

9-2020

Disentangling the effects of efficacy-facilitating informational support on health resilience in online health communities based on phrase-level text analysis

Insu Park
Dakota State University

Surendra Sarnikar
California State University, East Bay

Jeewon Cho
Oregon State University

Follow this and additional works at: <https://scholar.dsu.edu/bispapers>

Recommended Citation

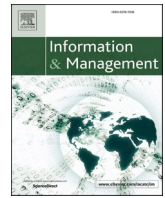
Park, Insu; Sarnikar, Surendra; and Cho, Jeewon, "Disentangling the effects of efficacy-facilitating informational support on health resilience in online health communities based on phrase-level text analysis" (2020). *Faculty Research & Publications*. 261.
<https://scholar.dsu.edu/bispapers/261>

This Article is brought to you for free and open access by the College of Business and Information Systems at Beadle Scholar. It has been accepted for inclusion in Faculty Research & Publications by an authorized administrator of Beadle Scholar. For more information, please contact repository@dsu.edu.



Contents lists available at ScienceDirect

Information & Management

journal homepage: www.elsevier.com/locate/im

Disentangling the effects of efficacy-facilitating informational support on health resilience in online health communities based on phrase-level text analysis

Insu Park^{a,*}, Surendra Sarnikar^b, Jeewon Cho^c

^a Department of Information Systems, College of Business & Information Systems, Dakota State University, Madison, SD, 57042, United States

^b Department of Management, College of Business and Economics, California State University at East Bay, Hayward, CA, 94542, United States

^c Department of Management, College of Business, Oregon State University, Corvallis, OR, 97331, United States

ARTICLE INFO

Keywords:

Health resilience
Directed content analysis
Self-efficacy
Response-efficacy
Text analytics
Helpfulness

ABSTRACT

This study examines the different types of supportive messages posted on a forum at online Healthcare communities (OHCs), which facilitate user self-efficacy and response-efficacy and an issue of how such informational messages encourage users to enhance their health resilience via goal-setting for health improvement. We theorize that self-efficacy-oriented messages affect helpfulness, focusing on the efficiency of the implementation, while response-efficacy-oriented messages influence the relationships among helpfulness, goal-settings, and health resilience based on the outcome expectancy. Using a computer assisted approach which allows for the directed content analysis, we test a conceptual model with the text-data collected from an OHC.

1. Introduction

In the healthcare arena, online healthcare communities (OHCs) not only allow patients to establish better relationships with caregivers [1], but also provide social support by sharing health-related experiences and emotional messages with peers [2]. Such supportive roles have long been recognized as constructive and protective factors against both life stresses and poor health [3]. As the previous literature has shown, OHCs have tremendous potential to influence users' health-related behavioral initiation and further help patients in improving their health conditions by providing various social supports [4,5]. For example, positive and emphatic messages and postings in threads of OHCs encourage users to simply cheer up (e.g., emotional support) and further help change their health-related behavior based on the shared specific instructional information on health improvement (i.e., informational support).

Informational support plays a significant role and is the most sought-after support in OHCs [6]. Nevertheless, scholarly efforts on social support have focused mostly on the roles of emotional/instrumental support that contributes to resilience through increasing an individual's resources [7–9]. Although emotional/instrumental support is critical for health resilience, examining other essential supports would provide an expanded and deeper understanding of the holistic spectrum of social support and its impact on health resilience in the context of OHCs [10].

Informational support in OHCs is one such example. For instance, Blanchard et al. [11] suggested that patients often need informational support from healthcare professionals to enhance the effectiveness of social support, which depends on various sources such as expertise [12], trust, and accuracy aspects [13,14]. Some antecedents of informational support from social capital (e.g., shared language and domain-specific expertise in OHCs) have been identified by previous research [15]. While initial efforts have been made to capture the importance of informational support in OHCs, a critical issue, related to identifying distinct types of informational support and their dynamics on user health resilience in OHCs, has largely gone unexplored. Specifically, little is known about how different types of informational support help OHC users improve their health conditions and how such specific types of informational support meet the users' differing needs for information about health-related conditions.

Informational support, unlike emotional support, provides specific information on health behaviors for OHC users to deal with the various stages of their health conditions. Such information identifies the effectiveness of those health behaviors or the ease with which they can be implemented by support seekers, who look for solutions to enhance their health, albeit not necessarily from medical experts. Thus, when a user seeks informational support from messages in a thread/forum, he/she may evaluate the level of informational support based on whether it

* Corresponding author.

E-mail addresses: Insu.park@dsu.edu (I. Park), surendra.sarnikar@csueastbay.edu (S. Sarnikar), jeewon.cho@oregonstate.edu (J. Cho).

would be (1) easy to implement and (2) effective for the symptom or disease for which the user is seeking assistance. The former type of informational support, labeled as *self-efficacy-oriented message support*, helps users implement the given information efficiently (easily and quickly). The latter type of informational support, dubbed *response efficacy-oriented message support*, focuses on the effectiveness of health behaviors for ameliorating specific symptoms. Indeed, the past research has identified two kinds of informational support [16], indicating that these two efficacy-related informational supports have distinct impacts on individual health behavior.

Considering the aforementioned context, the present study argues that informational support frequently occurs and is facilitated in interpersonal-relationship contexts where a caring, trustworthy, and respectful environment promotes users' rights to make their own choices [17]. In this case, informational support may be chosen based on users' preference for utilizing information given by peers. People tend to pay selective attention to various types of information, while processing information depending on their needs [18]; they are then likely to select information that matches their preferences from an online commentary [19]. Such selective attention can, in turn, influence their decision to utilize a particular type of information (e.g., informational support), based on whether it is deemed a favorable/useful type of information [20–23].

Thus, this study aims to examine the dynamic between informational support provided by OHCs and user health-related conditions, by addressing the following research questions: (1) Do different types of informational supports (i.e., self-efficacy-oriented and response efficacy-oriented support) have distinct effects on users' health improvement? (2) If so, how do these types of support differentially affect users' behavioral consequences? From an organizational perspective, understanding how OHC members utilize different types of informational support is critical for OHC managers to maintain patients' engagement and the sustainability of their healthcare community. Specifically, OHC managers and designers can develop tools and strategies for identifying suitable types of informational support and providing better choices for OHC users to improve their health under the given situation.

In OHCs, users' information-seeking efforts may allow them to not only continuously adapt and respond to changing goals and health expectations by obtaining more accurate self-views, but also enhance their health resilience [24,25]. Parry [9] explains that coping with uncertainties of illness leads to a new outlook on life and the development of resilience. Reflecting on our research context, it is highly likely that informational support, as it becomes a source efficacy—defined as an individual's belief in his/her capabilities to complete the targeted work/tasks/goals [45]—will lead to users' health improvement through two pathways. First, social networking service (SNS) users may share information that is helpful for other users to experience benefits. Citron et al. [26] suggested that individuals' perceptions of the helpfulness of the information are likely to influence whether they experience benefits for their health improvement. For this reason, helpfulness has been considered a primary way of measuring the perceived value of adopted information [27]. Second, it is plausible that individuals, when they receive helpful informational support, will set goals for health improvement. Indeed, past studies suggest that self-efficacy and response efficacy encourage users' goal-setting and further predict task performance through their impact on goal-setting [28,29]. Notably, previous research has been limited to exploring the extent to which patients actually receive support, but have not addressed the helpfulness of the support [30] or the potential relationship between helpfulness and further consequences spurred by helpfulness, such as subsequent motivation (i.e., goal-setting) and ultimate health-related resilience. This issue leads to our third research question: How does the helpfulness of informational support impact users' goal-setting and health resilience?

In investigating the effects of the two types of informational support on user goal-setting and resilience for health improvement, this study integrates self-efficacy and response efficacy into the theory building to

elucidate the effects of the different types of informational support. Reflecting this aspect, our study predicts that the different orientations of the informational support messages will lead OHC users to show distinct responses to those supports, depending on the efficiency or effectiveness that each message focuses on. On the one hand, one type of informational support may offer more self-efficacy-oriented support than the other, simply because self-efficacy-oriented support is easy to implement. On the other hand, some users may focus primarily on response efficacy-oriented support due to its effectiveness, regardless of the level of difficulty in terms of its implementation.

Next, we posit that the helpfulness of informational support will increase users' health-related goal-setting and resilience status. We also examine whether the different types of informational support have a moderation effect on the relationship between helpfulness of informational support and user goal-setting. We test our conceptual model in the context of an online diabetes community by extracting several discussion threads within the community. The current study utilizes a methodology based on *directed content analysis* in analyzing and quantifying an OHC's messages collected by text mining. This technique allows us to collect various phrases and sentences representing the contextual situation, and further synthesize subjective sampling and analysis techniques with a systematic coding procedure. Therefore, the results of this study contribute to our understanding about the distinct types of informational support in OHCs and the subsequent impacts on user resilience and self-care geared toward health improvement.

2. Theoretical framework

2.1. Social support theory

Social support has become a major social value and key benefit that SNS users perceive from online social networking [31]. In the healthcare area, social support has been considered not only a protective factor against life stresses and poor health [3], but also a critical factor for successful living with illness [32]. Indeed, social support is highly associated with various aspects of resilience in several clinical areas [32–36], including psychological health. According to Schleussner et al. [35], the “need” for psychosocial support indicates low resilience and quality of life. OHC members, it seems, seek social support from their stronger social ties prior to resorting to healthcare service providers when faced with difficult times [37]. The given support encourages the members to cope with emotional stresses in health-challenging situations. At the heart of such support, social network ties in OHCs enable the community members to receive various supports from their peers as a result of their frequent contacts [38].

Social support has two facets: (1) a structural aspect, which refers to the size and nature of one's social network, and (2) a functional aspect, which indicates overt behavioral transactions between supportive and supported people. Within the functional aspect, there are two broad categories: *emotional support* and *informational support*. While the former meets an individual's emotional desires, comprising expressions of care or concern that the individual obtains from communication with peers [39,40], the latter meets an individual's needs for information and instruction, including assistance in problem solving through provision of intangible information and advice [41,42]. In spite of its intangible nature, informational support provides useful and necessary information that assists OHC users to make good decisions and reduce uncertainty [39,40].

2.2. Self-efficacy and response efficacy

Efficacy, or more precisely self-efficacy, is a concept that stems from social learning theory, referring to an individual's belief in his/her own capabilities to complete the courses of action required to fulfill goals. Based on the pioneering work by Bandura [43], self-efficacy is defined as individual's judgment of his/her own competence to complete a specific

task, which further determines that individual's level of persistence to learn a task by influencing the individual's perceptions of future outcomes. That is, self-efficacy determines an individual's level of motivation (intensity, direction, and persistence) to achieve the given goals and tasks [44].

Likewise, people's beliefs about their abilities tend to influence their subsequent actions and prompt them to adjust the amount of effort they demonstrate based on the expected results of those actions. Past research has consistently shown that self-efficacy is strongly related to performance and consequential behaviors. According to the seminal work by Bandura [45], self-efficacy possesses two distinct sources of judgments of utility: perceived *personal efficacy* and *response outcome expectancies*. Bandura suggested that people stop trying because of "their serious doubt that they can do what is required" (self-efficacy) and that "they expect their efforts to produce meaningful results due to the unresponsiveness" (outcome expectancy). Thus, Bandura posited that an individual's behavior is best predicted by considering both self-efficacy and outcome expectancy, since these different patterns of outcome and efficacious beliefs are likely to yield distinct psychological effects [45].

Response efficacy (outcome expectancy) refers to the belief that an action will lead to a desired outcome [45]. According to Rogers, response efficacy reflects an individual's belief about whether the recommended coping response will be effective in reducing the threat to the individual. In contrast, self-efficacy is the perceived ability of the person to actually carry out the adaptive response [46]. Thus, self-efficacy concerns an individual's belief about whether he/she can perform the recommended coping response. As Rogers noted, because the two types of efficacy are different, the results should be different. In the healthcare literature, the terms "self-efficacy" and "response efficacy" are commonly used to refer to perceived personal efficacy and response-outcome expectancies, respectively [47]. As indicated by Rogers [48], response efficacy may be enhanced by information designed to increase outcome expectancies or beliefs about the effectiveness of the advocated behavior, while self-efficacy is typically accomplished by providing information on how easy it is to undertake some new action and to empower the recipient of the communication. Based on the differences between self-efficacy and response efficacy, and the types of information that would enhance each form of efficacy, this study investigates the distinctive roles of the two types of information in regard to the helpfulness of the information and the subsequent user goal-setting and resilience for health improvement.

The relationship between social support and self-efficacy has been amply supported by diabetes research. For example, O'Leary [49] suggested that a response efficacy measure should be included in diabetes research to enhance the understanding of adherence (i.e., patients' self-care skills, the effectiveness of the regimen, and which patients are likely to be most adherent). Skelly et al. [50] and Skinner and Hampson [51] also revealed the mediating role of social support on self-efficacy in diabetes self-management. Williams and Bond [52] showed that self-efficacy mediates the relationship between social support and self-care in individuals with diabetes. Furthermore, Keller discovered that response efficacy- and self-efficacy-oriented health messages have distinct effects, depending on an individual's regulatory focus [16].

2.3. Efficacy-facilitating informational support

According to Huang, Chengalur-Smith, and Pinsonneault [15], OHCs have unique roles, providing both information/knowledge and emotional support/companionship activities. Owing to these communities' characteristics, membership in OHCs is grounded in strong emotional bonds. These emotional bonds encourage OHC members to participate in OHC activities more vigorously than is the case for members of other types of knowledge-sharing online communities. Regarding sharing informational support, Navarro and Wilkins [53] discovered that an individual's level of information seeking on health corresponds to health behavioral intentions, priorities, and values that

he/she assigns to the quality of health desired, as well as the current level of personal health involvement. As a result, information seekers are likely to selectively utilize social support based on their behavioral intentions, and informational support is the most exchanged support type and the main attraction for members to join an OHC.

In particular, within diabetes-focused OHCs, users may embrace informational support as a way to cope with their unique needs, with such informational support serving as the source of different behavioral intentions and priorities in pursuit of efficiency and effectiveness. Consider a user looking for information/instruction that he/she can easily and efficiently adopt for addressing his/her health situation. When such efficient ways are then introduced, the type of supportive information would lead the user to believe in his/her capability of keeping up with the pertinent health needs quickly and easily. In this case, informational support focuses mainly on the issue of how easy it is to implement. In contrast, if a user is looking for support that will yield an eventual health-related consequence resulting from certain practices, this type of informational support provides the user with information on best practices that are helpful for addressing specific symptoms. In this case, informational support focuses primarily on the effectiveness of the practices for addressing specific symptoms or issues related to one's health.

These two different functions of informational support can be articulated in relation to their distinct efficacy, which further facilitates users' motivation and behavior geared toward health improvement. This aspect of informational support directly answers two efficacy-facilitating questions: (1) "Will this new behavior provide me with what I want quickly?" and (2) "Can I undertake the behavior successfully?" [16, p. 109]. We label the first type of informational support as *self-efficacy-oriented support* (SEOS), capturing self-efficacy enhancement, which is typically accomplished by the given information on how easy it is to undertake a new action [47]. In this study, we define SEOS as *a peer-generated message that provides members with information on the ease with which a practice related to a certain health issue can be implemented*. We label the second type of informational support as *response efficacy-oriented support* (REOS); it focuses on enhancing response efficacy, which is achieved by the given information on how users can effectively and successfully improve their health. Since response efficacy is a person's estimate that a given behavior will lead to certain outcomes [44, p. 193], it is concerned with whether the recommended coping response will be effective in reducing threats to the individual [54]. Thus, REOS focuses on the effectiveness of actions [16]. We define REOS as *a peer-generated message that provides members with information on the effectiveness of a practice for reducing health issues*.

2.4. Resilience

Resilience has been widely recognized as "an important resource reservoir that helps individuals manage the ever-changing situations experienced in life" [55, p. 732]. It also effectively preserves operational continuity and delivery of care by motivating employees to perform better, increasing employee job satisfaction and commitment, and improving group and organizational effectiveness [56–58]. In particular, resilience in psychology is viewed as "positive psychological capacity to rebound, to 'bounce back' from adversity, uncertainty, conflict, failure, or even positive change, progress and increased responsibility" [59, p. 702], or as the ability to bounce back from negative experiences and demonstrate flexible adaptation to the ever-changing demands of life [60]. In the healthcare area, many researchers have, more or less, agreed that resilience refers to successful adaptation despite risk and adversity [61]. Thus, resilience generally refers to the extent which an individual adapts or regains health in the face of significant adversity or risk, since resilience indicates a capacity for adaptability, positive functioning, or competence following chronic stress or prolonged trauma [62–65]. The fundamental roles of resilience include monitoring for changes and threats, anticipating changes and being proactive,

ensuring the capability to respond to disruptions, learning from past experiences [66], management commitment, flexibility, buffering capacity, and awareness of risk [67–69]. In addition, resilience is concerned with having a strong sense of self-worth, learning from experience, developing adaptability, and making connections with others [36]. It thus yields favorable outcomes, such as optimistic thinking [70], lower levels of psychological distress [71], positive work attitudes [72], and support for the value of resilience as a resource [55].

In the healthcare area, resilience has long been accepted as a major topic pertinent to both physical and mental illness [73,74]. In general, resilient individuals may be capable of dealing with unexpected difficulties in using systems and controlling their use of healthcare information systems (HIS) under stressful situations. An individual who exhibits higher levels of psychological resilience will be able to plan on making the best of his/her situation. For example, resilient individuals may use humor [75–77], creative exploration [78], relaxation [79,80], and optimistic thinking [79,80] as ways of coping with unfavorable situations. Such resilient individuals tend not only to proactively prepare for adversity, but also to reduce the impact of stressful events on themselves by using their psychological resources effectively [81]. Other evidence also supports the positive role of resilience for individuals with health conditions. According to Johnson et al. [74], resilient individuals share several characteristics, including effective coping strategies and strong social support. These characteristics help patients improve their health by equipping them with a “strong mind.” For instance, patients with cardiac disease and diabetes have been reported to have better psychosocial adjustments [82], and patients with cancer who possess a high level of self-esteem and efficacy have been reported to attenuate their depressive symptoms [36]. In addition, Chan et al. [83] uncovered that a group of patients who demonstrated high personal resilience had better physical and mental health after an eight-week rehabilitation intervention.

In this study, we adapt the concept of resilience as the health-related consequence of SNS users’ information seeking from peers. The given psychological resilience may maximize their health conditions by magnifying users’ confidence in, and expectations of, their capabilities and by encouraging them to think positively for their health improvement. Based on this perspective, the operationalization of the concept health resilience used in this study is as *peer-generated messages where peers express their confidence or expectation for capability to deal with the health-related issues*.

3. Hypotheses development

3.1. Helpfulness of informational support and goal-setting

Helpfulness has been regarded as an essential element for decision-making in online shopping and social network websites. According to Mudambi and Schuff [27], helpfulness is the extent to which a peer-generated seller evaluation is perceived by consumers to facilitate their decision-making processes. Past studies have shown that helpfulness influences behavioral changes leading to actual sales and the growth of product sales [84,85], improving the individual perception of the usefulness and social presence of websites [86], attracting consumer visits, increasing the time spent on a site (“stickiness”), and creating a sense of community among frequent users [27]. Eventually, helpfulness encourages users to make a better decision more easily [87] and further shapes individuals’ attitudes toward online websites [88]. Despite its predictability in regard to users’ behavior, however, the concept of helpfulness has been understudied in the social media context, specifically in OHCs. Initial evidence suggests that as a measure of perceived value for reviewers’ decisions, helpfulness is consistent with the notion of information diagnosticity [89]. Thus, a member’s messages about a given topic in a SNS thread can provide diagnostic value across other members’ information-evaluation processes.

Users tend to create a thread in OHCs when they are seeking helpful

information about topics and shared experiences. In this situation, OHCs may be a helpful source that users, as patients, can rely on for their preventive healthcare needs. When they seek to obtain help from OHCs, their searching behaviors may vary. For example, users with memberships can directly and actively solicit members’ support by creating one or more threads about their needs (i.e., specific symptoms). Users without memberships can search threads in the SNS to find what they are looking for, as an indirect way of obtaining help. Even though the main goal of OHCs is to share supportive messages and further encourage OHC members to improve their health situations, the helpfulness of those supportive messages is likely to depend on which type of support the users perceive them as offering. Since users are information seekers as well as consumers with the clear goal of health improvement, they tend to evaluate the given informational support based on their motivation for seeking such information. In this context, helpful informational support is defined as the degree to which a user’s *posted message indicates if peers’ supports for their health-related issues are helpful*. Unlike in the consumer reviews of products on online shopping websites (e.g., amazon.com), OHC reviewers can express and further evaluate the helpfulness of members’ corresponding messages, utilizing helpfulness-related words/phrases. Therefore, the degree of helpfulness for informational support can be measured based on how many *peers’ messages express “help” from peers’ supports for their health-related issues in the thread (the number of those help-related words/phrases)*.

Considering the significant role of informational support, we expect that the active use of helpful messages will contribute to users’ health-related outcomes, and we further argue that helpfulness plays an essential role in triggering users’ motivation for improving their health status. By explicitly linking users’ perceptions of helpfulness to their health resilience in the context of OHCs, this study theorizes that helpfulness of informational support provides the users with enhanced clarity on the potential actions they can take, thereby assisting them to plan their health-related goals based on the given information. This will, in turn, facilitate the subsequent implementation (practices) of the information to boost their health status.

To find helpful information that satisfies their needs related to their health conditions, users may search the messages for helpful informational support such as how other users have overcome their symptoms or how they have actually acted/reacted against symptoms to improve their health. Helpfulness of the information can be a starting point to serve their own health-related needs and health improvement processes, and thus stimulate their perception of health resilience. As a result, helpfulness from support can be a motivational strategy, allowing users not only to set goals for their health, but also to cope with their health-related issues without visiting a healthcare organization. Therefore, we posit that the helpfulness of informational support, obtained by direct inquiry or indirect searching in OHCs, will cognitively stimulate users to deal with their own health-related issues and further improve their health conditions. This leads to our first hypothesis:

Hypothesis 1a. . Helpfulness of informational support is positively related to users’ goal-setting for their health improvement.

Hypothesis 1b. . Helpfulness of informational support is positively related to users’ health resilience.

3.2. Goal-setting and health resilience

Goal-setting occurs in everyday life, as explicitly and specifically set goals can markedly improve performance on any given task [90]. A goal, in this context, is defined as what an individual consciously attempts to accomplish [91]. More specifically, a goal is an objective or an aim of an action, which indicates and gives directions to an individual about what needs to be done and how much effort is required to achieve the objective [92]. Research on goal-setting has been focused primarily on identifying the relationships between various characteristics of goals and task performance [93–96]. According to Locke et al. [97], difficult

yet achievable goals lead to better performance because they stimulate the highest levels of efforts by executors. Consistent with this theoretical notion, past research has confirmed that specific, challenging, and measurable goals with appropriate feedback result in higher and better task performance, as opposed to easy, ambiguous, and non-measurable goals (e.g., “do your best”) [93,98].

Reflecting the theory of goal-setting, we posit that users’ goal-setting for their health improvement is positively related to their health resilience, because users tend to explicitly mention specific action plans and best practices to enhance their health or reduce their health-related concerns by expressing their “goals” in their messages in healthcare SNS. The goal-setting, as a form of motivational grit and proactive action plan, may then increase the potential resilience of those users’ health. Therefore:

Hypothesis 2. : Users’ goal-setting for their health improvement is positively related to their health resilience.

3.3. Moderating effects of efficacy-facilitating informational support

According to Rogers [99], efficacy leads individuals to deal with a subject by making coping appraisals. The proposed link between coping appraisals and efficacy is based on the premise that people will be concerned with different coping responses, based on their efficacy orientation. In OHCs, it is feasible that the different informational supports might have distinct degrees of impact on helpfulness and goal-setting, depending on the efficacy orientation. Thus, in this study, we investigate two types of efficacy-facilitating informational support: SEOS and REOS. We posit that such distinctive efficacy-facilitating informational support will, in turn, spur individuals to action via their enhanced motivation to attain better health.

Reflecting the characteristics of the distinct efficacy-facilitating informational supports, we propose that SEOS affects the relationship between peers’ support and helpfulness by immediately increasing users’ motivation to use the specific content in the postings and their belief that they can easily and quickly follow that advice. In other words, SEOS is expected to trigger individuals’ intrinsic motivation and contribute to immediate satisfaction efficiently rather than encouraging individuals to achieve external goals [100] because, as Milne et al. [101] suggested, self-efficacy is more closely associated with intentions to perform a new health behavior than with response (outcome) efficacy. Owing to the ease of the actions mentioned in OHC peers’ messages, users would be less hesitant to implement the instructions embedded in those messages. Otherwise, “[p]eople can give up trying because they seriously doubt that they can do what is required” [45], p. 140]. Since “self-efficacy is assessed for immediately subsequent performance [rather] than response efficacy” [102, p. 477], the belief that they will be able to easily follow SEOS postings would allow users to perceive the SEOS messages as more helpful than making long-term plans. In this case, the SEOS messages provide direct satisfaction of basic psychological needs for users [103], while increasing their knowledge about health conditions, which, in turn, allows the users to start executing the recommended actions in a SEOS message under the belief that this plan is doable. Based on this logic, we propose the following hypothesis:

Hypothesis 3a. : The effect of self-efficacy-oriented messages on helpfulness will be greater than that of response efficacy-oriented messages.

In performing health-related actions in goal-setting contexts, individuals are more likely to focus on the effectiveness of the practices mentioned in a message to achieve the given goal. Since the primary purpose of the communication in OHCs is to help users find ways to improve their health, the ease of performing actions (i.e., SEOS) is likely to be a secondary factor compared to the helpfulness of the message supports in the context of goal-setting. Thus, in a message, the clarity of the desired outcome and effectiveness is critical for determining its

value in meeting the ultimate goal [90].

In addition, individuals who focus on the effectiveness of the suggested supports will likely be more concerned about whether they can achieve the outcome expected by completing the actions suggested by the informational support messages. That is, REOS, with its strong emphasis on the effectiveness of actions suggested in the messages, is more likely to influence users’ long-term actions (goal-setting/plans) than the instant satisfaction derived from SEOS. Therefore, we predict that the types of informational support will act as a boundary condition for the relationship between helpfulness and goal-setting, such that the effect of REOS on the relationship will be stronger than that of SEOS. Therefore:

Hypothesis 3b. : The types of informational support will moderate the relationship between helpfulness and goal-setting, such that the effect will be more pronounced for response efficacy-oriented messages than for self-efficacy-oriented messages.

We assume that the different types of efficacy-facilitating informational supports will have a moderation effect on the relationship between goal-setting and health resilience of users. As stated earlier, SEOS messages are expected to influence users’ perception of the message supports with an immediate impact, while REOS messages will lead users to consider the long-term outcomes suggested by the message support as well as health resilience. Based on the focus of REOS messages on outcome expectancy, we argue that the users will have higher levels of health resilience status derived from helpfulness when they encounter REOS, because REOS has a long-term impact on outcome performance, not on immediate subsequent performance spurred by SEOS [102]. Thus, we suggest the following hypothesis:

Hypothesis 3c. : The types of informational support will moderate the relationship between helpfulness and health resilience, such that the effect will be more pronounced for response efficacy-oriented messages than for self-efficacy-oriented messages.

Once users evaluate the helpfulness of a message support and set their own goals, they must commit to actual goal accomplishment, anchoring the consequential results of the goal-setting. In this context, users are not only encouraged to complete the goals, but also likely to develop a high expectation of success (in our research context, an enhanced health condition) [104]. Prior research has suggested that since goal-setting tends to focus on the outcome of the specific actions embedded in message supports, such actions related to ongoing performance may be facilitated by the level of motivation for achieving the goal—that is, by health resilience in our research context. In this situation, response efficacy will play a vital role in influencing the desired level of motivation, including behavioral instigation, direction, efforts, and persistence that eventually leads to the desired outcome of health resilience [92,105,106].

Considering the relationship between goal-setting and health resilience just described, we argue that REOS acts as a boundary condition and strengthens the relationship by facilitating the user’s estimation of outcome expectancy [44, p. 193]. According to past studies, users’ expectation of achieving a particular outcome is a function of their willingness to perform a behavior and the extent to which they value those outcomes [107,108]. In our research context, users’ outcome expectancy for the subsequent behavior and valence that they perceive focuses on improving their health resilience. REOS messages are more likely to influence the users’ health resilience than are SEOS message, since the former focus on the efficiency of the implementation. REOS messages allow users to believe that their health conditions will be enhanced by adopting the recommended course of action. By following the suggestions from the specific REOS messages, the users perceive that they will take one step closer to becoming resilient in their health issues. In addition, the users may respond to the goal-setting by taking a long-term view, while possessing a belief that the suggested REOS will make their health-related situation better in the long run. This is because

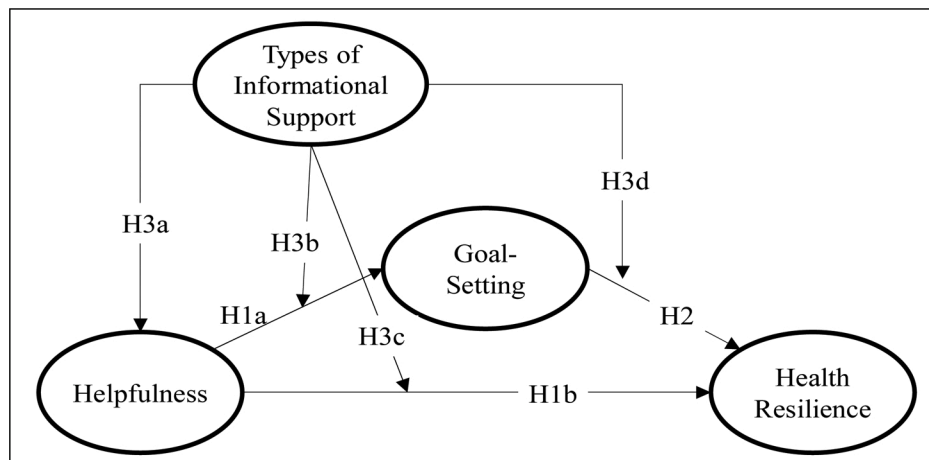


Fig. 1. The Conceptual Model.

the desirability of future goals (the “why” of an action) is a stronger determinant than the feasibility (the “how” of an action) when goals run over the long term rather than playing out in the short term [109]. Hence, we suggest the following hypothesis:

Hypothesis 3d. : The types of informational support will moderate the relationship between goal-setting and health resilience, such that the effect will be more pronounced for response efficacy-oriented messages than for self-efficacy-oriented messages.

Fig. 1 summarizes the conceptual model of this study.

4. Method

This study explores the role of OHCs in enhancing users’ health-related status. To test the posited hypotheses, we use a *directed content analysis* approach. Directed content analysis is applied when related theoretical research already exists [110]. It identifies key concepts as initial coding categories and validates the conceptual framework or theory [111]. In particular, “it can provide predictions about the variables of interest or about the relationships among variables, thus helping to determine the initial coding scheme or relationships between codes” [110, p. 1281]. This type of content analysis is especially useful for the variables that we develop from actual online communities, because the text data collected from an online community is not intended to provide measures for the variables. Thus, the extant theory based on past research is supported by raw data through a systematic, redundant, and cumulative collection and categorization of data in OHCs.

Fig. 2 depicts the procedure for obtaining and analyzing text data utilized in this study: (1) text mining, (2) coding phrases, (3) conversion of the coded text data to numeric data, and (4) data analysis. First, we used Python to collect text from threads. Second, we coded all thread files by using the same phrase-level dictionary with the same variables. Third, we converted the coded text data to a count data set using Atlas.Ti. Finally, we analyzed the count data to test the hypotheses after finishing data imputation.

4.1. Collecting text data

We collected text data from the www.tudidiabetes.org OHC. This website, which is funded by the Diabetes Hands Foundation, provides a platform for people who have diabetes to get in touch with their peers, help each other out, educate themselves, and share the steps that they take every day to stay healthy while living with diabetes. Both the structured data and the unstructured data from the discussion threads and users’ profiles were collected by a Python web crawler that we created. Through August 2014, there were 1295 discussion threads and

a total of 53,831 discussion postings in the forum. Table 1 summarizes the data collected.

4.2. Unit of analysis

The analysis was conducted based on the OHC thread unit of analysis. This data set was aggregated to the thread level. Aggregated data normally exert a *compositional effect*, reflecting group differences that are attributable to variability in the constitution of the group [112]. Threads in OHCs have characteristics similar to those of teams or groups. For example, a group has a leader and followers and works toward one goal, providing supports to its members as they strive to achieve that goal. Likewise, a thread focuses on a topic brought up by a thread creator in OHCs and communicates until most participants feel consensus has been reached or at least the thread creator is satisfied with the results (i. e., comments). Thus, the decision processes evoked in a thread when a specific topic is proposed may scarcely resemble those evoked when other threads are posted in the OHCs.

Such thread-unit data provide notable benefits for this study. Each thread in SNS community postings contains a story in terms of a topic related to healthcare, and each story contains incidents (i.e., paragraphs or groups of phrases) that can be established as variables. These incidents may be identified and then categorized by themes as variables. Since the thread-unit data are prospectively characterized by messages posted by the thread originator from the beginning of a specific topic and continuing to messages posted by peers, they can show that peers’ informational support is related to users’ resilience across a period of time. Thus, similar to the case with longitudinal data, a user who posts a topic or questions about the topic in a thread may also post following comments, responses, or answers in other peers’ support messages. In a single thread, all SNS users’ interactions through message posts about a single topic are stored by time; the same users can also be involved in other threads. For example, in this study, a single user posted his/her messages 7.2 times in a thread (see Table 1 for details).

4.3. Level of analysis and variables

In analyzing the text data, we used a “phrase-level” that counted combinations of two or more words, instead of counting words as indicators. Phrase-level in text analysis has several benefits over word-level counting. Importantly, the keyword indicators in phrase-level counting can be considered in contextual situations, while word-level counting cannot. For example, the following sentences all contain the same keyword, *happy*: “I was very *happy*,” “Are you *happy*?”, and “He will not be very *happy*.” However, these sentences have different subjects, tenses, and sentiments. Thus, we cannot know what the word

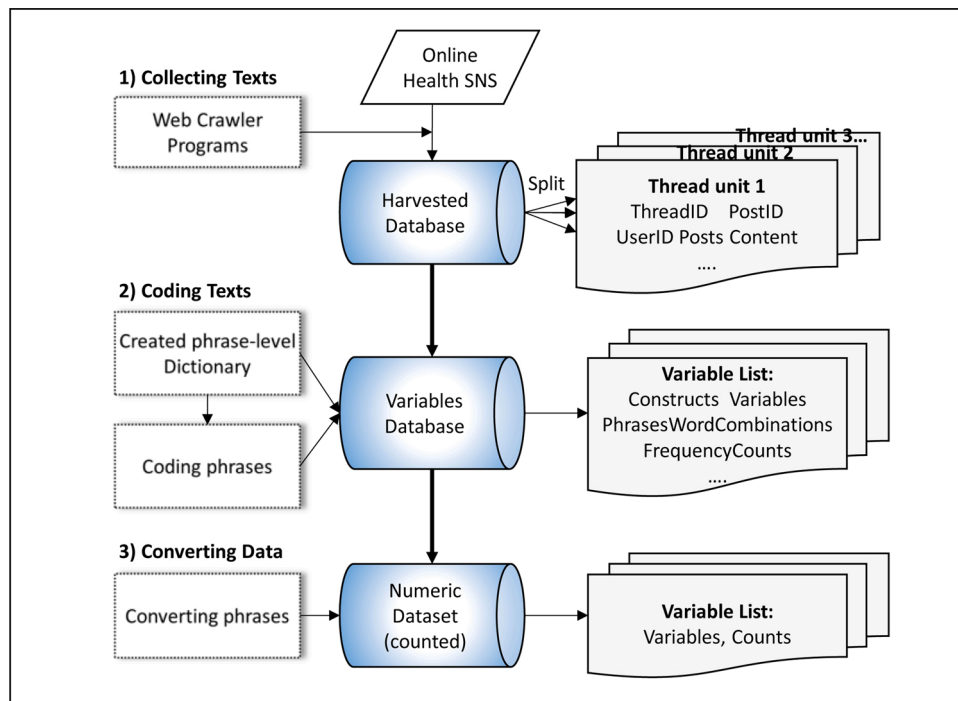


Fig. 2. Data Analysis Procedures.

Table 1
Data Classification.

Data set	tudiabetes.org
Total number of threads (sample size)	1295 threads
Total number of posts	53,831
Total number of users' posts	3117
Average number of posts in a thread	41.6
Max/min number of posts in a thread	1144/4
Average number of posts by a single user	17.3

happy really indicates in a certain context. Word counting in a word-level analysis is highly likely to be either overrated or underrated as a means of exploring the relationships among variables because it ignores the context. Specifically, word counting in different contexts may cause unexpected results. For example, if we count the keyword *happy* regardless of the context, the variable “happiness” might appear to have stronger effects than it actually does.

In contrast, in a phrase-level approach, the phrase can be counted while considering specific contexts by combining words (e.g., “are” + “happy”), which allows for finding a proper indicator for variables. In other words, compared to word-counting data, phrase-counting data can better measure a concept and provide valid indicators because this approach allows us to capture a certain context and its implications through the combination of words to make phrases. Therefore, to better capture the specific contexts and implications of the data, in this study we focus primarily on phrase-level content analysis in coding processes, conducting an analysis based on the word combinations related to social support, helpfulness, goal-setting, and resilience behavior in the collected data. Table 2 shows the variables and the criterion words for the categorization of those variables utilized in this study.

4.4. Coding text data

To find the variables in the theoretical framework, this study applied a three- step coding process based on variables from past research. This coding process was conducted using the Atlas.Ti software, which is a content analytic technique tool (see Appendix 1). After separating the

text data set within a single file, we created a dictionary for the coding indicators of each variable. We first manually analyzed the 1295 threads in the text data set to find phrases for variables. The specific keywords included in the phrases collected in this step were based on conceptual definitions from the past literature. For example, keywords for self-efficacy were selected based on the concept “how easy it is undertaken,” while keywords for response efficacy were based on “effort to produce results.”¹ Unlike the hermeneutic–interpretative approach, in which coders or researchers manually develop an interpretative account of media texts [115], our coding method is relatively clear due to the computer-assisted approach called “frame mapping,” manifested in the use of specific words [116,117]. We utilized this approach to find particular phrases that occurred jointly in some texts (see Appendix 1). Instead of checking validity, accuracy, or error caused by misinterpretation of the meaning of the messages, frame mapping simply indicates the same phrases based on keywords in contexts. With this message-based hermeneutic–interpretative approach, it is vital to identify how well a message represents what it is supposed to mean as an indicator or variable (validity), because a message indicates a measure item. Therefore, we obtained a set of data collected by identifying a particular phrase that represented an identical or semi-identical indicator/variable in a thread.

4.5. Identifying keywords

Based on the existing theory or prior research, we started identifying key concepts or variables representing broad theme/variables by generating hundreds of codes at the thread level. Given a collection of

¹ Two collectors compared the collected keywords based on definitions and construct measure items from previous research. This comparison was straightforward: The two collectors simply checked whether one of them included specific keywords for each indicator, rather than comparing their separate message interpretations. The inter-coder reliability for whether the two collectors had the same keywords was 0.94. Discrepancies were resolved by checking synonyms and antonyms of the keywords through discussion (see Appendix 2).

Table 2
Schemes Used for Measuring Variables.

Variables/Indicators	Operational definition	Examples of keywords included in the counted phrases
Emotional support	Total number of emotional support phrases in a thread (Modified from [113])	Hope/wish, good luck, glad/happy, believe, support, deserve/well-deserve, not give up/not impossible/excellent, etc.
Helpfulness	Total number of helpfulness phrases in a thread (Modified from [27])	Worth it, helpful, inspire, appreciate, encourage, etc.
Goal-setting	Total number of goal-setting phrases in a thread (New)	Goal, plan, decision, am going to/will do, etc.
Self-efficacy-oriented informational support	Total number of SEOS informational support phrases in a thread (Modified from [113])	Easy and related words, etc.
Response efficacy-oriented informational support	Total number of REOS informational support phrases in a thread (Modified from [113])	Effective or will lose weight, and related words, etc.
Health resilience	Total number of resilience phrases in a thread (Modified from [114])	Resilience/be resilient, deal with, cope with, I am sure I can, fix, ability, be strong, etc.
Control variables		
Information seeking	Total number of information-seeking phrases in a thread (Modified from [6])	Any advice /any suggestion/recommendation/I want to know/love to hear/ I'd like to know, etc.
Information quality	Total number of information-quality phrases in a thread (Modified from [6])	It was accurate/accurate/correct info/correct information/reliable info/no error, etc.
The number of posts	Total number of posts in the community (Modified from [113])	Total number of posts in the community

documents at the thread level, this process was conducted by coding-related keywords that were translated from keywords or key terms into theoretical categories. For example, the category “resilience” refers to users’ capacity for adaptability, positive functioning, or competence following chronic stress or prolonged trauma. Based on the items developed by Wagnild and Young [114], we abstracted keywords such as “can handle,” “well prepared,” “get through,” and “recover quickly” into the concept of “resilience.” Applying the same process, we mapped the related words into all seven variables. After we had identified keywords used for the measurement of our variables, we moved to the next step, specifying phrases and refining the words and phrases for each variable.

4.6. Creating a dictionary by specifying and categorizing phrases

After creating the categories representing the conceptual variables, we identified related-word phrases. We then created a dictionary by mapping the categories to related-word phrases. According to Gioia et al. [118,119], categories should be associated with existing concepts or variables or with emerging theoretical concepts and variables that do not seem to have adequate theoretical references in the existing literature. In this study, instead of using a word-level text analysis, we coded contextual word combinations expressed under specific contexts. To collect phrase-level texts, we located the sentences in which the keyword was embedded, found the words used together with keywords, and specified the exact phrases which would indicate more information about the contexts of the words. In most cases we considered a few words immediately before and after the keywords, but sometimes we needed to consider words found some distance away from the keywords,

depending on the sentences. To determine the phrases, we created a reference list containing the most commonly occurring combinations of the words and used it for coding phrase-level texts to count the occurrence of the threads.

4.7. Selective coding phrases

After we completed the phrase list for all the variables, we coded phrases for the variables into categories. Content analysis experts have noted that “most content analyses would benefit from the construction of special purpose dictionaries but developing a dictionary from scratch can be a formidable task. It is not surprising, therefore, that content analysts usually try to build on available dictionaries before they attempt to develop their own” [120], p. 287]. The suggestion of creating custom dictionaries needed to advance the management field is unlikely to become a reality if guidance is not provided for a thoughtful approach toward building such dictionaries [121].

4.8. Converting to a count data set

In this step, we converted the coded phrase-level data to a counted data set. We used the Atlas.Ti software application to convert the text data into numeric counted data.

4.9. Data analysis

The analysis was conducted in two steps: (1) data set imputation and (2) negative binomial regression analysis.

4.10. Data imputation

Since the data set counted the number of phrases in each thread, any variable might potentially have a zero count if no related phrase was counted. Commonly, this counting approach leads to missing values in the data and produces under/overdispersed counts due to the previously mentioned characteristics [122]. Since not all users participated in a thread by posting messages that included meaningful words for coding purposes, our data set did have missing data. Missing data can engender two problems—biased parameter estimates and inaccurate hypothesis tests/inaccurate standard errors/low power. To remedy these problems, a counted data set with missing data should be treated properly. According to Newman [123], missing data are categorized into three types—missing completely at random (MCAR), missing at random, and missing not at random. Based on these types, the following data imputation should consider the cases differently.

To treat missing data, we conducted multiple imputation (MI) for data missing completely at random (MCAR), using the SPSS statistical software. The software provides a function for MI. The missing responses in the data set were completely random because the data were counted and then converted based on the number of the phrases representing variables, and the missing data occurred independently of the characteristics of the cases. The procedure for MI included (1) imputing missing data five times to produce five complete data sets; (2) analyzing each data set, using a standard statistical procedure; and (3) combining the iterated results into one data set, using the formula from Rubin [124].

$$\sqrt{\frac{1}{M} \sum_{k=1}^M S_k^2 + \left(1 + \frac{1}{M}\right) \left(1 - \frac{1}{M}\right) \sum_{k=1}^M (b_k - \bar{b})^2},$$

where M is iterated results (five times in this study), b_k is the parameter estimate in replication k , and S_k is the standard error of b_k . We used a pooled data set and all these steps were completed by SPSS. Table 3 displays the descriptive statistics with the pooled data after the MI processes.

Table 3
Descriptive Statistics.

Indicators	Mean	Median	S.E.	Min	Max
Health resilience (1)	8.433	9.65	3.773	0.0	20.9
Goal-setting (2)	5.694	5.59	4.235	-6.4	48.7
Helpfulness (3)	7.141	7.72	5.098	-19.4	122.1
Emotional support (4)	2.564	2.00	3.087	-5.9	39.0
information seeking (5)	1.387	1.00	1.155	-2.1	16.0
information quality (6)	2.109	1.91	1.796	-1.1	14.0
Number of posting (7)	40.295	—	40.356	—	—

Note: * $p < 0.01$, ** $p < 0.001$.

4.11. Negative binomial regression analysis

The data contained the message postings of 1295 threads in a healthcare community for 1 year ($n = 1295$) and the dependent variable measured by count data after converting the selective codes. We conducted the *negative binomial regression* analysis technique designed for analyses of noncontinuous, count-dependent variables with overdispersion, and where the variance of the underlying distribution is greater than the mean [125,126]. A negative binomial estimation provides a better fit for count data than the more restrictive Poisson model [127] and accounts for an omitted variable bias, while simultaneously estimating heterogeneity [128,129]. Thus, the three models in this study were analyzed and tested as follows.

$\ln(\text{Helpfulness}) = \beta_0 + \beta_1\text{Emotional support} + \beta_2\text{Type of informational support}$ $+ \beta_3(\text{Emotional support} \times \text{Type of informational support})$ $+ \beta_4\text{Information seeking} + \beta_5\text{Information quality}$ $+ \beta_6\text{Number of messages}$	Model 1
$\ln(\text{Goal setting}) = \beta_0 + \beta_1\text{Helpfulness} + \beta_2\text{Emotional support}$ $+ \beta_3\text{Type of informational support}$ $+ \beta_4(\text{Helpfulness} \times \text{Type of informational support})$ $+ \beta_5(\text{Emotional support} \times \text{Type of informational support})$ $+ \beta_6\text{Information seeking} + \beta_7\text{Information quality}$ $+ \beta_8\text{Number of messages}$	Model 2
$\ln(\text{Resilience}) = \beta_0 + \beta_1\text{Goal-setting} + \beta_2\text{Helpfulness} + \beta_3\text{Emotional support}$ $+ \beta_4\text{Type of informational support}$ $+ \beta_5(\text{Goal-setting} \times \text{Type of informational support})$ $+ \beta_6(\text{Helpfulness} \times \text{Type of informational support})$ $+ \beta_7(\text{Emotional support} \times \text{Type of informational support})$ $+ \beta_8\text{Information seeking} + \beta_9\text{Information quality} + \beta_{10}\text{Number of messages}^2$	Model 3

5. Results

Table 4 presents the correlations for each of the variables described in the previous section. A review of the correlations among the independent variables, which appear in the same model, indicated that generally multicollinearity³ was not a concern.

After the imputation of the data, we ran negative binomial regression analyses with the three different dependent variables and the remaining variables listed in Table 1. Three separate analyses were conducted; their results are reported in Table 5. The goodness-of-fit index showed

² A negative binomial regression model is generally specified as follows: $\ln \lambda_i = \beta X_i + \varepsilon_i$, where the predictor variables λ_i are given, X is a vector of the covariates of variables, and ε_i is the error term, which follows a gamma distribution.

³ Multicollinearity is a quality of the linear predictor with a linear combination of the explanatory variables. To check for it, we used linear regression analysis with all variables. The results showed that VIFs were in a range between 1.12 and 1.300.

Table 4
Intercorrelations of the Measured Variables.

Indicators	1	2	3	4	5	6
Health resilience (1)	1					
Goal-setting (2)	.457**	1				
Helpfulness (3)	.567**	.336**	1			
Emotional support (4)	.118**	.179**	.124**	1		
Information seeking (5)	.302**	.149**	.248**	.138**	1	
Information quality (6)	.279**	.191**	.220**	.142**	.179**	1
Number of posts (7)	.019	.293**	.152**	.375**	.218**	.240**

Note: * $p < 0.01$, ** $p < 0.001$.

that all three models had a good fit (log-likelihood 101.928***, 335.480***, 510.326***, $p < 0.001$). In addition, the analyses for the three models demonstrated the deviance/df parameter was close to 1.0⁴ (0.937, 0.991, and 0.833 in models 1, 2, and 3, respectively), indicating no possible presence of overdispersion in the models. That further implies no need for addressing the problem of underdispersion or overdispersion in these models.

5.1. Hypothesis tests

Hypotheses 1a and 1b posited the effects of helpfulness on both goal-setting and health resilience. The results in Model 2 and Model 3 showed that helpfulness had significant effects on both goal-setting ($\beta = 0.276$, $p < 0.01$) and health resilience ($\beta = 0.291$, $p < 0.001$). Thus, Hypotheses 1a and 1b were supported. Regarding Hypothesis 2, which proposed a positive relationship between goal-setting and health resilience, the result showed that goal-setting was positively related to resilience ($\beta = 0.292$, $p < 0.01$) in Model 3.

Hypothesis 3a posited that SEOS affects helpfulness more than REOS does. Consistent with our prediction, the direct relationship between the informational support types and helpfulness was significant ($\beta = 0.455$, $p < 0.001$) in Model 1, indicating that SEOS had greater impact on helpfulness than did REOS. Thus, Hypothesis 3a was supported.

In Hypothesis 3b, we proposed the moderating effects of REOS on the relationship between helpfulness and goal-setting. Model 2 in Table 5 indicates that the support types had a moderating effect on the relationship between helpfulness and goal-setting ($\beta = -0.208$, $p < 0.05$), such that REOS had a stronger impact on the relationship than did SEOS. Thus, Hypothesis 3b was also supported.

Hypothesis 3c predicted that REOS would have a stronger effect on the relationship between helpfulness and health resilience than SEOS does. Model 3 in Table 5 shows that the effect of the support types on the relationship between helpfulness and health resilience was not significant ($\beta = 0.096$, $p > 0.05$). Thus, Hypothesis 3c was not supported.

Finally, Hypothesis 3d posited the moderation effect of support types on the relationship between goal-setting and health resilience. Model 3 in Table 5 shows the significant moderating effect of the informational support types on the relationship between goal-setting and health resilience ($\beta = -0.239$, $p < 0.001$), such that the effect of REOS was stronger than that of SEOS on the relationship. Therefore, Hypothesis 3d was supported.

In Fig. 3, we graphically depict the interaction effects of the two distinctive types of efficacy on the relationship between helpfulness and goal-setting, considering instructional and consequential supports. Because count models are nonlinear,⁵ the statistical significance of these interaction terms was interpreted carefully. Fig. 3a illustrates the significance of Hypothesis 2: individuals who receive instructional support

⁴ Good model fit (deviance/df = 1.0).

⁵ The calculation is $[\exp(b) - 1] * 100\%$; the graph uses $\exp(b)$.

Table 5
Results of Negative Binomial Regression Predicting Magnitude of Impact.

Main variables	Response efficacy-oriented support group		
	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
Dependent variables	Helpfulness	Goal-setting	Health resilience
Independent variables			
Goal-setting	—	—	0.292 (0.069)***
Helpfulness	—	0.276 (0.094)**	0.291 (0.068)***
Emotional support	0.163 (0.044)***	0.024 (0.041)	0.040 (0.015)**
[Type_SEOS]	0.455 (0.161)**	0.903 (0.144)***	1.329 (0.219)***
[Type_REOS] [@]	0	0	0
Moderating effects			
[Type_SEOS]*emotional support	-0.086 (0.046)	-0.001 (0.0416)	—
[Type_REOS]*emotional support [@]	0	0	—
[Type_SEOS]*helpfulness	—	-0.208 (0.098)*	-0.096 (0.068)
[Type_REOS]*h Helpfulness [@]	—	0	0
[Type_SEOS]*goal-setting	—	—	-0.239 (0.071)***
[Type_REOS]*goal-setting [@]	—	—	0
Control variables			
Information seeking	0.024 (0.051)	-0.018 (0.040)	0.045 (0.054)
Information quality	0.068 (0.029)*	0.042 (0.023)	0.063 (0.030)*
Number of messages	0.001 (0.014)	0.005 (0.012)***	-0.001 (0.002)
Intercept	-0.892 (0.1434)***	-0.579 (0.132)***	-2.167 (0.201)***
Model fit			
Deviance	658.992	710.591	616.742
Log-likelihood	-891.867	-1293.589	-834.110
Chi-square	902.713	728.228	1250.433
df	703	717	740
BIC	1829.691	2646.466	1734.421
Deviance/df	0.937	0.991	0.833
Likelihood-ratio chi-square test	101.928***	335.480***	510.326***

[@] Support type: Set to zero because this parameter is redundant.

[^] Emotional support was used as a control variable in Model 3.

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

substantially increase their goal-setting when they perceive those messages as helpful.

We used the coefficients of Models 1 and 3 in Fig. 3 illustrate the patterns of interaction effects that supported the hypotheses. Finally, Fig. 3 (right column) demonstrates that, all else being equal, individuals who receive consequential support have substantially increased health resilience when they perceive those messages as helpful.

5.2. Post-hoc analyses

To further verify our findings and gain useful additional insights, we conducted post-hoc analyses. Specifically, the independent variables and moderators were hierarchically added in the three models. This could potentially result in an independent variable in the first model becoming insignificant in the next model (Model 2) due to the intervening effect of the independent variable in each model. For example, the independent variable “emotional support,” which was significant in Model 1, was not significant in Model 2. Thus, by identifying the mediating role of the main variables in Models 2 and 3, this analysis highlighted the dynamics of the relationships between informational supports and the studied variables that were not hypothesized but extend our understanding of those relationships at a profound level.

The results of the post-hoc analyses were two-fold. First, the results of the post-hoc analysis of the mediation effect of helpfulness on the relationship between emotional support and goal-setting confirmed such an indirect relationship: emotional support has a significant effect on goal-setting via helpfulness ($\beta = 0.089, p < 0.05$). However, the full model (i.e., Model 2) became non-significant, indicating the inference of the mediating effect according to Baron and Kenny [130]. We interpret this finding as signifying that helpfulness plays a mediating role in the relationship between emotional support and goal-setting.

Second, we analyzed the mediating effect of helpfulness on the relationship between the informational support types and health resilience, while controlling for goal-setting, to determine the predicative explanatory power of informational support and helpfulness for health resilience. The results revealed that the mediation effect of helpfulness on the relationship was statistically significant ($\beta = -0.241, p < 0.001$). This indicates that informational support increases health resilience via helpfulness [113].

6. Discussion

6.1. Findings

The purpose of this study was to examine the supportive role of the SNS messages posted in threads of OHCs for users’ enhanced health-related behaviors via internalizing the supportive messages. Specifically, we posited that users’ helpfulness is positively related to a level of resilience via a cognitive goal-setting process. In addition, we expected that concerned users would cognitively utilize the two types of efficacy-facilitating informational support (i.e., SEOS and REOS) embedded in threads of OHCs in distinct ways, while coping with their health issues. Using phrase-level analysis method, the findings of the study supported the hypotheses stating that different message supports play valuable roles in enhancing users’ health behaviors by providing the two types of efficacy-facilitating informational support. By collecting thread-unit data—that is, prospective data capturing sequential series of postings through 12 months since the date of first posting on each topic—we also sought to investigate the effects of supports on health resilience across that period of time.

The main findings showed that SEOS and REOS increase helpfulness, goal-setting, and health resilience, but the two types of efficacy-facilitating informational supports play distinct roles in those relationships: the SEOS type is more influential and instructional for SNS users’ perceptions of helpfulness than the REOS type, while the REOS type moderates the relationships among helpfulness, goal-setting, and health resilience. The mediation effect of goal-setting on the main relationship was supported in that the more helpfulness (or goal-setting) the users perceive that they get from the community, the more they tend to pursue REOS for goal-setting (or resilience) while they are under the influence of SEOS. Thus, users’ decision to use informational support is determined by specific information about what they are capable of, and their attention to the information goes further than just considering general aspects of the information. Indeed, this result is consistent with the past research, suggesting that efficacy-based judgment plays a significant role [131–133]. Specifically, we suggest that once users perceive helpfulness of the informational support from SEOS, they will consider any additional available support to enhance their health resilience. This result is consistent with the primary findings of the extant IS literature [e.g., 6, [134], with our post-hoc analyses revealing that emotional support and companionship activities play major roles in OHCs, which sets OHCs apart from other virtual communities that are dominated by informational support.

In particular, the findings of this study shed light on best practices for OHCs to be sustainable, suggesting that it is critical to motivate users’ proactive companionship activities by providing opportunities for them to participate in posting high-quality supportive messages. This strategy would work in a variety of conditions, including other healthcare

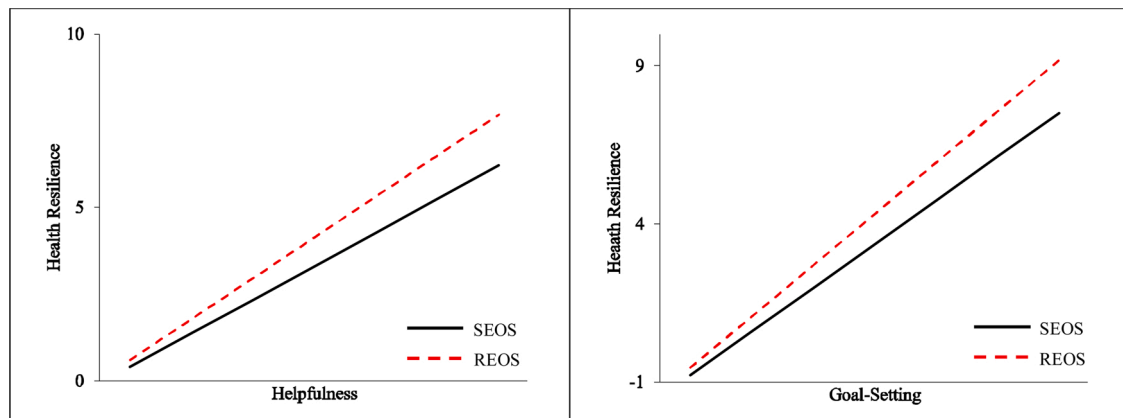


Fig. 3. Interaction Effects of Distinctive Efficacy (Model 3).

communities [15]. Furthermore, our findings call for researchers and practitioners to pay greater attention to the key roles of the different types of informational support messages written by posters in threads on health-related issues, while also considering the increasingly important role of OHCs as being complementary to that of healthcare institutions. The findings also resonate with the effects of users' efficacy across the support types.

6.2. Theoretical implications

This study advances our understanding of the important roles of OHCs in shaping users' perceptions of helpfulness and their health resilience, by integrating the distinct types of efficacy-facilitating informational supports. Drawing on the virtual community and healthcare literature, this study explicates the issues of (1) how users' information-seeking process can assist them in attaining outcomes beyond a simple adaptation that promotes helpfulness and goal-setting in health SNS and (2) how users can enhance their health resilience status through their efforts based on supportive messages. In particular, this study sheds light on the roles of the different types of efficacy-facilitating informational support that influence support seekers at a forum thread level.

Our research extends our understanding of the effects of users' interactions in OHCs in two ways. First, it demonstrates that OHC members' informational supports can lead to improvements in users' (information seekers) health-related behaviors based on the different roles of efficacy-facilitating informational support. Past research has primarily focused on the role of social capital as a type of social support [15] or the effect of social support on users' health conditions, as measured by the functionality level within "an overall assessment of a person's health condition" [6, p. 696]. While these studies examined the effectiveness of social networks for satisfying patient needs, the important question of *how* social support changes patients' health outcomes has remained largely unanswered [135]. Emphasizing the role of informational support as an essential social support offered by OHCs, the current study expounds on how users in OHCs gain informational support and then use that support to improve their health resilience. By investigating the online activities of OHC users, this study captures the benefits of operating forums in OHCs in a way that aids patients in improving their health-related conditions. These findings can be utilized to encourage information-seeking users and supporters to interact in ways that augment mutual engagement and prosocial behaviors affecting their subsequent health-related actions. While information seekers could selectively apply supportive messages to their health conditions, informational supporters could participate in OHCs by providing more useful information organized into the distinct types of informational support. In this way, OHCs would become a solid informational and resourceful venue where various aspects of social supports

are available, exchanged, and encouraged by the OHCs' membership [115].

Extending the extant research on the effects of informational support on users' behavioral consequences, we applied a phrase-level approach, which contributes to the enhanced validity of our findings while considering the specific contexts and implications of the text data. The findings obtained through these rigorous analyses articulate that users' health conditions can be improved by the two types of informational supports, as OHC users selectively accept these informational supports to advance their health. Both the sophistication of the theory building and the solid empirical evidence allowed for use of a novel methodological technique, the frame mapping approach. While previous studies using multiple-method techniques (qualitative and quantitative methods) in OHCs have relied on a hermeneutic approach [115], our study utilized a computer-assisted approach that allows a phrase-level keyword to capture the specific context and implications of the text data [116,117]. Unlike the hermeneutic-interpretative approach, which provides an interpretative account of media texts (i.e., a post or message) by manually coding them [115], our frame mapping approach found particular phrases that occur together in texts (see Appendix 1). This novel approach extends the extant analytic techniques by using text data in a way that builds theory and tests the theoretical hypotheses.

6.3. Practical implications

The current study provides practical insights into how OHCs might strategically facilitate and actively maximize the beneficial function of the postings and communications in threads for community members. Our findings revealed that, in virtual healthcare communities, users' perceptions of the helpfulness of informational support encourage their goal-setting for health improvement, and such goal-setting, in turn, positively affects health resilience. The results of this study are especially critical given the increased longevity of the population and the high costs associated with the healthcare system and medical treatment in the United States. According to the National Health Expenditure Accounts, healthcare costs in the U.S. reached \$3.5 trillion, or \$10,739 per person, in 2017,⁶ consuming a tremendous percentage of the nation's GDP as well as individual household expenses. While treating severe illness is certainly not the primary goal when operating OHCs, our results suggest that providing necessary and helpful informational support heightens users' proactive goal-setting and promotes further resilience for their health improvement. The positive role of OHCs via informational support contributes not only to reducing healthcare costs, but also

⁶ <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html>

to enriching those users' autonomy and motivation and subsequent management skills for enhanced physical well-being.

In addition, while a positive mediating relationship was posited in this study (helpfulness and health resilience via goal-setting), the different types of efficacy-facilitating informational support perceived by the users play distinct roles: SEOS focuses on the *efficiency* of the implementation and is more positively related to helpfulness, while REOS focuses on the outcome expectancy (*effectiveness*) and motivates users to engage in goal-setting and shore up their health resilience. Given that SEOS tends to suggest helpfulness early and quickly, it would be desirable to design a healthcare website so that it exposes members to SEOS as early as possible and thereby sparks their interest in the OHC's messages. This, it is suggested, would eventually lead to perceived helpfulness. Moreover, for the purpose of setting health-related goals and resilience, a dedicated forum can be designed and provided for those OHC members who are looking for REOS. Such a strategic design and implementation would facilitate the unique relationship between helpfulness and health resilience via goal-setting identified by the current study.

Since most online social communities operate voluntarily, with users being highly autonomous in regard to their messages/postings, managers/administrators are less likely to be involved in specific contents/topics in threads. However, OHC managers can design OHC forums in a way that better supports REOS and SEOS messages through tools such as ratings of messages' effectiveness and efficacy, and by including prompts in user responses that encourage sharing of REOS or SEOS messages. OHCs can also design questionnaires to elicit users' motivations and preferences; then, using artificial intelligence (AI) and natural language processing (NLP) techniques, they can better match users with appropriate informational supports.

Of course, ensuring that the OHCs remain professionally oriented environments, where ethical and trustworthy information is mutually exchanged and shared among the members, will be vital for maintaining the effectiveness of consequential supports (e.g., the prescriptions or medical activities). As our study indicated, such consequential supports would be helpful for users' goal achievement related to health improvement. Therefore, it would be beneficial to create and maintain effective and safe forums where users can navigate various hands-on information and consequential supports in a consistently professional and ethical environment.

6.4. Limitations and suggestions for future research

Although this study incorporates a solid theoretical framework using text analytics, it has several limitations that could be addressed by future research. First, we used the thread-level in the OHC as an analysis unit, where threads include differing numbers of peer reviews. By its very nature, thread-level data may fluctuate due to users' inconsistent participation and the different numbers of messages related to the variables. This aspect could cause methodological issues when developing variables or even constructs to explore the relationship among them. Therefore, future research should be mindful of the need for care when developing variables from posts in online community, especially when users' posts in a thread are not enough.

Second, the counts of phrases and the phrase-level analysis could yield different results based on the specific criteria used. Unlike when counting single words, to count phrases, a researcher first needs to create a phrase dictionary to classify word combinations. Since the phrase dictionary is created manually, the development process for the dictionary may cause a coverage problem (e.g., missing important words or phrases by the researcher or coders). Future research might employ a more comprehensive method of phrase-level counting by incorporating text mining and content analytics that properly articulate the roles of the messages posted in OHC contexts.

Lastly, the data used in this study were derived from archival data in

an OHC forum, but not from cross-sectional data collection. This may create a weak point for identifying the relationships among the study variables, especially in causal relationships. Although the texts utilized in the study were periodically sorted in the thread level in a timely manner, which does not warrant assuming causality within the relationships. Ideally, future research would test conceptual models using various sources of data, such as cross-sectional data and longitudinal data, which would increase the validity of the data analyses and further interpretation of the research findings. Since each thread in OHCs chronologically posts sequential messages by users (either message supporters or seekers), logical clues about the content, such as indicative relationships (including causality) among the keywords derived from users' interactions with messages, may be available for researchers to utilize for their theory building and analyses. According to Wunsch et al. [136], "If temporal priority of the cause over the effect is a necessary (but not a sufficient) condition for inferring causation, at the empirical level, putative causes and effects should indeed be ordered in time. In other words, longitudinal data, where the same individuals are followed over time either prospectively or retrospectively, are required for testing causal hypotheses (at the individual level)" (p. 8). As Wunsch et al. [136] suggested, this thread level of analysis may be applied to a longitudinal-based data source to assess the relationships among all participant-driven events that happen in a timely manner.

7. Conclusion

This study provides a deeper understanding of how online communities in the healthcare industry support their users' health, focusing on the underpinnings of two distinct types of efficacy-facilitating supportive messages. Drawing on social support theory and efficacy theory, the conceptual model was tested by using phrase-level text analysis of data obtained through text mining. The findings reveal that self-efficacy-oriented messages and response efficacy-oriented messages play critical roles in users' health-related goal-setting and resilience. More importantly, the different types of efficacy-facilitating informational supports have distinct roles in the posited relationships, depending on their emphasis on the function of efficiency and effectiveness that the users seek to meet their needs for health improvement.

Our study provides not only preliminary theoretical groundings for the supportive roles of OHCs as information providers in the healthcare industry, but also a novel way of understanding efficacy-facilitating informational supports that appeal to user cognition, based on solid theory building and methodology using content analysis with text analytics. We encourage IS scholars to continue to delve into the beneficial roles of online social communities in healthcare, utilizing rigorous research techniques with the integration of multiple advanced methodological tools.

CRedit authorship contribution statement

Insu Park: Conceptualization, Methodology, Data curation, Writing - original draft, Software, Visualization. **Surendra Sarnikar:** Data curation, Validation, Writing - review & editing. **Jeewon Cho:** Conceptualization, Writing - review & editing.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.im.2020.103372>.

References

- [1] HPSocialMediaSolutions, *Social Media in Healthcare*, Hewlett-Packard Development Company, 2013.
- [2] N. Kordzadeh, J. Warren, *Personal characteristics, privacy concern, and membership in virtual health communities: an empirical study*, in: *Proceedings of*

- the 20th Americas Conference on Information Systems (AMCIS), Savannah, Georgia, 2014, pp. 1–10.
- [3] L.M. Penwell, K.T. Larkin, Social support and risk for cardiovascular disease and cancer: a qualitative review examining the role of inflammatory processes, *Health Psychol. Rev.* 4 (2010) 42–55.
 - [4] L. Laranjo, A. Arguel, A.L. Neves, A.M. Gallagher, R. Kaplan, N. Mortimer, G. A. Mendes, A.Y.S. Lau, The influence of social networking sites on health behavior change: a systematic review and meta-analysis, *J. Am. Med. Inform. Assoc.* (2014) 1–10.
 - [5] S. Guo, X. Guo, Y. Fang, D. Vogel, How doctors gain social and economic returns in online health-care communities: a professional capital perspective, *J. Manag. Inf. Syst.* 34 (2017) 487–519.
 - [6] L. Yan, Y. Tan, Feeling blue? Go online: an empirical study of social support among patients, *Inf. Syst. Res.* 25 (2014) 690–709.
 - [7] M.A. Hoyt, A.L. Stanton, Unmitigated agency, social support, and psychological adjustment in men with cancer, *J. Pers.* 79 (2011) 259–276.
 - [8] M.A. Cohn, B.L. Fredrickson, S.L. Brown, J.A. Mikels, A.M. Conway, Happiness unpacked: positive emotions increase life satisfaction by building resilience, *Emotion* 9 (2009) 361.
 - [9] C. Parry, Embracing uncertainty: an exploration of the experiences of childhood cancer survivors, *Qual. Health Res.* 13 (2003) 227–246.
 - [10] T.A. Wills, M.G. Ainette, A. Baum, T. Revenson, J. Singer, 20 social networks and social support. *Handbook of Health Psychology*, 2012, p. 465.
 - [11] C.G. Blanchard, T.L. Albrecht, J.C. Ruckdeschel, C.H. Grant, R.M. Hemmick, The role of social support in adaptation to cancer and to survival, *J. Psychosoc. Oncol.* 13 (1995) 75–95.
 - [12] F. Agneessens, H. Waeghe, J. Lievens, Diversity in social support by role relations: a typology, *Soc. Networks* 28 (2006) 427–441.
 - [13] P. Borah, X. Xiao, The importance of 'likes': the interplay of message framing, source, and social endorsement on credibility perceptions of health information on Facebook, *J. Health Commun.* 23 (2018) 399–411.
 - [14] H. Song, K. Omori, J. Kim, K.E. Tenzek, J.M. Hawkins, W.-Y. Lin, Y.-C. Kim, J.-Y. Jung, Trusting social media as a source of health information: online surveys comparing the United States, Korea, and Hong Kong, *J. Med. Internet Res.* 18 (2016) e25.
 - [15] K.-Y. Huang, I. Chengalur-Smith, A. Pinsonneault, Sharing is caring: social support provision and companionship activities in healthcare virtual support communities, *Mis Q.* 43 (2019).
 - [16] P.A. Keller, Regulatory focus and efficacy of health messages, *J. Consum. Res.* 33 (2006) 109–114.
 - [17] C.A. Heaney, B.A. Israel, Social networks and social support, *Health behav. health educ. theory res. Pract.* 4 (2008) 189–210.
 - [18] A.G. Greenwald, C. Leavitt, Audience involvement in advertising: four levels, *J. Consum. Res.* 11 (1984) 581–592.
 - [19] S. Chung, I. Han, Factors influencing information distortion in online deliberations: the effects of informational characteristics and regulatory focus, *Comput. Human Behav.* 29 (2013) 2188–2196.
 - [20] R.H. Fazio, M.C. Powell, C.J. Williams, The role of attitude accessibility in the attitude-to-behavior process, *J. Consum. Res.* 16 (1989) 280–288.
 - [21] C. Janiszewski, The influence of display characteristics on visual exploratory search behavior, *J. Consum. Res.* 25 (1998) 290–301.
 - [22] R. Pieters, L. Warlop, Visual attention during brand choice: the impact of time pressure and task motivation, *Int. J. Res. Mark.* 16 (1999) 1–16.
 - [23] Y.-C. Hsieh, K.-H. Chen, How different information types affect viewer's attention on internet advertising, *Comput. Human Behav.* 27 (2011) 935–945.
 - [24] V.A. Earnshaw, S.M. Lang, M. Lippitt, H. Jin, S.R. Chaudoir, HIV stigma and physical health symptoms: do social support, adaptive coping, and/or identity centrality act as resilience resources? *AIDS Behav.* 19 (2015) 41–49.
 - [25] L.M. Sippel, R.H. Pietrzak, D.S. Charney, L.C. Mayes, S.M. Southwick, How does social support enhance resilience in the trauma-exposed individual? *Ecol. Soc.* 20 (2015).
 - [26] M. Citron, P. Solomon, J. Draine, Self-help groups for families of persons with mental illness: perceived benefits of helpfulness, *Community Ment. Health J.* 35 (1999) 15–30.
 - [27] S.M. Mudambi, D. Schuff, What makes a helpful review? A study of customer reviews on Amazon. Com, *MIS Q.* 34 (2010) 185–200.
 - [28] E.A. Locke, E. Frederick, C. Lee, P. Bobko, Effect of self-efficacy, goals, and task strategies on task performance, *J. Appl. Psychol.* 69 (1984) 241.
 - [29] A. Bandura, E.A. Locke, Negative self-efficacy and goal effects revisited, *J. Appl. Psychol.* 88 (2003) 87.
 - [30] C.B. Wortman, Social support and the cancer patient: conceptual and methodologic issues, *Cancer* 53 (1984) 2339–2360.
 - [31] N. Park, K.F. Kee, S. Valenzuela, Being immersed in social networking environment: facebook groups, uses and gratifications, and social outcomes, *Cyberpsychology Behav.* 12 (2009) 729–733.
 - [32] W.R. Beardslee, The role of self-understanding in resilient individuals: the development of a perspective, *Am. J. Orthopsychiatry* 59 (1989) 266–278.
 - [33] P.H. Byers, P.K. Nicholas, A. Webster, Hardiness and social support in human immunodeficiency virus, *Appl. Nurs. Res.* 6 (1993) 132–135.
 - [34] C. Bova, Adjustment to chronic illness among HIV-infected women, *J. Nurs. Scholarsh.* 33 (2001) 217–224.
 - [35] C. Brix, C. Schleussner, J. Füller, B. Roehrig, T.G. Wendt, B. Strauss, The need for psychosocial support and its determinants in a sample of patients undergoing radiooncological treatment of cancer, *J. Psychosom. Res.* 65 (2008) 541–548.
 - [36] D. Kralik, A. Van Loon, K. Visentin, Resilience in the chronic illness experience, *Educ. Action Res.* 14 (2006) 187–201.
 - [37] A.Me. Noronha, N. Mekoth, Social support expectations from healthcare systems: antecedents and emotions, *Int. J. Healthc. Manag.* 6 (2013) 269–275.
 - [38] B. Wellman, S. Wortley, Different strokes from different folks: community ties and social support, *Am. J. Sociol.* 96 (1990) 558–588.
 - [39] C. Schaefer, J.C. Coyne, R.S. Lazarus, The health-related functions of social support, *J. Behav. Med.* 4 (1981) 381–406.
 - [40] M. Mattson, J. Gibb Hall, Linking health communication with social support. *Health as Communication Nexus: a Service-learning Approach*, Kendall Hunt, Dubuque, IA, 2011, pp. 181–218.
 - [41] S. Cohen, T.A. Wills, Stress, social support, and the buffering hypothesis, *Psychol. Bull.* 98 (1985) 310.
 - [42] J.S. House, D. Umberson, K.R. Landis, Structures and processes of social support, *Annu. Rev. Sociol.* 14 (1988) 293–318.
 - [43] A. Bandura, W. Freeman, R. Lightsey, Self-efficacy: the Exercise of Control, Springer, 1999.
 - [44] A. Bandura, Self-efficacy: toward a unifying theory of behavioral change, *Psychol. Rev.* 84 (1977) 191.
 - [45] A. Bandura, Self-efficacy mechanism in human agency, *Am. Psychol.* 37 (1982) 122.
 - [46] D.L. Floyd, S. Prentice-Dunn, R.W. Rogers, A meta-analysis of research on protection motivation theory, *J. Appl. Soc. Psychol.* 30 (2000) 407–429.
 - [47] R.W. Rogers, J.T. Cacioppo, R. Petty, Cognitive and physiological processes in fear appeals and attitude change: a revised theory of protection motivation. *Social Psychophysiology: A Sourcebook*, 1983, pp. 153–177.
 - [48] R.W. Rogers, Cognitive and physiological processes in fear appeals and attitude change: a revised theory of protection motivation. *Social Psychophysiology: A Sourcebook*, 1983, pp. 153–176.
 - [49] A. O'Leary, Self-efficacy and health, *Behav. Res. Ther.* 23 (1985) 437–451.
 - [50] A.H. Skelly, J.R. Marshall, B.P. Haughey, P.J. Davis, R.G. Dunford, Self-efficacy and confidence in outcomes as determinants of self-care practices in inner-city, African-American women with non-insulin-dependent diabetes, *Diabetes Educ.* 21 (1995) 38–46.
 - [51] T.C. Skinner, S.E. Hampson, Social support and personal models of diabetes in relation to self-care and well-being in adolescents with type I diabetes mellitus, *J. Adolesc.* 21 (1998) 703–715.
 - [52] K. Williams, M. Bond, The roles of self-efficacy, outcome expectancies and social support in the self-care behaviours of diabetics, *Psychology, Health & Medicine* 7 (2002) 127–141.
 - [53] F.H. Navarro, S.T. Wilkins, A new perspective on consumer health Web use: "valuegraphic" profiles of health information seekers, *Manag. Care Q.* 9 (2001) 35–43.
 - [54] R.W. Rogers, S. Prentice-Dunn, Protection Motivation Theory, 1997.
 - [55] J. Shin, M.S. Taylor, M.-G. Seo, Resources for change: the relationships of organizational inducements and psychological resilience to employees' attitudes and behaviors toward organizational change, *Acad. Manag. J.* 55 (2012) 727–748.
 - [56] J. Avey, F. Luthans, C. Youssef, The additive value of positive psychological capital in predicting work attitudes and behaviors, *J. Manage.* 36 (2010) 430.
 - [57] F. Luthans, B.J. Avolio, J.B. Avey, S.M. Norman, Positive psychological capital: measurement and relationship with performance, *Pers. Psychol.* 60 (2007) 541.
 - [58] S. Peterson, F. Luthans, B. Avolio, F. Walumbwa, Z. Zhang, Psychological capital and employee performance: a latent growth modeling approach, *Pers. Psychol.* 64 (2011) 427.
 - [59] F. Luthans, The need for and meaning of positive organizational behavior, *J. Organ. Behav.* (2002) 695–706.
 - [60] J. Block, A.M. Kremen, IQ and ego-resiliency: Conceptual and empirical connections and separateness, *J. Pers. Soc. Psychol.* 70 (1996) 349–361.
 - [61] A.S. Masten, Resilience in Individual Development: Successful Adaptation Despite Risk and Adversity, 1994.
 - [62] K.M. Eisenhardt, J.A. Martin, Dynamic capabilities: What are they? *Strateg. Manage. J.* 21 (2000) 1105–1121.
 - [63] D.A. Levinthal, J.G. March, A model of adaptive organizational search, *J. Econ. Behav. Organ.* 2 (1981) 307–333.
 - [64] S.B. Sitkin, A.L. Pablo, Reconceptualizing the determinants of risk behavior, *Academy of Management, Acad. Manag. Rev.* 17 (1992) 9.
 - [65] A. Wildavsky, Searching for Safety, Transaction Publishers, 1988.
 - [66] E. Hollnagel, The four cornerstones of resilience engineering, in: C. Nemeth, E. Hollnagel, S. Dekker (Eds.), *Resilience Engineering Perspectives*, Ashgate, Farnham, UK, 2009, pp. 117–134.
 - [67] J. Carthey, M.R. De Leval, J.T. Reason, Institutional resilience in healthcare systems, *Quality Health Care* 10 (2001) 29–32.
 - [68] M. Costella, T. Saurin, L. de Macedo Guimarães, A method for assessing health and safety management systems from the resilience engineering perspective, *Saf. Sci.* 47 (2009) 1056–1067.
 - [69] D.D. Woods, E. Hollnagel, *Joint Cognitive Systems: Patterns in Cognitive Systems Engineering*, CRC Press, Boca Raton, FL, 2006.
 - [70] K.L. Kumpfer, Outcome measures of interventions in the study of children of substance-abusing parents, *Pediatrics* 103 (1999) 1128.
 - [71] S.O. Utsey, N. Giesbrecht, J. Hook, P.M. Stanard, Cultural, sociofamilial, and psychological resources that inhibit psychological distress in African Americans exposed to stressful life events and race-related stress, *J. Couns. Psychol.* 55 (2008) 49.
 - [72] C.M. Youssef, F. Luthans, Positive organizational behavior in the workplace: the impact of hope, optimism, and resilience, *J. Manage.* 33 (2007).
 - [73] D.E. Stewart, T. Yuen, A systematic review of resilience in the physically ill, *Psychosomatics* 52 (2011) 199–209.

- [74] J.L. Johnson, S.A. Wiechelt, Introduction to the special issue on resilience, *Subst. Use Misuse* 39 (2004) 657–670.
- [75] A.S. Masten, Resilience in individual development: successful adaptation despite risk and adversity, in: M.C. Wang, E.W. Gordon (Eds.), *Educational Resilience in Inner-City America: Challenges and Prospects* Erlbaum, 1994, pp. 3–25. Hillsdale, NJ.
- [76] E. Werner, R.S. Smith, *Overcoming the Odds: High Risk Children from Birth to Adulthood*, Cornell University Press, Ithaca, NY, 1992.
- [77] S.J. Wolin, S. Wolin, *Bound and Determined: Growing up Resilient in a Troubled Family*, Villard, New York, 1993.
- [78] B.J. Cohler, Adversity, resilience, and the study of lives, in: A.E. James, B. J. Cohler (Eds.), *The Invulnerable Child*, Guilford Press, New York, 1987, pp. 363–424.
- [79] L.B. Murphy, A. Moriarty, *Vulnerability, Coping and Growth: From Infancy to Adolescence*, Yale University Press, New Haven, CT, 1976.
- [80] E.J. Anthony, Risk, vulnerability, and resilience: an overview, in: E.J. Anthony, B. J. Cohler (Eds.), *The Invulnerable Child*, Guilford Press, New York, 1987, pp. 3–48.
- [81] B.L. Fredrickson, M.A. Cohn, K.A. Coffey, J. Pek, S.M. Finkel, Open hearts build lives: positive emotions, induced through loving-kindness meditation, build consequential personal resources, *J. Pers. Soc. Psychol.* 95 (2008) 1045.
- [82] S.E. Pollock, Human responses to chronic illness: physiologic and psychosocial adaptation, *Nurs. Res.* (1986).
- [83] C.L. Chan, R.T. Ho, W.F. Mphil, A.Y. Chow, Turning curses into blessings: an Eastern approach to psychosocial oncology, *J. Psychosoc. Oncol.* 24 (2006) 15–32.
- [84] P.-Y. Chen, S. Dhanasobhon, M.D. Smith, All Reviews Are Not Created Equal: the Disaggregate Impact of Reviews and Reviewers at Amazon. Com, 2008.
- [85] N. Korfiatis, E. García-Bariocanal, S. Sánchez-Alonso, Evaluating content quality and helpfulness of online product reviews: the interplay of review helpfulness vs. Review content, *Electron. Commer. Res. Appl.* 11 (2012) 205–217.
- [86] N. Kumar, I. Benbasat, Research note: the influence of recommendations and consumer reviews on evaluations of websites, *Inf. Syst. Res.* 17 (2006) 425–439.
- [87] P.A. Dabholkar, Factors influencing consumer choice of a "rating Web site": an experimental investigation of an online interactive decision aid, *J. Mark. Theory Pract.* 14 (2006) 259–273.
- [88] Z. Jiang, I. Benbasat, The effects of presentation formats and task complexity on online consumers' product understanding, *MIS Q.* (2007) 475–500.
- [89] S.M. Mudambi, D. Schuff, Research note: what makes a helpful online review? A study of customer reviews on Amazon. Com, *MIS Q.* (2010) 185–200.
- [90] D. Morisano, J.B. Hirsh, J.B. Peterson, R.O. Pihl, B.M. Shore, Setting, elaborating, and reflecting on personal goals improves academic performance, *J. Appl. Psychol.* 95 (2010) 255.
- [91] G.P. Latham, G.A. Yukl, A review of research on the application of goal setting in organizations, *Acad. Manag. J.* 18 (1975) 824–845.
- [92] E.A. Locke, G.P. Latham, *A Theory of Goal Setting & Task Performance*, Prentice-Hall, Inc, 1990.
- [93] E.A. Locke, G.P. Latham, New directions in goal-setting theory, *Curr. Dir. Psychol. Sci.* 15 (2006) 265–268.
- [94] G.P. Latham, T.R. Mitchell, D.L. Dossett, Importance of participative goal setting and anticipated rewards on goal difficulty and job performance, *J. Appl. Psychol.* 63 (1978) 163.
- [95] G.P. Latham, J.J. Baldes, The "practical significance" of Locke's theory of goal setting, *J. Appl. Psychol.* 60 (1975) 122.
- [96] G.A. Yukl, G.P. Latham, Interrelationships among employee participation, individual differences, goal difficulty, goal acceptance, goal instrumentality, and performance, *Pers. Psychol.* 31 (1978) 305–323.
- [97] E.A. Locke, G.P. Latham, Building a practically useful theory of goal setting and task motivation: a 35-year odyssey, *Am. Psychol.* 57 (2002) 705.
- [98] E.A. Locke, D.-O. Chah, S. Harrison, N. Lustgarten, Separating the effects of goal specificity from goal level, *Organ. Behav. Hum. Decis. Process.* 43 (1989) 270–287.
- [99] J.E. Maddux, R.W. Rogers, Protection motivation and self-efficacy: a revised theory of fear appeals and attitude change, *J. Exp. Soc. Psychol.* 19 (1983) 469–479.
- [100] M. Osterloh, B.S. Frey, Motivation, knowledge transfer, and organizational forms, *Organ. Sci.* 11 (2000) 538–550.
- [101] S. Milne, P. Sheeran, S. Orbell, Prediction and intervention in health-related behavior: a meta-analytic review of protection motivation theory, *J. Appl. Soc. Psychol.* 30 (2000) 106–143.
- [102] M.E. Gist, Self-efficacy: Implications for organizational behavior and human resource management, *Acad. Manag. Rev.* 12 (1987) 472–485.
- [103] M. Vansteenkiste, W. Lens, E.L. Deci, Intrinsic versus extrinsic goal contents in self-determination theory: another look at the quality of academic motivation, *Educ. Psychol.* 41 (2006) 19–31.
- [104] L. Karakowsky, S.L. Mann, Setting goals and taking ownership: understanding the implications of participatively set goals from a causal attribution perspective, *J. Leadersh. Organizational Stud.* 14 (2008) 260–270.
- [105] B. Weiner, *Human Motivation*, Psychology Press, 2013.
- [106] A. Bandura, Reflections on self-efficacy, *Adv. behave. Res. therapy* 1 (1978) 237–269.
- [107] J.W. Atkinson, Motivational determinants of risk-taking behavior, *Psychol. Rev.* 64 (1957) 359.
- [108] J.S. Eccles, Expectancies, Values, and Academic Behaviors, 1983.
- [109] N. Liberman, Y. Trope, The role of feasibility and desirability considerations in near and distant future decisions: a test of temporal construal theory, *J. personality social psychol.* 75 (1998) 5.
- [110] H.-F. Hsieh, S.E. Shannon, Three approaches to qualitative content analysis, *Qualitative health research* 15 (2005) 1277–1288.
- [111] W.J. Potter, D. Levine-Donnerstein, Rethinking Validity and Reliability in Content Analysis, 1999.
- [112] B.D. Johnson, Multilevel analysis in the study of crime and justice. *Handbook of Quantitative Criminology*, Springer, 2010, pp. 615–648.
- [113] K.-Y. Huang, S. Chengalur-Smith, A. Pinsonneault, Why Should I Provide Social Support? A Social Capital Perspective of Individual Helping Behavior in Healthcare Virtual Support Communities, 2014.
- [114] G.M. Wagnild, H.M. Young, Development and psychometric evaluation of the Resilience Scale, *J. nursing meas.* (1993).
- [115] J. Matthes, M. Kohring, The content analysis of media frames: toward improving reliability and validity, *J. commun.* 58 (2008) 258–279.
- [116] R.M. Entman, Framing: Toward clarification of a fractured paradigm, *J. commun.* 43 (1993) 51–58.
- [117] M.M. Miller, Frame mapping and analysis of news coverage of contentious issues, *Social sci. computer rev.* 15 (1997) 367–378.
- [118] D.A. Gioia, K.N. Price, A.L. Hamilton, J.B. Thomas, Forging an identity: an insider-outsider study of processes involved in the formation of organizational identity, *Administrative Sci. Q.* 55 (2010) 1–46.
- [119] D.A. Gioia, K.G. Corley, A.L. Hamilton, Seeking qualitative rigor in inductive research: notes on the Gioia methodology, *Organizational Res. Methods* 16 (2013) 15–31.
- [120] K. Krippendorff, *Content Analysis: an Introduction to Its Methodology*, Sage, 2004.
- [121] J.C. Short, J.C. Broberg, C.C. Coglisler, K.C. Brigham, Construct validation using computer-aided text analysis (CATA): an illustration using entrepreneurial orientation, *Organizational Res. Methods* (2009).
- [122] X.A. Harrison, Using observation-level random effects to model overdispersion in count data in ecology and evolution, *PeerJ* 2 (2014) e616.
- [123] D.A. Newman, Missing data: five practical guidelines, *Organizational Res. Methods* 17 (2014) 372–411.
- [124] D.B. Rubin, *Multiple Imputation for Nonresponse in Surveys*, John Wiley & Sons, 2004.
- [125] J.M. Wooldridge, *Econometric Analysis of Cross Section and Panel Data*, MIT press, 2010.
- [126] A.C. Cameron, P.K. Trivedi, *Regression Analysis of Count Data*, Cambridge university press, 2013.
- [127] A.M. Hess, F.T. Rothaermel, When are assets complementary? Star scientists, strategic alliances, and innovation in the pharmaceutical industry, *Strategic Manag. J.* 32 (2011) 895–909.
- [128] A.C. Cameron, P.K. Trivedi, Econometric models based on count data. Comparisons and applications of some estimators and tests, *J. appl. econometrics* 1 (1986) 29–53.
- [129] J.A. Hausman, B.H. Hall, Z. Griliches, *Econometric Models for Count Data With an Application to the patents-R&D Relationship*, National Bureau of Economic Research, Cambridge, Mass., USA, 1984.
- [130] R.M. Baron, D.A. Kenny, The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations, *J. personality social psychol.* 51 (1986) 1173.
- [131] A. Bandura, Human agency in social cognitive theory, *American psychologist* 44 (1989) 1175.
- [132] D.H. Schunk, J.R. Meece, P.R. Pintrich, *Motivation in Education: Theory, Research, and Applications*, Pearson Higher Ed, 2012.
- [133] A. Bandura, *Social Foundation of Thought and Action: a Social-cognitive View*, Englewood Cliffs, 1986.
- [134] L. Yan, Good intentions, bad outcomes: the effects of mismatches between social support and health outcomes in an online weight loss community, *Production Oper. Manag.* 27 (2018) 9–27.
- [135] L. Lamberg, Online empathy for mood disorders, *JAMA* 289 (2003) 3073–3077.
- [136] G. Wunsch, F. Russo, M. Mouchart, Do we necessarily need longitudinal data to infer causal relations? *Bull. Sociological Methodology/Bulletin de Methodologie Sociologique* 106 (2010) 5–18.

Insu Park is an Associate Professor in College of Business & Information Systems at Dakota State University. He received his PhD in Management (Management Information Systems) from the State University of New York at Buffalo. His research interests include information assurance, e-commerce, and IT impact. His research has been published in several leading journals, including *MIS Quarterly*, *Decision Support Systems*, *Information and Management*, *International Journal of Electronic Commerce*, and *IEEE Transaction on System, Man and Cybernetics*. He has numerous conference proceedings and presentations in leading conferences, such as the International Conference on Information Systems (ICIS) and the Academy of Management (AOM).

Surendra Sarnikar is an Associate Professor in the Department of Management at the College of Business and Economics, California State University East Bay. He received his PhD in Management Information Systems from the University of Arizona. His research interests include data mining, healthcare analytics, and socio-technical design of information systems. He has previously served as the President of the Special Interest Group on Healthcare IT at the Association for Information Systems (2016–18). He has won best paper awards for his work in healthcare information systems at the Hawaii International Conference on System Sciences and the International Conference on Information Systems.

Jeewon Cho is an Associate Professor in Management at the College of Business, Oregon State University. She received her PhD in Management (Organizational Behavior) from the State University of New York at Buffalo. Her research interests include (1) leadership processes and (2) employee performance under non-volitional surveillance and monitoring. Her research papers appeared in leading peer review journals, such as *Academy of*

Management Journal, *The Leadership Quarterly*, *Journal of Management*, *Decision Science*, *Information and Management*, and *Decision Support Systems*. She has a number of conference proceedings and presentations in major conferences, such as the Academy of Management (AOM), the Society for Industrial and Organizational Psychology (SIOP), and the International Conference on Information Systems (ICIS).