating higher income individuals to act and manage diabetes was strong ($\beta = 0.338$, $p < 0.01$), while media reinforcement had no significant influence among patients belonging to the lower income group. Overall, although the results of the sub-sample analysis indicate differences across groups of patients, our findings remain broadly similar.

VI. DISCUSSION

Findings

The goal of this study was to explore how the two dimensions of psychological empowerment (e.g., meaning as manifested through perception of educational benefits, and self-awareness to reflect on the enablement of self-efficacy for disease management) influence life changing interventions for patients with diabetes. We theoretically argued and empirically explored how media can reinforce the self-awareness dimension of psychological

empowerment on life changing interventions and that patient satisfaction plays a mediating role in influencing the association between psychological empowerment and life changing interventions for diabetes.

We find that perception about education benefits positively influences life changing interventions. This finding indicates that perceptions about gaining knowledge relevant to diabetes serve as a primary precursor for a patient's management of the disease. The meaning that is derived from the knowledge helps patients to bridge the gap between their cognitive inhibitions to take action for disease management.

We also find that self-awareness about the disease complications positively influences patient satisfaction and life changing interventions. This finding indicates that as a patient acquires nuanced knowledge of the disease and possible ways to manage it, he/she gains satisfaction with the disease management progress, and in turn becomes motivated to manage the disease and adopt interventions. In other words, an awareness-actuated self-efficacy helps patients orient their motivations to actionable items.

With respect to the complementary effect of media reinforcement, we find that as providers use intensive or richer media for communication with patients, the influence of self-awareness on life changing interventions increases. In other words, using richer media for communication motivates a patient who is aware, but otherwise lacks an action plan toward life changing interventions.

We theoretically argue for a mediation effect of patient satisfaction on life changing interventions. Empirical results did not support a mediation effect in our overall sample of patients. However, sub-sample analyses found partial support for patient satisfaction playing a mediating role between psychological empowerment and life changing intervention actions. Contrary to our theoretical arguments, patient satisfaction has a negative influence on life changing interventions for less educated and White Caucasian groups of patients. Plausibly, some patients who are satisfied with their progress deter from the action related to life changing interventions, although motivations to manage the disease remain high.

While we found support for our arguments in the overall sample of patients, the results vary across patients according to their gender, education, ethnicity, and income. Broadly, the influence of self-awareness remains significant across all categories of sub-sample of patients, while other results change. Further, the interaction effect of media reinforcement remains significant only among females, individuals without a degree, and high income (> \$34,500) groups. From the study findings, we infer that demographic factors need consideration in disease management. Plausibly, different groups of patients require a different, individual-oriented process of psychological empowerment. Indeed, there is no 'panacea for all' approach when it comes to disease management even when best practices may be more beneficial to patients and society as a whole.

Contributions

This article makes three contributions. First, it extends prior literature and suggests psychological empowerment is vital in managing an individual's actions related to disease management rather than only in case of work environment [Doll and Deng, 2010; Spreitzer, 1995]. We conceptualize that psychological empowerment is a precursor for patients' action on life changing interventions for the chronic disease management process. This article contributes to existing literature on health promotion behavior through psychological cognitive perspectives [Bandura, 1998; Sutton, 2008]. Research conducted involved mapping the two dimensions of psychological empowerment toward the disease management process and arguing that meaning and self-awareness are two prerequisites for the actionable intervention process.

A second contribution of this study is in explicating the complementary effect of media reinforcement on the relationship between self-awareness about the disease and life changing interventions. Indeed, disease management is often neglected and involves a one-directional approach of the doctor or provider instructing patients to manage the disease. Such an approach misses benefits of a bi-directional approach that involves empowering the patient and taking continuous feedback throughout a chronic disease management process. Our findings show that bi-directional communication media, such as emails, highly influence the outcome of the chronic disease management process. In empirically validating media reinforcement's complementary effect on an individual's management of a disease, we extend the media richness theory to the chronic disease management process. Finally, in exploring the impact of education benefits on life changing interventions, we contribute to health management literature in the context of diabetes management programs. We establish that such programs are effective for a patient if they can be designed and implemented in the right direction.

Limitations and Implications for Research

We acknowledge the following limitations of the study that future research should seek to overcome. First, because of data limitations and the use of a cross-sectional design, results of the study are associational in nature. Longitudinal data across a number of patient encounters can help to determine the causal effect of the conceptual model. Second, although our sample size is small compared to the number of diabetes patients across the United States, it is appropriate for our study since the focus is on individuals who are receiving follow up treatment for their condition. Nevertheless, larger patient data sets might inform nuanced findings. Third, the empirical analysis in the context of a specific disease (i.e., diabetes) could limit the general applicability of the findings to other chronic diseases such as asthma or cancer. Further, this study is limited to exploring the effect of one dimensional media reinforcement that can be extended to other dimensions, such as different levels of communication during disease management processes, or different communication strategies emerging from Web 2.0 technologies (namely, social media such as Facebook and Twitter). In addition, exploring the concept of psychological empowerment and media reinforcement in the context of emerging complex health IT artifacts (electronic medical records or personal health records) can provide additional insights beyond that which is provided in this study. Finally, the mediation effect of patient satisfaction needs further exploration, such as: what type of diabetes management education program draws more patient satisfaction (e.g., a one-on-one discussion or a group session)?

Managerial Implications

We draw three managerial implications from the results. First, education benefits perceptions and self-awareness influences life changing interventions. Healthcare providers need to give utmost importance to explaining detailed issues, concerns, and complications associated with the disease. Indeed, often patients take an approach that “the doctor knows about my disease, I do not need to know about it.” As a result, they neglect following simple precautions, such as leaving sugar out of coffee, or managing fatigue. Such negligence leads to an aggravated situation and advanced stage of the disease.

Second, providers need to pay attention in following up with patients proactively. Surely, with the emerging focus on preventive care in health care, appropriate follow ups are necessary to curb costs and increase quality of a treatment for a disease, rather than leaving the patient to manage on his/her own. Using richer electronic media to communicate with the patient enables higher self-awareness-based actions for life changing interventions.

Third, as we note in our sub-sample analysis, patients’ disease management process is also contingent on demographic characteristics. For example, income or ethnicity plays an important role in continuing the activities necessary for a disease management process. Often, the failure to follow an appropriate intervention may be due to the income or family situations of the patient; providers need to take these into account while treating patients.

VII. CONCLUSION

This article is one of the first empirical tests exploring how two dimensions of psychological empowerment increase motivation to act on life changing interventions. The two dimensions include meaning (through perception of educational benefits) and self-awareness about a disease. Theoretical conceptualization anchors to the psychological empowerment and media richness concepts and establishes the role of providers’ communication in chronic disease management. Using a unique data set surveying diabetes patients, we find the influence of self-awareness on life changing interventions increases when patient-provider communication is reinforced using richer media to follow up with patients. The amplified influence signifies the importance of leveraging the emerging digital communication wave to empower patients to take control of their health, thereby enabling a patient-empowered healthcare system. Thus, we contribute to existing healthcare management and information systems literature and examine the importance of digital media in patient empowerment. Further, the study also identifies some salient factors that should receive requisite attention from healthcare providers while offering health management programs and dealing with patients suffering from chronic diseases.

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Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the article on the Web, can gain direct access to these linked references. Readers are warned, however, that:

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