

Role of Social Media in Fostering Effective Health Management

Completed Research Paper

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Abstract

With the widespread use of social media in our mundane life, its applications have been used in various ways in the healthcare area. The more people find information and psychological supports from social media, the more healthcare service organizations provide health information via social media. Despite such trends, little empirical research has systematically examined meaningful linkages between the utilization of social media and individuals' health outcomes. To address this research gap, this study investigates how social media influence individual users' health outcomes by taking advantage of the SPO (Structure-Process-Outcome) framework, especially focusing on health management. The findings reveal that health information social media (HISM) have significant impacts on individuals' psychological and behavioral health outcomes. The main findings have contributions to extant literature in theorizing the role of social media in fostering effective health management and have managerial implications for health service providers by suggesting the better utilization of socially well-accepted tools/resources (i.e., social media) for enhancing their healthcare service quality.

Keywords: Health Information Social Media, Hospital Social Media, SPO Framework

Introduction

Along with the widespread use of social media, its applications have been implemented in various business domains. For instance, many modern companies are taking advantages of social media to strengthen communication channels with their employees and customers (Miller and Tucker 2013), and to improve other important areas/functions of their businesses. Recently, such social media applications and tools have also extensively utilized in the healthcare service industry. With advances in medical science and technology, and aging population, considerable numbers of diseases have become chronic where they are preventable and treatable. Continuous health management becomes everyone's work. Having a greater interest in a healthy long life, more and more people are visiting healthcare-related websites (e.g., WebMD) to find useful health information on a regular basis and to self-manage their health easily (Refebvre and Bornkessel 2013). According to research on online healthcare, the appearance of social media, such as Twitter, Facebook, and blogs, has also changed the manner of doctor-patient communications, and made new healthcare experience (Refebvre and Bornkessel 2013). People have psychological supports as well as disease-related information from social media (Greysen et al. 2010). In response to the trends, some leading healthcare service providers such as the Mayo Clinic and the Cleveland Clinic in the US are deploying all available means in social media to provide various types of health information and to manage their

customer relationships. It is reported that people prefer the healthcare services by "academic medical centers/teaching hospitals" and "doctor/physician groups" on the Internet due to their high credibility (Anderson and Agrawal 2011). Christensen et al. (2009) also argued that online communities (e.g., Patientlikeme.com) could be an effective business model for healthcare services dealing with chronic diseases requiring continuous prevention and management.

In line with this, the intersection of healthcare and social media represents a promising space for future IS research with increasing importance for the public. Prior literature suggests that conditions and effective design rules for better healthcare services along with social media applications are awaiting for further studies (Fichman et al. 2011). Despite this growing importance of the topic, the scope of research in this field is still far limited. While researchers in the social media area have just applied existing findings from their research into the healthcare context (Fichman et al. 2011), ones in medical research have fragmentarily examined the impact of social media as a medical intervention on the treatment of (chronic) diseases such as obesity and diabetes (Cavallo et al. 2012; Napolitano et al. 2013; Shaw et al. 2011).

To gain a comprehensive understanding about these issues, this study investigates the pivotal role of social media in encouraging better health management for individuals. Specially, we have introduced the term "HISM", health information from social media, to identify the effectiveness of social media as a mean of useful health information resources for effective health management. Consequently, this research answers the following key research questions:

- Does HISM have an impact on one's health management?
- Which factors of HISM are influential on one's health management?
- How does the impact of HISM on one's health management occur?

To address these questions, this study aims at examining how HISM affects the processes and the results of care for self-management based on the structure-process-outcome (SPO) framework. The SPO framework has provided a solid theoretical basis for recent medical research works especially in evaluating the quality of healthcare services. This study utilizes social media being operated by a general hospital. They are representative and credible healthcare service organizations in South Korea. We develop a research model based on a concept of self-management and the SPO framework, and consequently a set of research hypotheses are formulated to identify the influences of HISM on individuals' health management.

Literature Review

This study finds theoretical grounds from an existing concept and a well-established theoretical framework – the concept of self-management and the SPO framework. Self-management is a concept commonly used in describing one's health management. By examining self-management outcomes from HISM users, the impact of social media on one's health management is expected to be identified. In addition, the SPO framework evaluates the degree to which a healthcare service achieves a desirable healthcare outcome by considering the elements, activities, and overall results of the given service. By investigating and applying service elements, activities, and results in social media, what factors social media have and how the factors influence a person's health management can be identified.

Previous research dealing social media in healthcare are mainly focused on the phenomenon of social media use and the medical impact of social media use. Most of research are descriptions of the phenomenon, and the empirical research on the impact of social media are rare. Most empirical research on the social media impacts in healthcare focused on identifying the medical effect without explaining the source of effects. Therefore, considering the increased interest of this arena, the comprehensive empirical research on the impact of social media in healthcare is needed. In particular, this study looks at the importance of social media as stimulus for enhancing self-management by utilizing datasets gathered from social media users. In line with this, Hawn (2009) argues that effective self-management can be achieved from supports via social media.

Structure-Process-Outcome (SPO) Framework

Donabedian (1988) first proposed a framework that could measure the quality of healthcare by evaluating its structure, process, and outcomes. This concept has been used as a basis for inferring quality in many studies (Campbell et al. 2000; Salzer et al. 1987). To measure healthcare quality, the SPO framework evaluates the healthcare service environment ('structure'), service execution ('process'), and service outcome ('outcome'). Donabedian (1988) argued that "a good structure increases the likelihood of a good process, and a good process increases the likelihood of a good outcome." Donabedian (2004) also stated

that care quality is assessed by parts of SPO to capture the given aspect of the quality; however, a combined strategy can be of help in obtaining a more comprehensive assessment. For this reason, the SPO framework will be used to understand the comprehensive impact of self-management among HISM users. However, since the SPO framework has been used for healthcare in the physical environment, it is necessary to tailor it to the context of this study, which is healthcare service in the social media environment. The adjustments made are explained in detail as follows:

Outcome

“Outcome” in healthcare is closely related to the result of patient care: a change in health status and an antecedent of future health status. Although typical outcomes in healthcare are morbidity, recovery, and restoration of physical function (Donabedian 2005), the healthcare outcomes are not limited concepts regarding bio-medical health status. It can also include intermediate outcomes such as changes in one’s attitudes, knowledge, and behaviors associated with his/her health. This study attempts to examine the effectiveness of social media usages on healthcare management for the general population. Self-management is a popular term used in research on behavioral interventions and for healthful behaviors (Lorig and Holman 2003). In prior literature, self-management outcomes are mostly evaluated by performing behaviors related to self-management and are the key predictors of self-management behaviors, such as patient activation measure (PAM). In many recent studies, PAM has been adopted as the measure of psychometric properties for self-management outcomes including knowledge, skills, and confidence for the self-management of one’s health or chronic condition (Fowles et al. 2009; Lorig et al. 2013). In PAM, “activation” refers to having the capability and the willingness to take on the role of managing one’s own health (Hibbard et al. 2008). Having a sense of control over one’s health, as well as the knowledge, skills, beliefs, and behaviors, that a patient needs to manage one’s health are critical elements for better health conditions. Several studies have indicated that being engaged and activated with regard to one’s own care – carrying out the needed behaviors – are closely linked to better health outcomes (Bodenheimer et al. 2002; Von Korff et al. 1997). Thus, to assess the self-management outcome in a comprehensive manner, this study adopts both PAM and self-management behaviors as the dependent variables.

Process

“Process” in healthcare refers to what is done between a healthcare provider and a healthcare recipient. Simply, it is defined as the actual delivery and receipt of care (Campbell et al. 2000). Prior literature suggests the two aspects in the process of care: (1) the technical process of care and (2) the inter-personal process of care. The technical process of care, sometimes simply referred to as “clinical care,” refers to medical knowledge execution. When a healthcare provider makes an appropriate decision regarding the care and skillfully executes the plan (Blumenthal 1996), it constitutes high technical care quality. In contrast, interpersonal care has been viewed as the social and psychological interactions between the healthcare provider and the healthcare recipient. This has been operationalized as communication (Blumenthal 1996; Angst et al. 2012), sympathy (Blumenthal 1996), and responsiveness (Carmel and Glick 1996). Sherbourne and Stewart (1991) indicated that the interpersonal social relationship associated with care refers to social support.

If we apply this to the context of HISM, the process can be defined as activities over the social media among users, which has two aspects: technical (clinical) and inter-personal (social) support. Technical support primarily focuses on the specialized advice regarding one’s health condition, such as prognosis and exercise/diet plan for one’s health status. In this study, we use the term “condition-specific support” for such a technical process, and define it as “the degree to which a user perceives that (s)he has received the potential treatment options specialized to his/her personal health condition – such as prognosis and health management action plan – in HISM.” Regarding the interpersonal (social) support, users in HISM can build a relationship by sharing an emotion they have through comments and postings. Sherbourne and Stewart (1991) assessed social support in a medical study as measuring the degree to which interpersonal relationships serve particular functions, such as emotional support, appraisal support, informational support, and social companionship. Consistent with this, this research uses the term “inter-personal support” for social support in HISM, and defines it as “the degree to which a user perceive that (s)he has received social support in the HISM.”

Structure

In the healthcare context, the “Structure” refers to the setting (or environment) in which the processes and the outcomes occur (Donabedian 1988). Prior literature suggests that the structure of healthcare systems consists of three key resources: (1) human resources related to the healthcare service provider (Campbell et al. 2000; Donabedian 1980), (2) intellectual resources related to knowledge for care (Campbell et al. 2000; Donabedian 1980), and (3) material resources related to healthcare service facilities where the knowledge is delivered (Campbell et al. 2000; Mainz 2003).

In the physical environment, healthcare services (i.e., medical knowledge execution) are delivered by healthcare professionals using medical facilities. From the HISM point of view, the structure can be defined as the social media conditions under which activities of exchanging healthcare-related are delivered by information providers via social media. In this context, corresponding to these three resources of structure in healthcare service, this study draws three resources – (1) information provider (human resource), (2) information (intellectual resource), and (3) facilities to deliver information (material resource) – as components of the structure in HISM. Subsequently, this study draws variables in accordance with each resource of this structure.

First, with respect to human resources in HISM, source credibility is considered. Source credibility refers to the quality indicators of a communicator such as his/her expertise, trustworthiness, attractiveness, and power (Belch and Belch 1987). Eysenbach et al. (2002) and Hu and Sundar (2009) identify that one of the major elements of health information quality on the Internet is source credibility, and that credibility has precedence over processing the information. Moreover, in case of the social media run by a healthcare service organization (e.g., hospitals), a considerable amount of postings delivering various healthcare information is typically posted under the name of the organization. However, it is not clear yet whether the viewers of the information regard the source of information – an information provider – as an expert who belongs to the organization or not. To determine this, this study adds one more dimension of source credibility: the credibility of the organization that runs the HISM account. Goldsmith et al. (2000) suggest that corporate credibility can be a specific type of source credibility. This type of source credibility focuses on the perceived expertise and trustworthiness of the organization, which offers services or products, rather than any spokespersons hired by the organization. In the way of focusing one’s perception to an organization, this study considers an additional type of information source, the account owner, as a research variable for human resources in HISM. We use the term ‘account owner credibility’ for such credibility of the organization. Thus, this study adopts source credibility and account owner credibility as variables to measure the key attributes of human resources in HISM, and the variables are defined Table 1.

Second, with respect to intellectual resources in HISM, the content type of message in HISM is considered. In the physical healthcare setting, the methods of care are driven by the knowledge, know-how, and attitudes that care providers have. In the social media setting, the methods of providing information are driven by messages, such as postings and comments. According to prior research, there are two types of health information – information based on experiential knowledge and that based on medical knowledge – and emotional appeals in the online environment (Hartzler and Partt 2011). However, in the preliminary observation on HISM, we found that many postings and comments did not fall into one of these types. For this reason, to gain insight for the content type of messages in HISM, this study conducted content analysis of messages (postings and comments) in HISM, run by a healthcare service organization for the purpose of providing health information. The goal of content analysis is “to provide knowledge and understanding of the phenomenon under study” (Downe-Wamboldt 1992). The content analysis of messages in HISM was executed considering the main steps for human coding, as suggested by Neuendorf (2002). As a result of the content analysis, this study identifies that messages (postings and comments) in HISM provide four types of content: knowledge-based health information (KBHI), experience-based health information (EBHI), emotional appeals (EA), and non-health topics (NHTs). Accordingly, this study adopts these four types of message content as variables for measuring an attribute of information in the HISM; each variable is defined Table 2.

Third, with respect to material resources in HISM, media capability which supports both information processing and transmission is considered. Media capability is referred as the potential structures provided by a medium that influences the manner in which individuals can transmit and process information (Dennis et al. 2008; Rice and Steinfeld 1994). In prior research, Dennis et al. (2008) suggest the five primary media capabilities supporting information transmission and information processing. Transmission velocity (the speed at which a medium can deliver a message to the intended recipients), parallelism (the number of simultaneous transmissions that can effectively take place) and visual sets (the number of ways in which a

medium allows information to be encoded for communication) are important in deriving a medium’s ability to support information transmission. Rehearsability (the extent to which the media enables the sender to rehearse or fine tune a message during encoding, before sending) and reprocessability (the extent to which the medium enables a message to be re-examined or processed again, during decoding) are important for information processing. Social media offers functions that provide help to exchange information, such as postings and comments, a variety of visual symbols and posting sharing. Hence, this study adopts media capability to measure an attribute of material resources in the HISM. It can be defined as “the extent to which a user perceives the HISM that makes available users to transmit and process information.”

Variable	Definition
Source Credibility	The extent to which the user perceives that the information provider in HISM has the expertise and the trustworthiness to fulfill his/her needs.
Account Owner Credibility	The extent to which the user perceives that the account owner of HISM has the expertise and the trustworthiness to fulfill his/her needs.

Table 1. Human Resource in HISM

Variable	Definition
Knowledge-Based Health Information	The degree to which a user perceives that (s)he can get the posting/comment dealing with health-related information based upon existing medical knowledge or facts in the HISM.
Experience-Based Health Information	The degree to which a user perceived that (s)he can get the posting/comment dealing with health-related information based upon one’s personal experience in the HISM.
Emotional Appeals	The degree to which a user perceived that (s)he can get the posting/comment showing one’s emotional status in the HISM.
Non-Health Topic	The degree to which a user perceived that (s)he can get the posting/comment dealing with non-health-related topic information in the HISM.

Table 2. Intellectual Resource in HISM

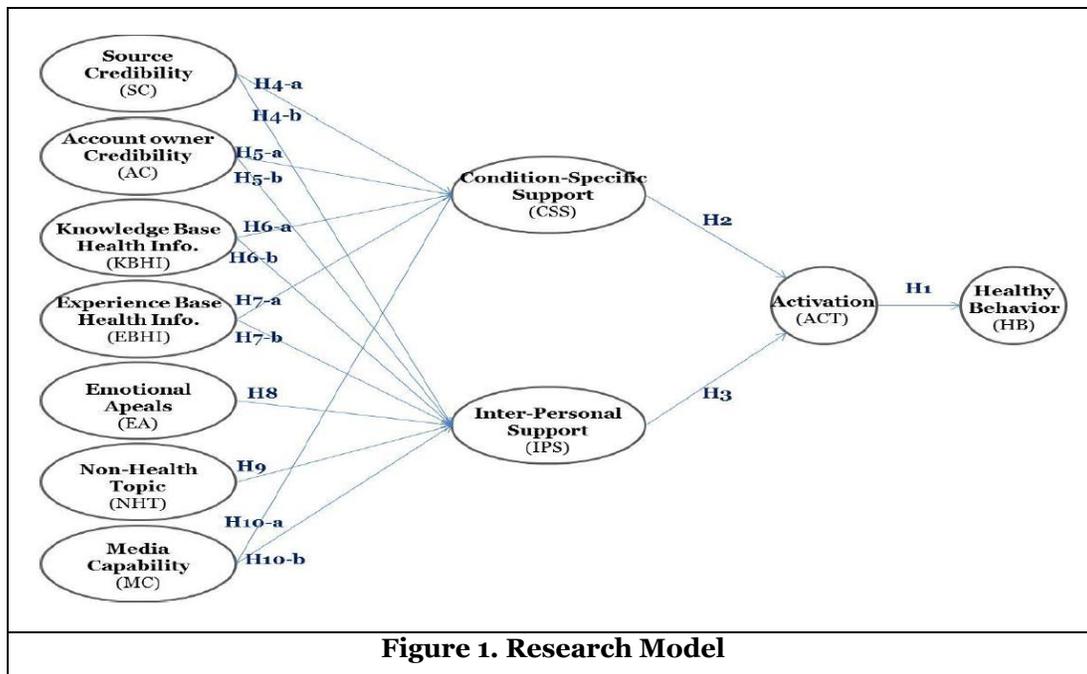
Research model

To verify the relationships between Structure, Process, and Outcome (SPO) in HISM, we develop a research model as presented in Figure. 1. Based on the research model, this study identifies the impact of HISM on one’s health management, so-called self-management, and investigates the important factors of HISM in terms of healthcare service.

Outcome: Social Media Impact on Self-Management

Activation refers to knowledge, skill, and confidence in managing one’s health and healthcare. Hibbard et al. (2004) developed a comprehensive measure for activation, named as patient activation measure (PAM). PAM has been well-adopted in healthcare research to predict ones’ healthy behaviors such as appropriate medicine intake, diet, exercise, and partaking in relaxation. Hibbard et al. (2005) identify that when activation is increased, various improved health behaviors follow subsequently. Mosen et al. (2007) examined PAM’s association with self-management outcomes among adult patients; further, they found that patients with high PAM scores are more likely to perform self-management behaviors than those with low PAM scores. Thus, we expect that the activation of HISM users will have a positive impact on the healthy behavior that is related to self-management.

H1: Activation positively influences healthy behavior.



Process and its Relationship to Outcome

Condition-specific supports in this research are primarily about receiving personalized healthy choices related to one's health condition such as prognosis or a health management action plan through HISM. A diagnosis based on personal health conditions leads to an appropriate decision about one's care; moreover, it can result in successful health outcomes. Positive health outcomes can be originated from the precise diagnosis of one's health condition. Individual assessments are a critical first step to induce self-management efforts necessary to manage his/her health problems (Novak et al. 2013). When the needs and problems of people are well-understood, many possible solutions (easily acceptable to them) are generated (Lorig and Holman 2003). Providing acceptable solutions for one's specific condition allow people to be knowledgeable and confident in what they should do. Therefore, we expect that condition-specific supports have a positive impact on the activation of HISM users.

H2: Condition-specific support positively influences activation.

Inter-personal supports in this research concern one's receiving social supports via HISM. In prior research, a social support is considered as an inter-personal social relationship in care; further, it has been identified that there is a positive relationship between social support and psychological, behavioral, and physical health outcomes (Uchino 2006). Ievers-Landis et al. (2003) find that social support from a family significantly enhances knowledge and confidence in performing health-related tasks. Sherbourne and Stewart (1991) elaborate that the reassurance and emotional supports provided in a close inter-personal context may foster a sense of control over the situation. Activation consists of knowledge, confidence to perform health behaviors, and a sense of control over the situation. In line with this, we expect that inter-personal support (i.e., social support) has a positive impact on the activation of social media users.

H3: Inter-personal support positively influences activation.

Structure and Its Relationship Process

Human Resource and Its Relationship Process

This study adopts source credibility as a human resource in social media. Source credibility refers to the ability of a spokesperson to favorably or unfavorably affect a receiver's acceptance of new information (Dholakia and Sternthal 1977). It is generally measured by both the degree of expertise and trustworthiness of an information provider (Tormala and Petty 2004). Roobina (1990) argue that source credibility favorably enhances the believability or validity of a spokesperson's message, as perceived by the receiver of

the message. Wright (2002) finds that perceptions of the credibility of another group member affects the participant's perceptions of emotional support, which is part of social support, from the messages given by the source. In this regard, we assume that when people have higher source credibility for the information provider and their believability become improved, they perceive more supports from the given information. Therefore, we expect that source credibility has an impact on users' perceptions of condition-specific support and inter-personal support.

H4-a: Source credibility positively influences condition-specific support.

H4-b: Source credibility positively influences inter-personal support.

In the case of the social media run by a healthcare service organization, it is not clear for information receivers whether the source of information (i.e., an information provider) is an expert belonging to the organization. To take account this issue into our study, we introduce one more dimension of source credibility: the credibility to the organization operating the HISM account (i.e., account owner credibility). As mentioned earlier, the concept of corporate credibility is measured as perceived expertise and trustworthiness of a firm: this study focuses on the perceived expertise or trustworthiness of the account owner itself rather than that of any spokesperson hired by the healthcare service organization. In sum, account owner credibility means the extent to which users feel that the organization that owns the account has knowledge or ability to fulfill their needs, which could be related to whether the organization can be trusted or not. Newell and Goldsmith (2000) argue that corporate credibility plays an important role in forming perceptions of messages delivered by the firm. LaBarbera (1982) argue that when corporate credibility is lacking, any message the firm presents to the public may elicit an unfavorable response. Thus, we expect that account owner credibility will have an impact on users' perception of condition-specific support and interpersonal support.

H5-a: Account owner credibility positively influences condition-specific support.

H5-b: Account owner credibility positively influences inter-personal support.

Intellectual Resources and Its Relationship Process

Intellectual resources are related to knowledge, information, and know-how regarding care. In social media, these factors can be conveyed by the information or content of messages (e.g., postings and comments). Using the postings and comments in HISM, for instance, a social media account owner and users communicate and share health information they have, the health experiences they faced, emotions they felt, and non-health topics such as weather forecasting or news. From the content analysis of HISM, we have discovered the four distinct types of message content in health information – knowledge-based health information, experience-based health information, emotional appeals and non-health topic. Knowledge-based health information refers to health-related information based upon existing objective medical knowledge or facts. Experience-based health information refers to health-related information based on one's personal experience. Emotional appeals are statements that convey one's emotional status. Non-health topics refer to non-health-related information or chats. In prior research, Hartzler and Pratt (2011) identified that clinicians provide medical topic information, which can stimulate an improved understanding of the medical domain or strategies to better fit one's life; furthermore, patients commonly share their expertise regarding personal health experience, which involves the provision of information and advice used to guide one's personal health management.

From the content analysis, we also find that when a person asks something about his/her health condition via HISM, the account owner or other users provide comments/answers based on their medical knowledge and health experience. With knowledge-based health information or experience-based health information, specifically, the HISM account owner and its users may offer condition-specific supports to HISM users. As such, we expect that knowledge-based health information and experience-based health information have an impact on users' perception of condition-specific support and interpersonal support.

H6a: Knowledge-based health information positively influences condition-specific support.

H6b: experience-based health information positively influences condition-specific support.

Besides specific health/medical information to a certain disease, participants in HISM can exchange various information or share their emotions using postings and comments. When information in postings and comments are uploaded, people respond to them with a "like" function or comments to provide additional information. When one applies his/her emotion in postings and comments, people also respond to them with the "like" function or offer comments with encouragement or compliments. That is, with emotional messages, knowledge-based health information, experience-based health information and non-health topics, postings and comments may support interpersonal relationships in HISM, which serve particular functions, such as emotional support, appraisal support, informational support and social companionship. Thus, we expect that knowledge-based health information, experience-based health information, emotional appeals and non-health topics have an impact on users' perception of condition-specific support and interpersonal support.

H7a: Knowledge-based health information positively influences inter-personal support.

H7b: Experience-based health information positively influences inter-personal support.

H8: Emotional appeals positively influences inter-personal support.

H9: Non-health topic positively influences inter-personal support.

Material Resource and the Relationship Process

Material resources refer to a set of facilities required for healthcare services. In this study, material resources in social media are regarded as social media capability, which influences the manner in which social media users can transmit and process information. According to Dennis and Reinicke (2004), depending on media capability, interactions and communications among participants can be easier or more difficult. In prior studies on a health information community for cancer patients, the physical ability of community for multiple people to respond to a message increases the number of potential supporters and interactions (Wright 2002). That is, social media capability has a potential to improve user interactions, and may increase the perception of supporting interactions in social media. As more interactions occur in HISM, users may perceive more supports. Therefore, we expect that media capability has an impact on user perceptions of condition-specific support and interpersonal support.

H10-1: Medial Capability positively influences Condition-Specific Support.

H10-2: Media Capability positively influences Inter-personal Support.

Measures and Data Collection

Given that this study aims at identifying the role of social media in fostering better health management, it is required to probe the perceptions of participants in HISM. Thus, we utilized a survey approach to validate our research model and hypotheses. To increase the reliability of the survey measurement, multiple measurement items were adopted and developed for each variable. The operationalized definitions of the variable and the measurement items are summarized in Table 3.

Construct		Variable	Definition	Items	Reference
Structure	Human Resource	Source Credibility	The extent to which the user perceived that the information provider in HISM has the expertise and the trustworthiness to fulfill his/her needs	6	Ohanian (1990), Cugelman (2009)
		Account owner Credibility	The extent to which the user perceived that the account owner of HISM has the expertise and the trustworthiness to fulfill his/her needs.	6	Ohanian (1990), Cugelman (2009)
	Intellectual Behavior	Knowledge-Based Health Information	The degree to which the user perceived that (s)he can get the posting/comment dealing with health-related information based upon existing medical knowledge or facts in the HISM.	3	Newly Developed

		Experience-Based Health Information	The degree to which the user perceived that (s)he can get the posting/comment dealing with health-related information based upon one's personal experience in the HISM.	3	
		Emotional Appeals	The degree to which the user perceived that (s)he can get the posting/comment showing one's emotional status in the HISM.	3	
		Non-Health Topic	The degree to which the user perceived that (s)he can get the posting/comment dealing with non-health-related topic information in the HISM.	3	
	Material Resource	Media Capability	The degree to which the user perceived that (s)he can get the posting/comment dealing with non-health-related topic information in the HISM.	5	
Process		Condition-Specific Support	The degree to which the user perceived that (s)he can get the posting/comment dealing with non-health-related topic information in the HISM.	8	Sherbourn et al. (1991)
		Inter-personal Support	The degree to which the user perceived that (s)he received social support in the HISM.	14	
Outcome		Activation	The extent to which the HISM user has knowledge, skills and confidence for self-management of his/her health.	13	Hibbard et al. (2004)
		Healthy Behavior	The degree to which the HISM user carried out the behaviors to prevent chronic conditions or improve his/her health.	3	Mosen (2007)

Table 3. Operational Definition and Its Measure Items for Variables

Measurement Development

To empirically validate the research hypotheses, all variables in the research model were evaluated by perceptual measures. In the questionnaire, most perceptual measures used multiple items to improve the reliability and validity. Variables and related measurement items that have already been used and validated in other research were adopted whenever possible. However, due to the lack of empirical investigation into the subject of HISM, the measures were mostly operationalized or modified from theoretical statements in relevant literature.

Additionally, the measurement items of five independent variables concerning the structure, and the measurement items of one mediate variable concerning the process in the social media were newly developed: knowledge-based health information, experience-based health information, emotional appeals, non-health topic, media capability, and condition-specific support. These were developed by operationalizing existing theories and from the result of the content analysis of HISM. Table 3 presents the operational definitions of all research variables in this study along with references.

For the measurement items for source credibility and account owner credibility, this study adopted and modified Roobina's (1990) items measuring the perception of trustworthy and expertise to the information provider. To measure inter-personal support, this study adopts Ware & Sherbourne's (1992) medical outcome study (MOS) social support survey items. Although the original MOS social support items has 20 items, this study modified it to be applicable to the online environment. To measure activation, this study adopts Hibbard et al.'s (2004) short-form PAM items, which includes 13 survey items. For measurement items for health behavior, the survey items in the self-management outcome study (Mosen et al. 2007) were adopted.

To measure knowledge-based health information, experience-based health information, emotional appeals, non-health topics, media capability, and condition-specific support, this study developed the measure items following Hinkin's (1998) measure development process for use in survey questionnaires. To establish the reliability and validity for the newly developed measure items, we conducted a rating task, as suggested by Schriesheim et al. (1993). We recruited 10 volunteers who were business major MS students and PhD candidates, and distributed a rating questionnaire for assessment of developed measure items. Verbal briefings and examples were provided to the volunteers before the rating task. Six rating questionnaires were made corresponding to six variables. At the top of rating questionnaire, the definition about one of the six variables is presented, and all developed measure items for the six variables were suggested below the definition. Then, volunteers are asked to assess the degree to which each item measure is concerned with the definition at the top with five-point scale (5 = completely or almost completely, 4 = much, 3 = moderately or about half, 2 = some, 1 = none or hardly any). We detected no major problem on the items measuring all of the research variables in this study. Each variable possessed adequate conceptual validity.

Measurement Development

An online survey was used to collect data and test the research model in November 2013. The subject population included social media users who were currently using a HISM account that was officially run by Samsung Medical Center, and individuals recruited through Facebook in a convenience sampling procedure. The users who completed the survey were offered incentives in exchange for their participation. From those who responded (total 617), a total of 511 survey respondents provided an answer clearly on the name of the HISM account they were using. Those cases met our threshold and were retained for the analysis.

Participants in their 20s and 30s were 79.06% of the study population. The number of females (66.93%) was twice that of males (33.07%). Participants who had a bachelor's degree (54.01%) were more than half of the population. The period of HISM experience was also evenly distributed. Almost two-thirds of users did not have a disease experience (66.93%) or family history (71.82%).

Prior research identified that family history is associated with health-related behaviors (Jacobsen et al. 2004) and motivation (Jacobsen et al. 2004; Hughes et al. 2003) to perform health behaviors. Kye and Park (2012) found that personality was also associated with health behaviors and self-efficacy among Korean diabetes patients. Ross et al. (2009) identified that personality is associated with social activities on Facebook. In this regard, this study examined the impact regarding the significance of the demographics and related factors to inter-personal support, activation, and health behaviors in our research model. As a result, the impact of gender, education, and period on activation, and the impact of age, gender, family history, and some aspects of personality (agreeableness, anxiousness, and extraversion) on health behaviors were significant. In the case of inter-personal support, the impact of habits, gender, education, health experience, and some aspects of personality (extraversion) were significant. We considered this test result to our research model, and the significant factors were controlled.

Result

A path analysis, a statistical method of structural equation modeling (SEM), was adopted to validate the hypothesized model. Based upon the SPO framework and the related prior research, this study developed a research model including 11 constructs and 67 measure items. Among them, five constructs and 25 measure items were newly developed. According to Chin (2010), a PLS analysis is primarily appropriate for a research model having newly developed measures and structural paths, and is also useful to testing the complex models capturing many factors related to attitudes, opinions, and behaviors overtime. SmartPLS 3.0 was used to test the proposed research model and to validate the hypotheses. The table 4 shows the test results of the measurement model. The measurement model in this research satisfies the threshold criteria to establish both convergent and discriminant validity.

Variable	Measurement Item	Outer Loadings	Composite Reliability	Cronbachs Alpha	AVE
Source Credibility	SC1	0.900	0.953	0.940	0.770
	SC2	0.883			
	SC3	0.882			
	SC4	0.872			
	SC5	0.868			
	SC6	0.859			

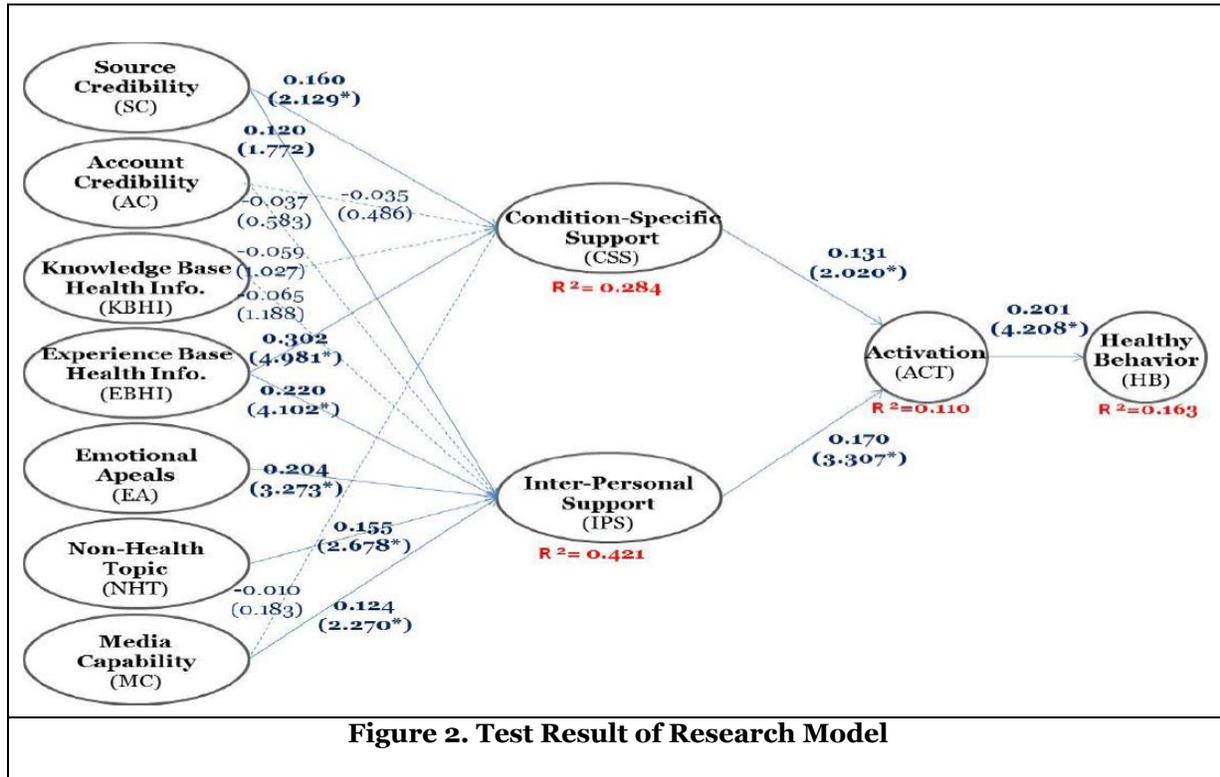
Knowledge Base Health Information	KBHI1	0.867	0.891	0.817	0.731
	KBHI2	0.865			
	KBHI3	0.832			
Emotional Appeals	EA1	0.888	0.869	0.774	0.689
	EA2	0.865			
	EA3	0.832			
Media Capability	MC1	0.821	0.897	0.858	0.635
	MC2	0.784			
	MC3	0.787			
	MC4	0.790			
	MC5	0.801			
Condition-Specific Support	CSS1	0.816	0.951	0.941	0.707
	CSS2	0.835			
	CSS3	0.810			
	CSS4	0.811			
	CSS5	0.870			
	CSS6	0.867			
	CSS7	0.856			
	CSS8	0.857			
Healthy Behavior	HB1	0.847	0.885	0.806	0.720
	HB2	0.869			
	HB3	0.829			
Account Owner Credibility	AC1	0.865	0.941	0.925	0.727
	AC2	0.836			
	AC3	0.860			
	AC4	0.866			
	AC5	0.838			
	AC6	0.849			
Experience Base Health Information	EBHI1	0.849	0.901	0.836	0.753
	EBHI2	0.884			
	EBHI3	0.870			
Non-Health Topic	NHT1	0.771	0.876	0.789	0.703
	NHT2	0.877			
	NHT3	0.864			
Inter-Personal Support	IPS1	0.784	0.966	0.962	0.674
	IPS2	0.828			
	IPS3	0.868			
	IPS4	0.683			
	IPS5	0.745			
	IPS6	0.832			
	IPS7	0.848			
	IPS8	0.852			
	IPS9	0.854			
	IPS10	0.858			
	IPS11	0.791			
	IPS12	0.814			
	IPS13	0.853			
	IPS14	0.860			
Activation	ACT	1.000	1.000	1.000	1.000

Table 4. Results of Convergent Validity Analysis

Testing Result of the Research Hypothesis

With an adequate measurement research model, the proposed hypotheses were tested with partial least squares (PLS). To examine the significance of the path coefficient, bootstrap resampling was used (Chin 2001). The size of the resampling is recommended as 250-500 (Chin 2001; Cotterman and Senn 1992) or 1,000 (Hair et al. 1986). We used the recommended size from Hair et al. (1986), and applied it for examining

the research model. Figure 2 presents the results of the research model. Among the 15 hypotheses, five were rejected.



As identified in prior medical knowledge, the testing result of hypothesis 1 shows that an individual's activation has a positive impact on health behaviors (beta = 0.201, t-value = 4.208, $p < 0.05$). Regarding the test of hypotheses on the impact of support (process) in HISM, hypotheses 2 and 3 examined the influence of each type of support in the HISM. As we hypothesized, condition-specific support and inter-personal support positively influenced activation (beta = 0.131, t-value = 2.020, $p < 0.05$; beta = 0.0170, t-value = 3.307, $p < 0.05$).

Regarding the test of hypotheses on the impact of human resources (structure) on the process in HISM, Hypotheses 4-a and 4-b examined the influence of users' credibility to information source on each type of support in the HISM. These are also, as we hypothesized, the source credibility that positively influenced the two kinds of support (beta = 0.160, t-value = 2.129, $p < 0.05$; beta = 0.120, t-value = 1.772, $p < 0.05$). Hypotheses 5-a and 5-b examined the influence of users' credibility to account owner of HISM on each type of support. These were not significant.

Looking at the test of hypotheses regarding the impact of intellectual resources (structure) on the process in the HISM, Hypotheses 6-a and 6-b examined the influence of knowledge-based health information in HISM on each type of support. Contrary to our expectations, the influence of knowledge-based health information on the two kinds of support was not significant. However, in the case of examining the influence of experience-based health information – Hypotheses 7-a and 7-b – both condition-specific support and inter-personal support were positively influenced by experience-based health information (beta = 0.302, t-value = 4.981, $p < 0.05$; beta = 0.220, t-value = 4.102, $p < 0.05$). Emotional appeals and non-health topics, as hypothesized in Hypotheses 7 and 8, also had positive impacts on inter-personal support in the HISM, respectively (beta = 0.204, t-value = 3.273, $p < 0.05$; beta = 0.155, t-value = 2.678, $p < 0.05$).

According to the test of hypotheses regarding the impact of material resources (structure) on the process in the HISM, Hypotheses 9-1 and 9-2 examined the influence of media capability on each type of support. Inter-personal support was positively influenced by media capability (beta = 0.124, t-value = 2.270, $p < 0.05$), whereas media capability's influence on condition-specific support was not significant.

Conclusion

This study empirically substantiates the impact of social media and identified factors with an impact using a theoretically solid framework. However, the following limitations also exist. First, data in this study were collected from the Facebook site of only one hospital. Further, there is a limit on generalizing the result due to the media characteristics of Facebook and the organizational characteristics of the hospital. To generalize the result of this study, data collection from various types of social media and healthcare service organizations would also be necessary. Second, this study carried out a survey targeting only HISM users. To verify the detailed effectiveness of social media on disease treatment, a survey targeting non-HISM users for hospital customers would also be necessary. Third, although this study considers many control variables, there may be other factors related to the structure in HISM that are important to the process in HISM, but are not included in our model yet, such as service organizational culture, financial resources and other externalities.

Nevertheless, we believe that this research represents a first step toward a comprehensive understanding of how social media influences one's health management; moreover, the limitations offer avenues for future research. In addition, the research model in this study can be extended and enhanced. In this regard, this research is expected to provide the following theoretical and practical contributions to the field of medical and social media research.

Contribution

This research is expected to provide the following theoretical and practical contributions to healthcare and social media research.

From an academic perspective, first, this study conducted pioneering research on healthcare services in social media using a solid theoretical framework, the SPO framework, to assess the influence of social media on an individual's healthcare outcomes. Second, to achieve this goal, because the SPO framework was developed for an offline healthcare service environment, the study does not just apply the existing framework, but made significant adjustments to the context of the social media environment. Considering the HISM environment, activities in HISM and the changes after using HISM in accordance with structure, process, and outcome in healthcare services, we identify that factors should be considered in HISM as a healthcare service, and then draw variables to evaluate the attributes of such factors.

Based on prior social media research and content analysis, with regard to the structure in HISM, we draw source credibility and account owner credibility as attributes of human resources in HISM. With regard to the process in HISM, we draw condition-specific support and inter-personal support, which are the reflected attributes of activities in HISM. Related to the outcome of using HISM, based on prior self-management research, we adopted activation and health behaviors as dependent variables in this research. The measure items of drawn variables were also newly developed. Third, in consequence of such efforts, we suggest a framework that comprehensively examines the impact of HISM managed by healthcare service organizations in a healthcare service perspective. Although more and further comprehensive systematic studies on social media in healthcare service should be conducted, in this regard, this study begins the challenge of suggesting a framework for social media evaluation in healthcare services.

From a practical perspective, especially for healthcare service providers, with a comprehensive set of outcome variables, this study examined the impact of social media on an individual's healthcare more thoroughly. Considering psychological and behavioral health outcomes comprehensively by combining the changes in activation and health behaviors, this study demonstrates the potency of HISM as a healthcare service tool. The result of this study can be practical support to healthcare service providers who have concerned a cost-effective way for the above behavior-dependent diseases treatment. Second, by examining the impact of HISM using a comprehensive solid framework, this study suggests strategic guidelines regarding online healthcare services through social media. Considering the results related to the credibility of the information source, this study suggests that not highlighting the expertise and trustworthiness of the account owner, but having more information sources that have expertise and trustworthiness and displaying it to HISM users is more effective for providing support related to one's health management. In addition, the result related to health information with personal experience shows that providing motivation to share personal health experience to users and making a venue for it will be critical when a healthcare service organization designs HISM with the aim of promoting user's health management. In sum, most concerns in HISM design deploy information providers with expertise and trustworthiness to HISM users

as well as those with rich cases of personal health experience. Finally, compared with prior research on social media use in medicine, this study did not limit the scope of the respondents to patients who had chronic diseases. We extended the study to the general public by applying the self-management concept for healthcare service outcome in social media. This may provide implications to policy makers who are struggling to improve public healthcare by increasing the utilization of social media.

Implication and Discussion

Based on the SPO framework and the concept of self-management, this study validates the impact of HISM on individual's health management, and identified influential factors of such impact in the survey targeting HISM users. When it comes to the effect of HISM use on one's health management, this study identified that HISM influences the changes in one's psychometrical and behavioral health outcomes. The results show that the use of HISM draws increased activation, which refers to the status a person with knowledge, skills, beliefs, and behaviors that a patient needs to manage one's health, and consequently, result in improvements in behavioral changes for health. This implies that HISM has the potential as a tool to promote one's health management, and can be used in public health promotion.

Regarding factors affecting the impact of HISM, first, in the case of intellectual resources, it was identified that health information with one's health experiences, one's emotion, and non-health topics are influential on a user's perception of inter-personal support rather than health information with medical knowledge. In particular, health information with one's health experiences has a positive impact on the user's perception of condition-specific support. Health information with one's health experiences describe certain circumstances or conditions more specifically than health information with medical knowledge. In the case of experience-based health information, an account owner – a healthcare service organization – provides patients' stories, which show what kinds of symptoms and pains the patients experienced and what kinds of healthcare services the patients used. Users in HISM provide their own health experience or family experiences, such as diet and exercise. In a further analysis, Non-Health Topics were also influential on a user's perception of condition-specific support. This means that interaction and communication between an account owner – healthcare service provider – and users in HISM are important as well as providing health-related information. In the content analysis, we found that a healthcare service organization mainly provides knowledge base health information in HISM. This means that the activities of healthcare service organization providing health information with medical knowledge are less effective in giving support to users in a HISM, and other ways of providing health information should be considered. These results suggest that when a healthcare service organization provides health information through social media for a person's health management, health information with one's story or emotions are more effective rather than listing medical knowledge, and should continuously interact and communicate with users.

Regarding the impact of human resources in HISM, credibility of the social media account owner had no influence on users' perceptions of support, while credibility of the information source was influential on users' perception of support. This means that people in the HISM care more about the expertness and trustworthiness of the information provider rather than of the organization the information providers belong to. In the postings and comments from account owner running HISM, the author (information provider) is not clear compared to them from individual account users. It can make people more care the information provider than the organization the information providers belong to. We also doubted that the surveyed HISM managed their content or information provider. Related to this issue, we checked for the possibility that account owners filtered out messages that provided pseudo information, and blocked access to uncertain information sources. We interviewed a person in charge of managing the Samsung Medical Hospital Facebook account. Their policy was always to monitor all contents of every posting and comment in all HISM they own. However, the emergence of negative or uncertain messages in the HISM was rare, but even when such cases occur, they did not filter such messages. Further, they said that the responses to such messages were very few. Taking all of these considerations, we assume that this source credibility-related issue may be an attribute of the social network service, such as Facebook or Twitter. Because compared to other social media, such as web blog or online community, the social network service easily reveals one's identity, it may make users beware of making an irresponsible comment in a HISM, as well as make it easier to distinguish a credible information source.

Regarding the impact of material resources in HISM, social media capability supporting one's information transmission and processing is influential only on the user's perception of inter-personal support, referred to as social support. Diagnosis of one's health condition in the case of condition-specific support is not an instantaneous activity; rather, it needs time to analyze and decide while sharing one's emotions –

exchanging small talk is relatively instantaneous. In this regard, inter-personal support is largely influenced by social media capability rather than condition-specific support in HISM. This result offers the implication that, when a healthcare service provider wants to use social media with regard to relational treatments or service, the choice of media, which has various functions supporting information transmission and processing, can be a primary consideration.

Furthermore, with regard to how an impact occurs in HISM, as we identified, condition-specific support and inter-personal support are influenced by different factors. Condition-specific support is influenced by source credibility and health information with one's experience, while inter-personal support is influenced by health information with one's experience, emotions, non-health topics, and media capability. This means that depending on the priority of healthcare service provider to the process, the strategy on managing HISM should be differentiated. If the HISM account owner want to focus on providing specialized health advices for health management or targeted to certain disease patients who are needed continuous symptom management, a qualified information provider and information about personal health experiences are required. Whereas if the HISM account owner want to focus on providing relational support for health management or targeted to patients who need continuous psychological relaxation, choice of media should be carefully driven, and sharing emotions and updating non-health information should be considered as well as information with personal health experience.

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