

# Why Should I Provide Social Support? A Social Capital Perspective of Individual Helping Behavior in Healthcare Virtual Support Communities

*Completed Research Paper*

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## Abstract

*The phenomenon of online social support has been studied for years. However, little is known about the factors that drive individual online helping behavior. While the Information systems literature provides rich insights into the determinants of online social support, the emphasis has been exclusively on the provision of informational help. By contending the need to expand our investigation to different types of support, this paper studies individual provisions of both informational and emotional social support in healthcare virtual support communities (HVSCs). Drawing on social capital theory, the structural, relational, and cognitive dimensions of social capital are conceptualized as the social support determinants. The results show that the social capital dimensions can be both facilitators and inhibitors of the two types of social support. This study can contribute not only to the literature on HVSCs, but also to studies of other types of virtual communities such as electronic networks of practice.*

**Keywords:** Social support, informational support, emotional support, social capital theory, healthcare virtual support community

## Introduction

The number of Internet users participating in healthcare virtual support communities (HVSCs), and the accompanying number of HVSCs have been rising (Fox and Jones, 2009; Haynes, 2009). Through message forums, listservs, or social networking sites, participants of HVSCs engage in social interaction with peers who are facing similar life stresses to exchange social support—“aid and assistance exchanged through social relationships and interpersonal transactions” (Heaney and Israel, 2002, p. 187). There are some unique features of HVSCs that favor social support exchange (Caplan and Turner, 2007; Walther and Boyd, 2002). For instance, by eliminating time and space constraints, HVSCs provide individuals with immediate access to similar others for advice and/or consolation when needed (Wright and Bell, 2003). These similar others, compared to friends and family members, are better able to empathize and provide help (Wright and Bell, 2003). Additionally, HVSCs allow those with different backgrounds to interact, creating weak-tie relationships that facilitate the flows of diverse information (Barak et al., 2008; Wright and Bell, 2003). For these advantages of HVSCs to be realized, members of HVSCs need to be willing to make voluntary provisions of social support to one another. However, individual participation in HVSCs does not guarantee social support provision. Lurking behavior, encouraged by characteristics of online communications such as anonymity and asynchronous interaction, seems common in HVSCs (Nonnecke and Preece, 2000; Nonnecke and Preece, 2003). While lurking may not necessarily be dysfunctional (Rafaeli et al., 2004), it does affect the success and longevity of virtual communities (Preece, 2001; Rafaeli et al., 2004). Lurking can especially be a problem when a virtual community is new and without sustainable active contributors (Nonnecke et al., 2006). It is therefore important to explore the factors that encourage online social support provision.

In the Information Systems (IS) discipline, studies of the antecedents of online helping behavior provide rich insights into such factors (e.g., Wasko and Faraj, 2005). These studies, however, have exclusively focused on the provision of informational support (i.e., knowledge sharing), which is defined as the type of social support that is provided to reduce uncertainty and/or facilitate problem-solving (Schaefer et al., 1981).<sup>1</sup> Little attention has been paid to the determinants of individual offerings of emotional support – the communication of love, caring, empathy, and reassurance (Heaney and Israel, 2002; Schaefer et al., 1981) – online.<sup>2</sup> We argue that the full story of online social support phenomenon (in HVSCs) requires a focus on this affective domain of social support as well. This is not only because the two types of helping behavior are the two most provided types of social support in HVSCs (Pfeil, 2009), but also because the two support types may be activated under different conditions (Thoits, 2011; Wellman and Wortley, 1990), and they can differently influence individual health behavior (Thoits, 1986; Wang et al., 2012). This paper attempts to study the two types of support and answer the research question: “what are the factors that drive members of HVSCs to provide voluntary informational and emotional support to help others?”

Specifically, Nahapiet and Ghoshal’s (1998) conceptualization of social capital provides a useful theoretical lens for studying online social support provision. According to Nahapiet and Ghoshal (1998), inter-personal relationships can be characterized by three social capital dimensions: structural (social connectivity of relationships), relational (quality and content of relationships), and cognitive (ability or resources facilitating social exchange), in which collective activities are embedded. As an integrative framework, this conceptualization provides a comprehensive view of aspects of social relationships, which promises a better understanding of the social support phenomenon (House and Kahn, 1985). This look into the “relational factors” is also critical to determine if and how support is provided (Dunkel-Schetter and Skokan, 1990). Nahapiet and Ghoshal’s (1998) social capital framework is especially suitable for studying the determinants of online social support due to its capability of characterizing online social interactions and relationship building, which are key elements of the virtual world (Preece, 2001).

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<sup>1</sup> Although the term “social support” has generally been reserved for social science and healthcare disciplines, we consider the voluntary sharing of knowledge across social relationships studied in the IS literature as a type of social support transaction. The definition of social support given by Albrecht and Adelman (1987, p. 19) – “*verbal and nonverbal communication between recipients and providers that reduces uncertainty about the situation...and functions to enhance a perception of personal control in one’s experience*” – captures this informational, uncertainty-reduction aspect of social support.

<sup>2</sup> An example of informational support message posted on a cancer HVSC: “*If you are in pain by all means talk to your oncologist.*” An example of emotional support: “*Gosh, that’s a lot to put on your shoulders, especially when you need direction and advice.*”

The paper is structured as follows. We first review the IS literature regarding the determinants of social support provision. The proposed model incorporating the dimensions of social capital as the determinants of support provision is discussed next. The method for testing the proposed model is described afterward. This leads to the results, discussion, and conclusion sections.

## **IS Literature on the Determinants of Online Social Support**

Based on Heaney and Israel's (2002) definition of social support, which involves *social interactions for exchanging aid and assistance*, we can identify IS studies that explore the determinants of online social support provision (e.g., Chiu et al., 2006). Online social support studies in the IS discipline have focused on the voluntary sharing of informational support to answer questions such as "why people voluntarily contribute knowledge and help others through electronic networks" (Wasko and Faraj, 2005, p. 36). Since, as Wellman and Gulia (1999, p. 173) contends: "Even when online groups are not designed to be [emotionally] supportive, they tend to be," it is critical to consider individual emotional support behavior when studying online helping behavior. In some of these studies, even when the research contexts involve HVSCs, in which emotional support is the primary user activity, this type of support is ignored (Hsu et al., 2007; Ma and Agarwal., 2007; Ridings et al., 2002; Zhao et al., 2013). A study of support behavior that does not take its different aspects into account could lead to premature conclusions. For example, reciprocity has been shown to be unrelated to, or even negatively related to, informational support behavior in many IS social support studies (e.g., Wasko and Faraj, 2005; Wiertz and de Ruyter, 2007). Instead of concluding that in online settings, "direct reciprocity is not necessary for sustaining collective action" (Lin et al., 2009, p. 936), a probable explanation that requires further investigation could be that reciprocity, an aspect of trusting relationships (Coleman, 1988), mainly affects emotional support.

Many IS studies on the determinants of social support adopted Nahapiet and Ghoshal's (1998) social capital framework as their theoretical basis (e.g., Robert et al., 2008; Wasko and Faraj, 2005). Conceptual ambiguity and a lack of consensus with regard to modeling the social capital dimensions are observed in this strand of research. Theoretically, each of the social capital dimensions is itself a multi-dimensional construct, consisting of components such as trust, social identity, and shared language (Nahapiet and Ghoshal, 1998). It thus would be proper to empirically consider these components as lower-order constructs that form the higher-level abstractions of the social capital dimensions. However, most of these studies treated the components of social capital dimensions as separate and independent constructs that are linked directly to the outcome variables (e.g., Chang and Chuang, 2011). Law et al. (1998) argued that analyzing the direct relationships between components of higher-level constructs and dependent variables precludes any general conclusion at the level of higher-level constructs. In other words, unless empirical analyses are conducted at the level of structural, relational, and cognitive capital, it seems inappropriate to draw conclusions like "relational capital ... are the main factors influencing participants to share knowledge" (Chang and Chuang, 2011, p. 16).

Further, many of these IS studies used survey questionnaires to capture individual online contribution behavior (e.g., Chiu et al., 2006; Zhao et al., 2013). We argue that especially when measuring the frequency or the degree of engaging in activities such as sharing information, self-report data is susceptible to subjectivity bias. When comparing self-reported and the actual length of system use, Collopy (1996) found that heavy system-users tended to under-report their actual usage, while light users tend to over-report theirs. This, according to the author, can be due to recall errors or social norms, in circumstances where such behavior is socially desirable. In the context of virtual communities, data can also be biased when individuals inadvertently over-attribute their own contributions, which can happen when they notice a high volume of communication activities. Such a "self-serving bias" (Heider, 1958) arises due to one's self-interests and typically enters unconsciously when one makes judgments based on information perceived from the outside world (Bazerman et al., 1997). In their study on individual use of electronic brainstorming systems (EBS), Pinsonneault et al., (1999) pointed out that, when seeing a large number of ideas generated by a group of employees through the use of EBS, these employees may unconsciously inflate their contributing behavior.

To conclude, we contend that by emphasizing one type of social support, extant IS studies provide only partial insights into individual contributions of help online. Additionally, the issue of ambiguity with regard to modeling the social capital dimensions in these studies can make it difficult to draw conclusions

on the effects of these dimensions. Thirdly, biased data regarding online contribution behavior can be collected via respondents' self-assessment. These issues will be addressed in the current study.

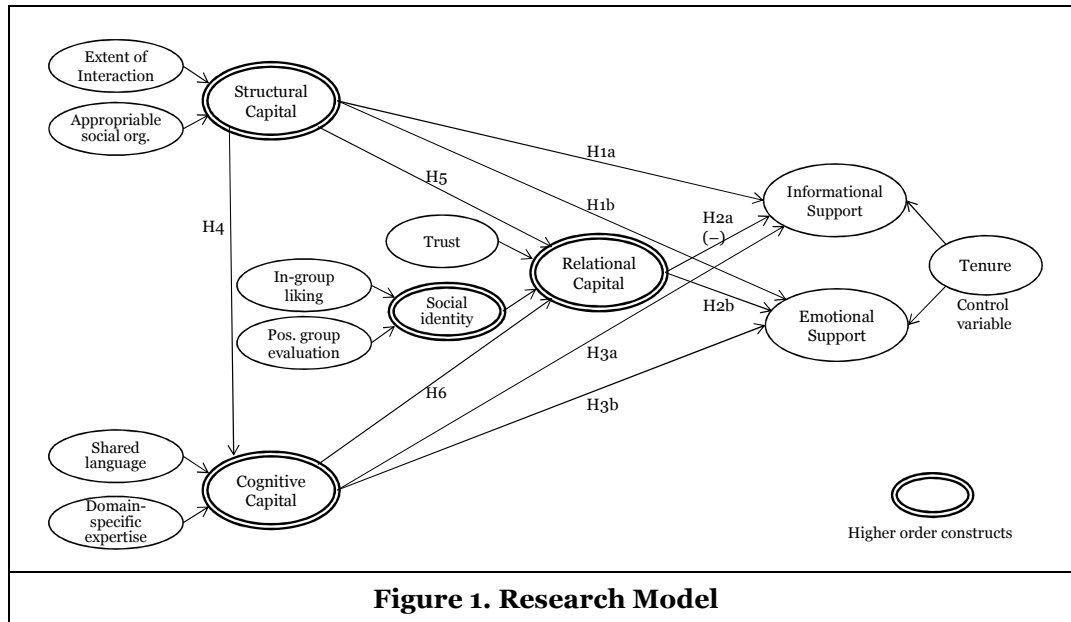


Figure 1. Research Model

## Model and Hypotheses

In this section, we present and discuss a model conceptualizing individual support behavior in HVSCs. In this model, we consider both informational and emotional support behavior, which allow us to account for the real-world dynamics in HVSCs. Additionally, we model structural, relational, and cognitive capital as hierarchical constructs, which has the advantage of theoretical parsimony (Law et al., 1998), increasing the breadth of model generalization (Gorsuch, 1983). Figure 1 shows our model.

### Structural Capital and Social Support Provision

According to Nahapiet and Ghoshal (1998), structural capital concerns the impersonal configuration of an individual's social relationships representing who one reaches and how one reaches them (Burt, 1992). It is the result of a history of social interactions, memberships in organizations, community participations, etc., and the extent of these social engagements (Adler and Kwon, 2002). Here we consider the extent of social interaction and appropriable social organizations as forming components of structural capital (Chiu et al., 2006; Nahapiet and Ghoshal, 1998). The *extent of social interactions* aspect of structural capital represents extent to which one interacts with, and thus is structurally connected to, others of the same community. Coleman (1988) posited that social relationships, created and maintained via social interactions, provide an effective way of exchanging information. This idea that social interaction creates connections linking one to others to access and exchange resources is the fundamental proposition of social capital theory (Nahapiet and Ghoshal, 1998). *Appropriable social organizations* is about the creation of multiplex relationships and occurs when social relationships formed for one purpose become available for appropriation for other purposes (Coleman, 1988). In appropriable social organizations, relationships contain more than one type of "content," through which information flows are more diverse due to the existence of multiplex channels for interaction (Coleman, 1988; Nahapiet and Ghoshal, 1988). Such a formation of multiplex relationships to broaden discussion topics can happen in online environments (Wellman and Gulia, 1999). For example, Huang et al. (2014) found that members of HVSCs interact not just for the purposes of problem-solving or emotional-consolation, i.e., to exchange social support. Rather, they also frequently socialize for companionship purposes such as chatting or sharing jokes. This latter type of social activity, social support researchers call it companionship activity, is defined as the engagement in social interactions in order to satisfy the intrinsic desire for enjoyment and pleasurable companionship (Rook, 1987). Different from social support that is exchanged during life

stressors, individuals participate in companionship activities whether or not stressful events are present (Huang et al., 2014; Rook, 1987).<sup>3</sup>

The two components of structural capital respectively represent interaction intensity and breadth/multiplexity, two key dimensions characterizing social interaction ties (Mesch and Talmud, 2006). Comparing to many previous conceptualizations of structural capital that focused mainly on the intensity of interaction (e.g., Chang and Chuang, 2011; Chiu et al., 2006), the consideration of appropriable social organizations as well promises a better understanding of the concept of structural capital and its manifestations in social relationships (Adler and Kwon, 2002). In the context of HVSCs, structural capital concerns one's continuous interactions via participation in discussion threads for social support and/or companionship purposes, allowing for the exchange of more detailed and a wider array of information about each other's everyday experiences.<sup>4</sup>

We claim that continuous interaction creates a context facilitating the provision of informational support. In such a context, one acquires more information about support seekers' illness, diagnosis, treatment regimen, and so forth, and thus knows better how to provide informational support to help deal with current difficulties (Barnes and Duck, 1994). This is especially true when individuals form appropriable social organizations in which they are linked in multiple ways, interact on multiple occasions, and thus have more complete information about each other. Moreover, through continuous social interactions, an individual will be more likely to have access to other community members' information needs sooner than those who interact less (Burt, 1992; Nahapiet and Ghoshal, 1998), increasing his/her opportunity to provide informational support. On the other hand, those who interact less with other members are less likely to provide informational help since others may have already contributed earlier. Additionally, social interactions help an individual to identify community experts (Steinfeld et al., 2009), allowing him/her to have more opportunities to provide informational support referring support seekers to appropriate experts. Individuals engaging in interactions may also be more likely to be known, in terms of experience and/or expertise, to others. This gives him/her a greater chance to be solicited for, and thus to provide, informational support (Ryan et al., 2005; Wellman and Wortley, 1990).

Similarly, continuous social interaction is a basis for the offerings of emotional support. Through continuous social interactions, individuals are provided with more opportunities to be aware of other community members' emotional states and distress, and thus are more likely to provide emotional help. The increased access to information about connected parties, especially for those who form appropriable social organizations, allow them to discover a variety of similarities, such as socio-demographic information, shared experiences, and hobbies (Brown, 2001; Johnson and Miller, 1986). This promotes empathy and a concern for others' welfare, fostering emotional helping (Håkansson and Montgomery, 2003; Wright and Bell, 2003). Additionally, since these community members with high levels of structural capital have more information about connected others' situations and experiences, they have more opportunities to share with distressed support seekers the experiences of similar others, or to directly provide them with access to these similar others (network support, a form of emotional support) (Cutrona and Suhr, 1992). Through the increased engagement in social interactions, one also has more opportunities to express appreciation and validation, and acknowledgement (esteem support, a form of emotional support) for others' contributions (Cutrona and Suhr, 1992). Based on the above discussion regarding structural capital and its components, we hypothesize:

H1a: HVSC members with higher levels of structural capital will provide more informational support.

H1b: HVSC members with higher levels of structural capital will provide more emotional support.

### ***Relational Capital and Social Support Provision***

Whereas structural capital studies impersonal social connections, relational capital delves into the quality and nature of these relationships (Bolino et al., 2002). Specifically, it is about the social assets, including social identity and trust, that are created and leveraged therein (Nahapiet and Ghoshal, 1998). *Social*

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<sup>3</sup> An example of companionship activity message posted on a cancer HVSC: "What's Your Favorite Pizza? I am not 100% sure, but I think everyone loves pizza. I know I do. So, what is your favorite pizza? Toppings? Crust? Brand?"

<sup>4</sup> In the context of this study, a discussion thread is a topic-centric conversation unit that is composed of exchanged messages among a group of virtual community members (Deghani et al., 2013).

*identity* concerns one's psychological state by which one sees oneself as a member of, and belonging to, a social group (Tajfel, 1972; Tajfel, 1978; Hogg and Abrams, 1988). This social identification process also involves an individual's affective commitment to a group, and the positive evaluation in favor of the group (Ellemers et al., 1999; Hogg and Terry, 2000). In online communications, according to the social identification/deindividuation (SIDE) model, characteristics such as the absence of nonverbal cues can obscure and undermine perceived interpersonal differences. This increases one's identification with other group members in terms of the salience of group characteristics and engagement in behavior implied by the community identity (Postmes et al., 2005; Spears and Lea, 1994), such as providing social support in HVSCs (Tanis, 2007). *Trust* is about one's belief that others will meet their responsibilities to oneself (Ommen et al., 2008), and that the results of others' intended actions will be appropriate (Misztal, 1996). Such trusting belief is important in predicting social exchange and cooperative behavior (Gulati, 1995; Levin and Cross, 2004). In online contexts, Posey et al. (2010) defines online community trust as "the degree to which an individual believes that those within his or her selected online community are reliable and are trustworthy with information that makes the individual vulnerable" (p. 186). In virtual environments where the rules and norms that regulate individual behaviors are weak or even absent, trust is needed to sustain social engagement and community continuity (Jarvenpaa et al., 1998; Ridings et al., 2002). According to Bolino et al. (2002), relational capital represents affective relationships among individuals through which they trust and identify with one another. Such trusting relationships and feelings of social attraction and in-group liking (i.e., social identity) are the essences of relational intimacy (Burgoon and Hale, 1987). From the perspective of relational capital, it is these social assets embedded in close relationships that motivate one's behavior (Adler and Kwon, 2002).

In the IS literature, the relationship between relational capital or its components and the provision of information/knowledge in virtual communities has been inconclusive (e.g., Chiu et al., 2006; Wasko and Faraj, 2005). In accordance with the finding that individuals who were willing to continue participating in a HVSC exchange less informational support (Wang et al., 2012), we argue that in the context of HVSCs, individuals with high levels of relational capital toward community members will be less likely to provide informational support. Based on Wang et al.'s (2012) explanation, many members of HVSCs may interact to serve their immediate information needs. Once their needs are met, those who are committed to a HVSC may focus more on emotional exchange and relationship building (Wang et al., 2012). It can be inferred that relationship building in HVSCs is negatively associated with one's information needs, and that those with high levels of relational capital are less likely to exchange informational support. Moreover, according to the social information-processing (SIP) theory, while intimate relationships with trust and liking can be formed online, this formation requires ample message exchanges between relationship partners (Walther, 1992; Walther and Bunz, 2005). This is because relationship development over the Internet needs extended interactions to "provide sufficient information exchange to enable communicators to develop interpersonal knowledge and stable relations" (Walther and Burgoon 1992, p. 55). Through increased self-disclosure and information exchange, afforded by online communications (Joinson, 2001; Tidwell and Walther, 2002), relationship partners perceive each other to be closer (Jiang et al., 2011; Walther and Burgoon 1992). This extended information exchange not only results in reduced information needs among connected parties, it also means that the information possessed by these community members becomes highly redundant (Granovetter, 1973; Perry-Smith, 2006). In such a situation, individuals high in relational capital may decrease their exchange of informational support because of their high levels of information-overlap. In other words, they may have run out of topics for exchanging information (Ling et al., 2005). Although those with whom one has close relationships could also be very likely good sources of informational help, when they are alerted to one's negative life events, it may be more natural for them to first step in with emotional substance (Thoits, 2011), as will be discussed next.

Further, one can also form relational capital and identify with the community as a whole, through community participations, message readings, and/or interactions (Bateman et al., 2011; Nonnecke and Preece, 2003). This can lead to individuals' sense of obligation toward the community, and thus a belief that it is their duty to support the community (Bateman et al., 2011; Wiertz and Ruyter, 2007). These individuals may reduce their sharing information as a result of their active community management strategies: to prevent the community from being flooded by duplicate information (Ling et al., 2005; Nonnecke and Preece, 2003), or to hold off answering those who did not first "do their homework" (e.g., search previous discussion threads) (Wasko and Faraj, 2000).

We also argue that those high in relational capital will be motivated to provide more emotional support. The primary reason is that close relationships afford more emotional support transactions (Burlleson, 2003). For support seekers, the sharing of emotion with close others when experiencing emotional events is an integral part of one's emotion process (Rimé et al., 1991). For support providers, close others' expressions of emotion and feeling, especially unpleasant ones, can be contagious (Hatfield et al., 1992). This sharing and spreading of emotions among those with close relationships can lead to increased provisions of emotional support, not only for the purpose of restoring support seekers' disrupted mental functions, but also as an active coping strategy for support providers to improve their own affected moods (Midlarsky, 1991; Van Kleef et al., 2010). Additionally, being emotionally responsive toward others has been regarded as a key for maintaining close and trusting relationships (Fekete et al., 2007; Reis and Shaver, 1988). In other words, to sustain relational capital, support seekers expect that close others should be emotionally supportive and be able to share in their sufferings, and support providers think they should be emotionally involved in close others' experiences and provide more emotional sustenance. Such affective-oriented communications embedded in close relationships can be intensified further in online settings, where features of online communications such as the lack of non-verbal cues facilitate "hyperpersonal" communications (Walther, 1996). Specifically, through the "intensification loop" of message senders' self-selective disclosure and receivers' idealization of others, online relationships can be highly intimate, and online interactions can involve more disclosure of private thoughts and emotion (Jiang et al., 2011; Tidwell and Walther, 2002). This implies that individuals with high levels of relational capital in HVSCs may put more effort toward sharing emotional substance as well as toward providing emotional support. Based on the above discussions, we hypothesize:

H2a: HVSC members with higher levels of relational capital will provide less informational support.

H2b: HVSC members with higher levels of relational capital will provide more emotional support.

### ***Cognitive Capital and the Provision of Support***

The cognitive dimension of social capital refers to resources that promote shared understanding and interpretations among connected individuals and allow them to engage in communications (Nahapiet and Ghoshal, 1998). Nahapiet and Ghoshal (1998) suggested that it is this social capital dimension that capacitates individuals to engage in social exchange. Specifically, this aspect of social capital focuses on whether connected parties truly understand one another (Bolino et al., 2002). Shared language and domain-specific expertise are such critical resources providing shared understanding and meanings (Chiu et al., 2006; Nahapiet and Ghoshal, 1998; Wasko and Faraj, 2005). *Shared language* – the extent to which a social group member is able to communicate with other members via shared symbols (Hutchins and Hazlehurst, 1995) – is the means by which people communicate. "Within a given culture there is a shared language, so that every utterance has an agreed meaning" (Argyle, 1967, p. 80). By using community-specific language in socially agreed-upon ways, collective actions among group members are made possible (Nahapiet and Ghoshal, 1998). Further, shared language creates an atmosphere encouraging social exchange as it eases communication among individuals (Bolino et al., 2002; Luring and Selmer, 2011). Shared language is particularly important for defining the actions of virtual communities because of their high dependence on written texts (Haythornthwaite, 2007). In addition to shared language, an expertise in the content of social exchange is also needed for one to successfully engage in collective activities. *Domain-specific expertise* is the realm of knowledge or skill that one has about a particular subject area (Alexander and Judy, 1988). It arises from the internalization of context-sensitive understandings of a specific domain (Subramani, 2004), and is supported by personal experience and social interactions (Driver et al., 1994; Lang, 2001). As one's level of domain-specific expertise increases, so does his/her capacity for effective actions, as it provides him/her with abilities to correctly interpret a context, and to respond appropriately (Orr, 1996). Such a domain expertise has been found to be critical for individuals to make online contributions (e.g., Ardichvili et al., 2003).

In an HVSC, individuals' levels of cognitive capital – shared language and healthcare-related expertise – are critical for them to provide informational support. An individual high in cognitive capital is equipped with the knowledge required to understand support seekers' context-relevant needs (Mao and Benbasat, 2000), and thus is better able to provide informational support that helps solve current problems. Such an individual is also more likely to contribute his/her knowledge simply because s/he has more information – past experiences, success stories, etc. – to share (Mao and Benbasat, 2000). Moreover,

according to Ardichvili et al. (2003) and Wasko and Faraj (2000), one barrier to knowledge sharing in virtual communities is the potential support provider's feeling of a lack of the requisite expertise. In other words, individuals with high levels of cognitive capital will be less concerned about "losing face" by providing the wrong information, and thus will feel more comfortable to contribute their expertise. Likewise, through the mastery of community-specific vocabularies and jargon, one high in cognitive capital is more likely to share information since s/he knows that s/he will use the language correctly, and that support receivers will understand what is provided (Goodman and Darr, 1998).

Higher levels of cognitive capital are also positively associated with individual provision of emotional support in HVSCs. One's knowledge of the situation experienced by the support seeker and the ability to imagine how the support seeker experienced the situation help one take the perspective of the support seeker, empathize with him/her, and provide emotional support (Håkansson and Montgomery, 2003; Pfeil and Zaphiris, 2007). This knowledge of support seekers' feelings and experience is a critical aspect of the empathy process (Håkansson and Montgomery, 2003). The understanding of a support seeker's similar experience may also remind the provider of his/her own past experience and evoke emotions that match the support seeker's situation (Hoffman, 2000). This support provider is thus more likely to empathize "truly" with the support seeker, fostering the provisions of emotional help (Håkansson and Montgomery, 2003; Pfeil and Zaphiris, 2007). Further, according to Rimé et al. (1991), after emotional circumstances, people tend to share their emotional experiences in a socially shared language. As a result, those with high levels of cognitive capital are more likely to make sense of received emotion expressions and reciprocate with support. The higher one's level of cognitive capital, the more one is capable of understanding and relating to the seekers' situations and emotions, and therefore the more one is likely to provide emotional support. Based on the above discussion, we hypothesize:

H3a: HVSC members with higher levels of cognitive capital will provide more informational support.

H3b: HVSC members with higher levels of cognitive capital will provide more emotional support.

### ***Associations among the Social Capital Dimensions***

Existing IS and Management literature also suggests positive associations among the social capital dimensions (e.g., Karahanna and Preston, 2013). Since social capital may affect resource exchanges through the associations among its dimensions (Nahapiet and Ghoshal, 1998), investigating these associations will lead to a better understanding of the determinants of social support.

**Structural Capital and Cognitive Capital:** Through continuous interactions, for purposes of support exchange and/or companionship activities, members of HVSCs are structurally connected to each other. The higher the level of structural capital one has, the more other members' expertise will flow through the communication channels (Wellman and Gulia, 1999), allowing one to learn from connected parties (Wellman and Gulia, 1999; Wright and Bell, 2003). Research in various disciplines has long acknowledged the importance of social interaction for the transfer of knowledge (e.g., Blau, 1974; Nonaka, 1994). Social interactions also help community members acquire community-specific language (Bathelt et al., 2004; Huffaker, 2011), through the "interactive alignment" of meanings (Garrod and Pickering, 2004). The acquisition of meanings and expertise can further be fostered in online text-based communications, as cognitive thinking and learning can be stimulated via the processes of reading and writing (Lapadat, 2006). Therefore, when members of HVSCs increase the intensity and breadth of their interactions, cognitive capital can also be created and/or acquired.

H4: HVSC members' levels of structural capital are positively related to their levels of cognitive capital.

**Structural Capital and Relational Capital:** In addition to its positive association with cognitive capital, structural capital also predicts the levels of relational capital, as social interaction is the basis for inter-personal attraction and relational intimacy (Bolino et al., 2012; Hill and Dunbar, 2003). Reis and Shaver (1988) conceptualized intimate relationships as 'digested' products of interactions and are characterized by interpersonal processes such as trust and identification. In online environments where participants normally do not know each other at the beginning, continuous interactions are key to evaluating each other's trustworthiness and values and beliefs, leading to the building and maintenance of trust and social identity (Code and Zap, 2010; Hinds and Mortensen, 2005; Iacono and Weisband, 1997). According to the SIDE model, through interactions, members of virtual communities tend to maximize



perceived similarities, defined as the salient characteristics of the community, among each other, fostering group identification (Postmes et al., 2005; Spears and Lea, 1994). In the context of this study, structural capital provides members of HVSC opportunities to assess each other's similarities in terms of their difficulties and experiences, maximize these similarities, and identify with one another. Therefore:

H5: HVSC members' levels of structural capital are positively related to their levels of relational capital.

**Cognitive Capital and Relational Capital:** We also argue that the competency of community members to conduct social exchange – cognitive capital – affects their levels of relational capital. Members of a HVSC are normally sufferers of similar situations, with a common fate of experiencing the stressor and a common goal of its removal (Wright and Bell, 2003). Individuals high in cognitive capital are capable of understanding other members' situations and have the ability to make contributions. This justifies their membership in the HVSC and thus strengthens their community identification (Fayard and DeSanctis, 2010; Ren et al., 2007). Additionally, as a unifying symbol, shared language helps define and organize social categories for people to identify with one another and distinguish group/non-group members (Haythornthwaite, 2007). The enactment of shared language via social interactions is particularly critical for creating social identity in online contexts since there are no other symbolic artifacts for them to identify with (Fayard and DeSanctis, 2010). Further, the use of shared language also nurtures interpersonal trust (Abrams et al., 2003), as using shared language fosters a sense of familiarity, and thus, trust, among community members (Inkpen et al., 2004; Karahanna and Preston, 2013). Thus:

H6: HVSC members' levels of cognitive capital are positively related to their levels of relational capital.

## Methodology

### Data Collection

The target HVSC is a large U.S. based online breast cancer discussion board, from which messages were collected. Discussion threads initiated within the four time periods – the first weeks of May 2011 and Oct. 2011, Jul. 1, 2012 through Aug. 31, 2012, and Sep. 1, 2012 through Oct. 31, 2012 – were downloaded using a web crawler. These collected message threads pertain to three separate data sets. Information about the three data sets is listed in Table 1. Participants of this study were derived from the 2<sup>nd</sup> data set. Based on the user ID which is unique for each registrant, a total of 293 members were identified from the 2<sup>nd</sup> data set. In order to have a complete record of individual behavior taking place across the two-month period, from Jul. 1<sup>st</sup> to Aug. 31<sup>st</sup>, we eliminated those who registered during this period, resulting in 187 community members. Our aim is to study the relationship between the social characteristics of these 187 members, in terms of their structural, relational, and cognitive social capital, and their subsequent provision of informational and emotional support (derived from the 3<sup>rd</sup> data set).

Dataset	Purpose	Description	Num. of Messages
Threads initiated during the 1 <sup>st</sup> weeks of May '11 and Oct. '11	Data for training the automated text classifier	The collection of data spanning two different time periods (May and Oct., 2011) allowed us to account for possible behavioral differences across different seasons (Ahuja et al., 2003). The number of collected messages provided a balance between efforts required to conduct manual content analysis and the collection of data large enough to be representative.	1,274 (100 threads)
Threads initiated between Jul. '12 and Aug. '12	Generating independent variables	As with Chang et al. (2011) and Wasko and Faraj (2005), data for testing the proposed model was collected from two time periods to address the mutual-dependence issue between the independent and dependent variables. Specifically, the messages used for generating independent variables were those posted two months prior to the messages used for generating dependent variables. This helps ensure the causal direction to be tested in the model.	5,491 (425 threads)
Threads initiated between Sep. '12 and Oct. '12	Generating dependent variables		6,226 (452 threads)

### Data Analysis

To analyze the collected data, two coders manually analyzed the first data set and classified the 100 message threads into threads initiated either for support exchange or for companionship activities, the two main types of social activities in HVSCs (Huang et al., 2014). This was done based on the definitions

and purposes of these two types of activities (support exchange: for problem solving or emotional consolation; companionship activities: for fun and relaxation).<sup>5</sup> Inter-coder reliability, based on Cohen's (1960) Kappa, was .86. Disagreements were resolved through discussion, resulting in 40 threads that were categorized as threads for companionship activities and 60 threads for social support exchange. The subsequent manual classification task focused on classifying the 795 messages in these 60 social support threads into different types of social support. Each of these messages was manually classified into messages posted for either informational or emotional support, based on the definitions of the two support types. If more than one support type was provided in a message, the predominant one was coded. The resulting inter-coder reliability was .90. Then, following the procedure of Huang et al., (2010), these coded messages were applied to "train" the computer program incorporating a machine learning algorithm to classify the two types of support messages automatically. 10-fold cross-validation method (Sebastiani, 2002) was used to evaluate the trained program, yielding a 92.48% average classification accuracy.

The process described above was repeated for the 2<sup>nd</sup> and 3<sup>rd</sup> data sets. That is, first the total of 877 threads from the two data sets were manually classified into threads for either support or companionship purpose. Then, to classify the support messages into the two social support types, due to the large number of support messages involved (a total of 6,859 messages), the previously trained computer program was applied. Table 2 summarizes the number of messages involved in the classification tasks in each data set, and the classification results. Based on these results, next the independent and dependent variables used for testing the hypotheses, as summarized in Table 3, were prepared, and the proposed model was tested.

<b>Dataset</b>	<b>Total Num. of Messages</b>	<b>Companionship Activities</b>	<b>Informational Support</b>	<b>Emotional Support</b>
1 <sup>st</sup> weeks of May 2011 and Oct. 2011	1,274 messages (100 threads)	479 messages	446 messages	349 messages
Jul. 2012 through Aug. 2012	5,491 messages (425 threads)	2,250 messages	1,081 messages (Auto Classification)	2,160 messages (Auto Classification)
Sep. 2012 through Oct. 2012	6,226 messages (452 threads)	2,608 messages	1,218 messages (Auto Classification)	2,400 messages (Auto Classification)

### **Independent Variables**

*Structural capital* was modeled as a second-order formative construct consisting of its first-order components, extent of social interaction and appropriable social organization. The classification of the constructs into formative and reflective was conducted in line with the decision criteria for constructs outlined by Petter et al. (2007). To measure the extent of social interaction, two reflective indicators were used: message-thread ratio and exposed message-thread ratio. These indicators are manifestations of one's level of interactivity when participating in a thread. "Message-thread ratio" is expected to capture, on average, the extent to which a community member engages in discussion threads to which s/he posted messages. The higher the value, on average the more messages s/he posts when involved in a thread. "Exposed message-thread ratio" for a community member is intended to capture the average amount of information a given member is exposed to when s/he participates in a discussion thread. The higher the value, the more information about oneself and other members of the same thread is exchanged.

The intent of the appropriable social organization construct is to capture the extent to which a community member formed multiplex relationships in a given HVSC. Two reflective indicators were developed to manifest the construct: "appropriable relationship ratio" and "companionship activity ratio". The higher the value of appropriable relationship ratio, the higher the degree to which the member has formed appropriable social organizations with other members in the HVSC. Likewise, the higher the value of

<sup>5</sup> To classify message threads into the two types of activities (social support and companionship activities), only the first message of each message thread was analyzed. This strategy was undertaken due to the nature of online threaded discussion in which the first message of a thread sets up a discussion topic and the conversation that follows is supposed to revolve around this topic.

companionship activity ratio, the more one's purpose of engagement in social interactions has moved beyond exchanging social support.

<b>Table 3. Variables Used in this Study</b>			
	<b>Construct</b>	<b>Indicator</b>	<b>Definition</b>
<b>Independent Variables</b>	Extent of Social Interaction (reflective)	Message-thread ratio (EOS1)	$\frac{\text{Total \# of msgs posted by the member}}{\text{Total \# of threads to which the member posted msgs}}$
		Exposed message-thread ratio (EOS2)	$\frac{\text{Total \# of msgs in threads to which the member posted msgs}}{\text{Total \# of threads to which the member posted msgs}}$
	Appropriable Social Organization (reflective)	Appropriable relationship ratio (ASO1)	$\frac{\text{\#of members with whom one participated in companionship threads together}}{\text{\#of members with whom one participated in any message threads together}}$
		Companionship activity ratio (ASO2)	$\frac{\text{Total \#of msgs posted by the member to threads initiated for companionship activities}}{\text{Total \#of msgs posted by the member}}$
	Trust (reflective)	Self-disclosure words ratio in emotional support msgs (TRU1)	$\frac{\text{Total \#of self disclosure words identified through LIWC (in emo. support msgs)}}{\text{Length of emotional support msgs posted by the member}}$
		Self-disclosure words ratio in informational support msgs (TRU2)	$\frac{\text{Total \#of self disclosure words identified through LIWC (in info. support msgs)}}{\text{Length of informational support msgs posted by the member}}$
	In-group Liking	Num. of outgoing friend requests (IL)	Total number of friend request made by the member
	Positive group Evaluation (reflective)	"We" to "We" + "I" ratio in emo. support msgs (PGE1)	$\frac{\text{\# of We words occur in the member's emotional support msgs}}{\text{\# of We words + I words occur in the member's emotional support msgs}}$
		"We" to "We" + "I" ratio in info. support msgs (PGE2)	$\frac{\text{\# of We words occur in the member's informational support msgs}}{\text{\# of We words + I words occur in the member's informational support msgs}}$
	Shared Language	Shard Language (SL)	The degree of similarity between the language used by the member and the prototypical language of the target discussion board
	Healthcare-related Expertise (formative)	UMLS concept count (HRE1)	# of distinct UMLS semantic types identified in his/her social support messages
Num. of (non-confirmed) incoming friend requests (HRE2)		Total number of friend request from other members to the focal member without the member's confirmation	
<b>Dependent Variables</b>	Informational Support (reflective)	Informational support count	# of informational support messages posted by a member
		Informational support length	Word count in all the informational support msgs posted by the member
	Emotional Support (reflective)	Emotional support count	# of emotional support messages posted by a member
		Emotional support length	Word count in all the emotional support msgs posted by the member
<b>Control Variable</b>	Tenure	Tenure	Num. of months between a HVSC member's date of registration and July, 2012.

*Relational capital* was modeled as a higher-order formative construct with two lower-order constructs: trust and social identity. Social identity, in turn, was modeled as a second-order formative construct with two first-order latent variables: in-group liking and positive group evaluation. Based on Posey et al.'s (2010) definition of online community trust, an individual's trust toward members of the HVSC was measured by the level of self-disclosure in his/her support messages. Self-disclosure represents one's willingness to trust and take risks in disclosing personal and sensitive information (Wheless and Grotz; 1977; Grabner-Kräuter, 2009; Porter and Donthu, 2008). It also signals that the discloser trusts and values the receiver's response (Jiang et al., 2011). Self-disclosure was measured by applying the Linguistic Inquiry and Word Count (LIWC) software package (Pennebaker et al., 2007) to analyze message content. LIWC is a research tool used to search text documents and count the frequencies of the occurrence of words belonging to each of the 68 pre-defined word categories. LIWC categories including 1<sup>st</sup>-personal pronoun-singular (e.g., I, my), 1<sup>st</sup>-personal pronoun-plural (e.g., we, our), family (e.g., husband, mom), friend (e.g., neighbor, roommate), positive emotion (e.g., love, happy), and negative emotion (e.g., hurt, insult) were used to create two reflective measures to identify self-disclosure words in online messages (Callaghan et al., 2013; Houghton and Joinson, 2012).

The two first-order latent constructs of social identity, in-group liking and positive group evaluation, respectively represent the affective and evaluative aspects of social identity (Bergami and Bagozzi, 2000; Ellemers et al., 1999).<sup>6</sup> In-group liking is the extent to which one is socially attracted and intends to friend others due to shared group membership, which results from one's identifying group members in terms of their embodiment of the group prototype (Bergami and Bagozzi, 2000; Hogg and Terry, 2000). According to the SIDE model (Postmes et al., 2005; Spears and Lea, 1994), such a group-based liking toward one another is likely to take place in virtual settings. In-group liking was measured by the number of out-going friend requests made by community members, which represents the degree to which a community member feels a sense of liking for, and an interest in socializing with, other members.<sup>7</sup> Positive group evaluation – the degree to which one favorably evaluates the group s/he identifies with (Hogg and Terry, 2000) – concerns a positive value connotation of being a group member (Ellemers et al., 1999) and is driven by an intrinsic need for self-esteem (Hogg and Terry, 2000). Such a positive evaluative bias toward the group is evoked automatically as group members use words referring to in-group categorization (e.g., we, our) (Brewer and Gardner, 1996; Perdue et al., 1990). As suggested by previous research (e.g., Cassell and Tversky, 2006), we used the ratios between individual uses of *we-words* (e.g., “we,” “our”) and *I-words* (e.g., “I,” “me”) in support messages to create two reflective measures on one's positive evaluation toward the HVSC. Two indicators were generated by applying the LIWC categories of “1<sup>st</sup> person plural” pronouns (i.e., *we-words*) and “1<sup>st</sup> person singular” pronouns (*I-words*) to analyze these messages.

*Cognitive capital* was modeled as a second-order formative construct with two first-order constructs: “shared language” and “healthcare-related expertise.” To assess the level of shared language, we applied an approach commonly used in the Information Retrieval and Natural Language Processing disciplines to analyze online messages. Specifically, we applied the vector-space model (VSM) and the term-weighting-inverse-document-frequency (*tf-idf*) weighting approach (Baeza-Yates, 1999) to generate a prototypical message that represents common language shared by community members. The basic idea of prototypical message is that words in messages that are widely used by members of the same community but not by members of other communities should represent the shared language of this community. Based on the prototypical message, we were able to compare the closeness (based on cosine similarity) between it and each community member's messages.<sup>8</sup> The closer a member's messages to the prototypical message, the more the member used community-specific language in his/her messages.

To assess one's level of healthcare-related expertise, two formative indicators were used: the usages of Unified Medical Language System (UMLS) semantic types in one's support messages, and the number of incoming friend requests. Conceptually, the former indicator measures the degree to which a community member expresses his/her healthcare-related knowledge when interacting with other members. “Number

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<sup>6</sup> A third aspect of social identity, cognitive identification, stands for one's cognitive awareness of his/her membership in a group (Ellemers et al., 1999). According to Bergami and Bagozzi (2000), affective and evaluative identification fully mediate the effect of cognitive identification on individual helping behavior.

<sup>7</sup> In the target HVSC, each member can send friend requests to others, regardless of whether other members confirm such requests.

<sup>8</sup> In automated text analysis, cosine similarity, compared with other similarity measures such as Euclidean and Pearson correlation, is a preferred measure for assessing (online) document similarities (Strehl et al., 2000).

of incoming friend requests,” on the other hand, captures the degree to which members of a HVSC regard an individual as an expert. UMLS (Bodenreider, 2004) is an online meta-thesaurus of controlled vocabularies of biomedical terminologies. Each term in the UMLS belongs to one or more of the total of 135 semantic types such as “Disease or Syndrome” (e.g., infection, lymphedema), or “Mental or Behavioral Dysfunction” (e.g., depression, addiction).<sup>9</sup> The development of the “number of incoming friend requests” measure is based on social comparison theory (Festinger, 1954; Schachter, 1959), which posits that people under anxiety conditions are more likely to affiliate and seek information from those who adjust better than themselves (Bennenbroek, et al., 2002; Molleman et al., 1986; Thoits, 1986). This tendency for “upward affiliations” allows individuals to acquire guidance from these experts for coping with the stressors. It can thus be inferred that members of HVSCs who have high degrees of incoming contacts from other members are expected to have “either overcome their threatening circumstances or adjusted well” (Taylor and Lobel, 1989, p. 571). We consider only one’s incoming friend requests that were not confirmed by him/her to capture the one-way affiliation implied by social comparison theory. This idea is also consistent with the concept of network authority: an authoritative user is more likely to be connected/contacted by others than to send the contact (Budalakoti and Bekkerman, 2012).

### **Dependent Variables and Control Variable**

Individual provision of informational support and emotional support are the two dependent variables in this study. Two reflective indicators were used for each construct: total number and total length of support messages provided by a member. Additionally, we included community members’ tenure in the community, calculated as the number of months since members’ date of registration, as the control variable. This is because one’s past experience in participating in a community may affect his/her current behavior (Limayem et al., 2007).

## **Results**

To test the proposed hypotheses, Partial Least Squares (PLS) analysis method was used for model validation and structural model testing. We chose PLS since it is appropriate for analyzing models that contains both formative and reflective indicators (Diamantopoulos and Winklhofer, 2001). Additionally, PLS places minimal demands on sample sizes (Chin, 1998). SmartPLS 2.0 software package (Ringle et al., 2005) was used for data analysis.<sup>10</sup> To model the hierarchical structural model, we followed Becker et al.’s (2012) and Wetzels et al.’s (2009) guidelines and used repeated indicator approach with formative measurement (mode B) for the repeated indicators to construct the higher-order latent variables.

### **Measurement Model Validation**

The first step of analysis is to test the adequacy of the measurement model. For reflective constructs, we assessed their indicator reliability (via indicator loadings, Table 4), convergent validity (via AVE, Table 5), internal consistency reliability (via CR, Table 5), and discriminant validity (via cross loadings and the square root of AVE, Table 4 and 5) (Chin, 1998; Fornell and Larcker, 1981). The results indicated that all the reflective constructs met the recommended threshold values.<sup>11</sup> Regarding formative constructs, we evaluated the construct validity (via indicator weights) and reliability (via multicollinearity test) (Chin, 1998; Petter et al., 2007). All the weights of the indicators for formative constructs are significant at the 0.01 level, suggesting indicator validity. Multicollinearity can be a concern in our model because of the high correlation between the two first-order constructs of cognitive capital (see Table 5). The resulting VIF (variance inflator factor) values range from 1.0 to 3.27, which are lower than the 3.3 threshold (Petter et al., 2007), suggesting the absence of multicollinearity.

Our data for measuring different social relationship characteristics (i.e., social capital dimensions) was collected from the same time period. As a result, common method variance (CMV) may potentially bias the results regarding the associations among them (Podsakoff et al., 2003). Two methods were used to

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<sup>9</sup> MetaMap, a software tool that applies the UMLS for identifying biomedical concepts in texts, was used to analyze collected messages and map word occurrences to UMLS semantic types (Aronson, 2001).

<sup>10</sup> A bootstrapping procedure (500 resamples) was used to assess the significance level of the hypothesized paths.

<sup>11</sup> PGEI’s factor loading is 0.68, which is lower than the generally accepted 0.7 threshold. As indicated by Chin (1998), for exploratory research design and newly developed indicators, as is the case for our proposed model, factors loadings of 0.6 should be acceptable.

assess CMV. Harman's single-factor test was first performed (Podsakoff et al., 2003), and the result showed that no single factor could explain most of the variance among the variables (the first factor accounted for 29.7% of the variance). Additionally, we also applied the correlational marker technique (Lindell and Whitney, 2001; Richardson et al., 2009) and followed Lindell and Whitney's (2001) and Malhotra et al.'s (2006) post hoc approach to choose the second-smallest positive correlation between two manifest variables (0.004) as a proxy for CMV. By examining the CMV-adjusted correlations among latent constructs, we found that the significance levels of all but one of the correlations remain unchanged, suggesting CMV is unlikely to be a concern in our study (Malhotra et al., 2006).

**Table 4. Factor Loadings and Cross-Loadings (of Reflective Constructs)**

	Extent of Social Interaction	Appropriable Social Org.	Trust	In-Group Liking	Positive Grp. Evaluation	Shared Language	Emotional Support	Informational Support
EOS1	<b>0.78</b>	0.01	0.16	0.01	0.01	0.18	0.11	0.07
EOS2	<b>0.90</b>	0.04	0.31	0.13	0.17	0.28	0.21	0.03
ASO1	0.04	<b>1.00</b>	-0.09	0.20	0.03	0.21	0.25	0.16
ASO2	-0.01	<b>0.90</b>	-0.33	0.11	-0.08	-0.05	0.04	0.01
TRU1	0.28	-0.12	<b>0.76</b>	0.13	0.28	0.46	0.29	0.13
TRU2	0.18	-0.06	<b>0.80</b>	-0.03	0.24	0.52	0.27	0.24
IL	0.09	0.19	0.06	<b>1.00</b>	0.13	0.18	0.43	-0.01
PGE1	0.14	0.00	0.25	0.11	<b>0.68</b>	0.30	0.22	0.09
PGE2	0.05	0.03	0.24	0.08	<b>0.80</b>	0.38	0.27	0.22
SL	0.28	0.19	0.63	0.18	0.46	<b>1.00</b>	0.55	0.52
EMO1	0.22	0.23	0.34	0.47	0.32	0.51	<b>0.99</b>	0.38
EMO2	0.17	0.23	0.36	0.39	0.33	0.58	<b>0.99</b>	0.49
INFO1	0.06	0.15	0.26	0.01	0.22	0.53	0.49	<b>0.99</b>
INFO2	0.05	0.14	0.22	-0.02	0.22	0.51	0.38	<b>0.99</b>

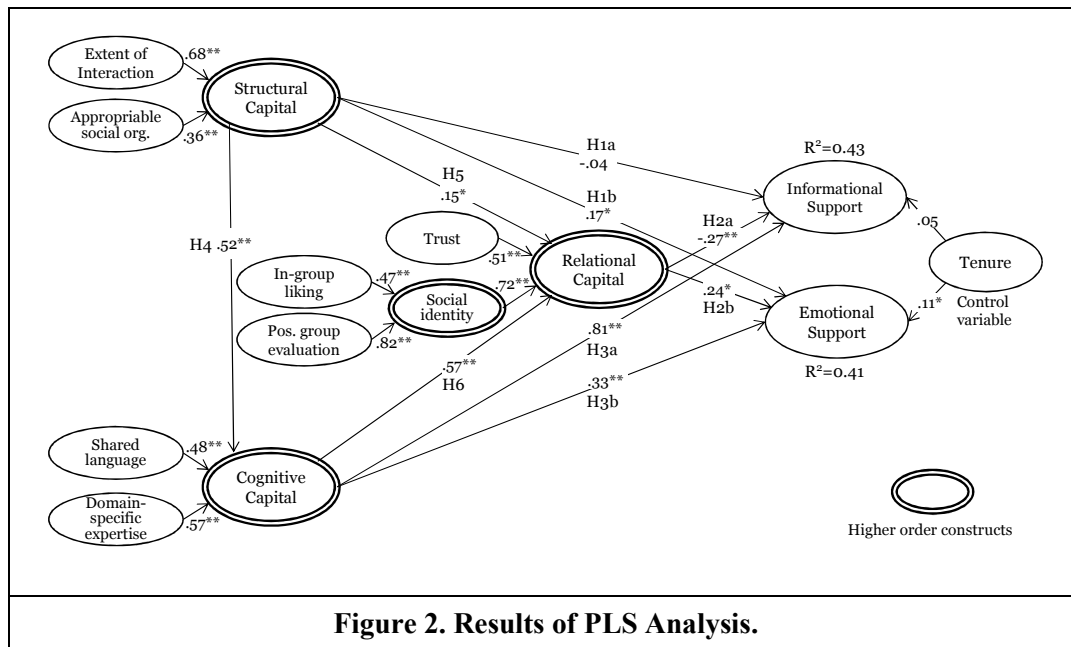
**Table 5. Descriptive Statistics, AVE, CR, and Inter-Construct Correlations**

		Mean	SD	AVE	CR	1	2	3	4	5	6	7	8	9
1	Extent of Social Interaction	2.58	0.93	0.71	0.83	<b>0.84</b>								
2	Appropriable Social Org.	0.45	0.31	0.90	0.95	0.04	<b>0.95</b>							
3	Trust	0.11	0.06	0.61	0.75	0.29	-0.12	<b>0.78</b>						
4	In-Group Liking	15.51	29.01	N/A	N/A	0.09	0.19	0.06	<b>N/A</b>					
5	Positive Grp. Evaluation	0.07	0.09	0.55	0.71	0.12	0.02	0.33	0.13	<b>0.74</b>				
6	Shared Language	0.35	0.16	N/A	N/A	0.28	0.19	0.63	0.18	0.46	<b>N/A</b>			
7	Healthcare-related Expertise	14.38	11.61	N/A	N/A	0.10	0.08	0.61	0.08	0.40	0.83	<b>N/A</b>		
8	Emotional Support	20.49	37.44	0.97	0.99	0.20	0.23	0.36	0.43	0.33	0.55	0.54	<b>0.99</b>	
9	Informational Support	7.12	14.83	0.98	0.99	0.06	0.14	0.24	-0.01	0.22	0.52	0.66	0.44	<b>0.99</b>

Note: 1. Acceptable thresholds: Composite Reliability (CR)>0.7, Average Variance Extracted (AVE)>0.5 (Chin, 1998; Fornell and Larcker, 1981). 2. The diagonal elements are the square root of the AVE

### Structural Model Testing

Figure 2 shows that that 41% of the variance in emotional support contribution and 43% of the variance in informational support contribution could be explained by the model. As for the hypotheses, structural capital failed to predict the provision of informational support. As a result, H1a was not supported. Relational capital negatively predicted the provision of informational support ( $\beta = -0.27, P < 0.01$ ). Thus, H2a was supported. Further, cognitive capital was positively associated with informational support provision ( $\beta = 0.81, P < 0.00$ ), supporting H3a. With regard to emotional support, all the 3 hypotheses predicting the its contribution (H1b to H3b) were supported. Specifically, structural capital was positively related to emotional support provision (H1b,  $\beta = 0.17, P < 0.05$ ). Emotional support can also be predicted by relational capital (H2b,  $\beta = 0.24, P < 0.05$ ) and cognitive capital (H3b,  $\beta = 0.33, P < 0.01$ ). Hypotheses regarding the associations among the social capital dimensions (H4-H6) were all supported as predicted. Specifically, structural capital predicted both the levels of cognitive capital (H4,  $\beta = 0.52, P < 0.01$ ) and relational capital (H5,  $\beta = 0.15, P < 0.05$ ). Additionally, cognitive capital was positively related to relational capital (H6,  $\beta = 0.57, P < 0.01$ ). Individual tenure in the community, the control valuable, was positively related to the provision of emotional support, meaning that the longer one's tenure in the target HVSC is, the more likely s/he will offer emotional support to other members.



Note. \*  $p < 0.05$ ; \*\*  $p < 0.01$

### Post-Hoc Analysis

The associations among the social capital dimensions in our model called for a test of mediation effects. We applied a bootstrapping approach to estimate standard errors and to test the significance of the mediating effects (Henseler et al., 2009). The results indicate that cognitive capital significantly mediates the effects of structural capital on emotional support ( $\beta = 0.17$ ,  $P < 0.01$ ) and informational support ( $\beta = 0.42$ ,  $P < 0.01$ ). Relational capital, however, did not mediate structural capital's impacts on both support types.<sup>12</sup> Additional analyses also showed that cognitive capital mediated the effect of structural capital on relational capital ( $\beta = 0.29$ ,  $P < 0.01$ ), and relational capital mediated the effect of cognitive capital on the provisions of emotional ( $\beta = 0.13$ ,  $P < 0.05$ ) and informational support ( $\beta = -0.15$ ,  $P < 0.01$ ).

### Discussion

This study intends to contribute to the online social support literature, and especially, to complement and extend existing IS online social support studies, by investigating the antecedents of individual provision of informational and emotional support in HVSCs. The findings of this study support the argument that characteristics of social relationships are critical factors predicting social support provision (Dunkel-Schetter and Skokan, 1990). Specifically, the three social capital dimensions are significant predictors of community members' provision of emotional support, as hypothesized. Further, while relational capital is negatively associated with, and structural capital was unrelated to, informational support provision, cognitive capital positively influences individual offering of informational support. Consistent with previous studies (e.g., Ahuja and Galvin, 2003), structural capital influences the other two dimensions of social capital. Additionally, cognitive capital also positively affects relational capital, as hypothesized.

Contrary to our hypothesis, there was no direct relationship between structural capital and informational support. The idea that structural capital may not guarantee one's contribution of informational support seems to support Adler and Kwon's (2002) argument that social actions may be less likely to happen if one does not have cognitive capital to do so. This is especially true in the case of providing informational

<sup>12</sup> We also applied Baron and Kenny's (1986) method to compare mediated and unmediated models linking the social capital dimensions to social support provision. The path coefficient for the relationship between structural capital and informational support provision remained non-significant even in the unmediated model. As a result, we conclude that the non-significant direct relationship between structural capital and informational support provision was not due to a mediation effect.

support, which requires related expertise to make contributions. When a community member asks for information regarding a disease or a healthcare provider, one is unable to help unless one knows what and how to provide. However structural capital does play an indirect role in informational support provision via the facilitation of relational and cognitive capital, as shown by the significant paths between them.

While our study focuses on HVSCs, which seems to be different from organization-based virtual communities in which discussing professional knowledge is the primary reason for participation, we argue that emotional support is becoming more essential in such settings, making our findings applicable to the context of professional social life. In addition to the aforementioned reason that virtual communities often tend to be emotionally supportive (Wellman and Gulia, 1999), this change is facilitated by the trend of organizational use of Web 2.0 applications to induce relationship formation and voluntary knowledge sharing (Huang and Güney, 2013). It is also evidenced by recent Web 2.0 studies conducted in organizational settings that report rapport building, self-disclosure, and exchanging emotional support as benefits (e.g., DiMicco et al., 2009; Jarrahi and Sawyer, 2013). As the boundaries of all facets of employees' work and social lives are blurred by these social applications (Skeels and Grudin, 2009), it is very likely that more opportunities for exchanging emotional support will also be created.

In this regard, this study provides manifold implications for IS social support studies. First, since one type of social support may be preferable and more useful than the other, depending on the situation (Cutrona and Suhr, 1992), our separation of the two types of support promises a better understanding of the online social support phenomenon. Additionally, by finding a negative relationship between relational capital and the provision of informational support, our study adds evidence to the social capital literature that social capital can be both a facilitator and an inhibitor of the exchange of social resources (Adler and Kwon (2002). It also provides a possible explanation for the negative relationships between relational capital, or its components, and knowledge contribution in many previous IS studies (e.g., Wasko and Faraj, 2005). Second, we conceptualized the social capital concept as a hierarchical structural model. As discussed earlier, this results in a parsimonious model of social capital through which conclusions regarding the effects of its dimensions can be directly drawn. Further, the modeling of the social capital dimensions as higher-order constructs also enables us to explore the associations among them. While only a few studies investigated these relationships (e.g., Karahanna and Preston, 2013; Sun et al., 2012), our findings reveal the importance of studying the associations among these social capital dimensions.

Further, we used content analysis to generate most of the variables, as Collins and Feeney (2000) suggested that self-report studies on social support must be supplemented by observational studies that examine the interpersonal nature of the social support process as it unfolds in dyadic interactions. In this study content analysis was applied to classify different types of social support. The differentiation between social support and companionship activities further allowed us to test the effect of appropriable social organizations on social support provision. Based on the premise that word use conveys psychological information about an individual (Pennebaker et al., 2003), content analysis also helped us discover the levels of trust and social identity of message posters. Additionally, we were able to identify those with high levels of expertise and those who used community-specific language. Since social capital concerns different aspects of social relationships, variables generated directly from social interaction messages, compared to survey questionnaires would better reflect the social nature of this concept.

### ***Practical Implications***

This study reveals the need for creating social capital among member of HVSCs to facilitate social support provision, which determines the success and longevity of virtual communities. Our findings show that, in virtual environments where trust and social identity are generally slower to develop, structural capital can expedite this process. The continuous interactions to exchange individual expertise using community-specific language (i.e., to acquire cognitive capital) are especially critical for creating relational capital and social support provision. Practitioners and site administrators should focus on initiating threads, or participating in discussions, to engage members in interactions and help them know each other better.

The findings of this study could also help practitioners design appropriate interventions to foster the provision of the type of support that is more desirable in a given community. For example, the provision of informational support in HVSCs can be encouraged for healthcare organizations seeking to enhance the quality of their offerings through patients' inputs via virtual community initiatives (Füller et al., 2009;



Nambisan and Nambisan, 2009). This can be achieved through the provision of educational resources for expertise development, or the identification of, and work with, experts in a community. Additionally, the offering of emotional support could be stressed and facilitated for HVSCs intended for individuals with low levels of control over the stressors such as mental disorders (Yan and Tan, 2010). This can be done by the creation of structural capital via, for example, encouraging individual participation in companionship activities. One should note, even for organizations attempting to harvest the “wisdom of crowds” through electronic networks of practice to stimulate knowledge sharing, emotional support should be promoted among community members, as it can lead to employee job satisfaction and commitment (Lilius et al., 2011).

Community administrators should investigate the reasons for the negative effect of relational capital on informational support. If, for example, a reduction of informational support is a result of members’ active community management, such a reduction may actually be beneficial as it increases the “findability” of community information (Morville, 2005). On the other hand, if information redundancy is the reason, approaches to overcome this “bottleneck” can be drawn from the knowledge management literature, such as introducing experts to the community to stimulate professional discussions (e.g., Anand et al., 2002).

### **Limitations**

There are some limitations in this study. First, since this study examined only one HVSC, which is dominated by female participants, whether or not our findings are applicable to other settings requires further examination. We are especially interested to see if our proposed model predicts individual helping behavior in organization-based virtual communities. Second, since our analysis was based on cross-sectional data, we were unable to address the dynamic processes of social capital development and their ongoing effects on social support provision. While we relied on theory and introduced a time lag to minimize the concern for reverse causality, it is also likely that the dimensions of social capital and the provision of social support are mutually dependent. A longitudinal or case study that sheds light on such a complex phenomenon would therefore be desirable. Third, due to the anonymous nature of the discussion board in which personal information is given only spontaneously in their messages, we were not able to obtain detailed demographic information about the 187 members, which may have impacts on the dependent variables. In this study we conceptualized and examined two formative components for each social capital dimension. While our use of these components has been justified, other potential components, such as norm of reciprocity (a component of relational capital, e.g., Wasko and Faraj, 2005) or shared vision (a component of cognitive capital, e.g., Chiu et al., 2006), exist. To increase the explanatory power of our model to better account for the variations in individual social support behavior, a more thorough investigation into their components is desirable. There are also limitations related to the content analysis method. For example, since the level of analysis for support classification is the whole message, detailed information about the existence of, and the degree to which, different types of support embedded within each message is missing. The intentional separation of message threads into threads for support exchange and for companionship activities may also over-simplify the real-world complexities of social interaction. Further, an inevitable limitation of conducting automated content analysis is the introduction of prediction errors. Lastly, being a field, observational study, we have no control over some potential extraneous factors – behavioral, social, or contextual – that may interfere with the phenomenon under investigation. These limitations with regard to the analysis of qualitative data call for future studies to employ a mixed-method methodology to triangulate the findings in order to validate the proposed the model.

### **Conclusion**

Identifying the antecedents of social support provision has been argued to be a critical research topic by healthcare as well as IS researchers. House (1987) pointed out that for improving and strengthening individual social support, “we must understand the forces that determine them” (p. 140). However, such investigation has been scarce in online social support studies. Our model identifies these antecedents and examines their complex relationships with different types of supportive behavior. This study not only provides insights for the design and administration of HVSCs, but it is also expected to both broaden and add specificity to our knowledge of online social support for the IS social support literature.

## References

- Abrams, L. C., Cross, R., Lesser, E., and Levin, D.Z. 2003. "Nurturing Interpersonal Trust in Knowledge-Sharing Networks," *Academy of Management Executive* (17:4), pp. 64-77.
- Adler, P. S., and Kwon, S.-W. 2002. "Social Capital: Prospects for a New Concept," *Academy of Management Review* (27:1), pp. 17-40.
- Ahuja, M. K., and Galvin, J. E. 2003. "Socialization in Virtual Groups," *Journal of Management* (29:2), pp. 161-185
- Albrecht, T. L., and Ropp, V. A. 1984. "Communicating about Innovation in Networks of Three U.S. Organizations," *Journal of Communication* (34:3), pp. 78-91.
- Alexander, P. S., and Judy, J. E. 1988. "The Interaction of Domain-Specific and Strategic Knowledge in Academic Performance," *Review of Educational Research* (58:4), pp. 375-404.
- Anand, V., Glick, W. H., and Manz, C. C. 2002. "Thriving on the Knowledge of Outsiders: Tapping Organizational Social Capital," *Academy of Management Executive* (16:1), pp. 87-101.
- Ardichvili, A., Page, V., and Wentling, T. 2003. "Motivation and Barriers to Participation in Virtual Knowledge-Sharing Communities of Practice," *Journal of Knowledge Management* (7:1), pp. 64-77.
- Argyle, M. 1967. *The Psychology of Interpersonal Behaviour*. London: Penguin.
- Aronson, A. R. 2001. "Effective Mapping of Biomedical Text to the UMLS Metathesaurus: The MetaMap Program," in *Proceedings of the AMLA Symposium*, pp. 17-21.
- Baeza-Yates, R., and Ribeiro-Neto, B. 1999. *Modern Information Retrieval*, Boaton, MA: Addison-Wesley.
- Barak, A., Boniel-Nissim, M., and Suler, J. 2008. "Fostering Empowerment in Online Support Groups," *Computers in Human Behavior* (24), pp. 1867-1883.
- Baron, R. M., and Kenny, D. A. 1986. "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology* (51:6), pp. 1173-1182.
- Barnes, K. M., and Duck, S. 1994 "Everyday Communicative Contexts for Social Support," in *Communication of Social Support: Messages, Interactions, Relationships, and Community*, B. R. Burleson, T. L. Albrecht, and I. G. Sarason (eds.), Thousand Oaks, CA: Sage Publications, pp. 175-194.
- Bateman, P. J., Gray, P. H., and Butler, B. S. (2011) "The Impact of Community Commitment on Participation in Online Communities," *Information Systems Research* (22:4), pp. 841-854.
- Bathelt, H., Malmberg, A., and Maskell, P. 2004. "Clusters and Knowledge: Local Buzz, Global Pipelines and the Process of Knowledge Creation," *Progress in Human Geography* (28:1), pp. 31-56.
- Bazerman, M. H., Morgan, K. P., and Loewenstein, G. F. 1997. "The Impossibility of Auditor Independence," *Sloan Management Review* (38:4), pp. 89-94.
- Becker, J.-M., Klein, K., and Wetzels, M. 2012. "Hierarchical Latent Variable Models in PLS-SEM: Guidelines for Using Reflective-Formative Type Models," *Long Range Planning* (45:5-6), pp. 359-394.
- Bennenbroek, F. T. C., Buunk, B. P., van der Zee, K. I., and Grol, B. 2002. "Social Comparison and Patient Information: What do Cancer Patients Want?," *Patient Education and Counseling* (47), pp. 5-12.
- Bergami, M., and Bagozzi, R. P. 2000. "Self-Categorization, Affective Commitment and Group Self-Esteem as Distinct Aspects of Social Identity in the Organization," *British Journal of Social Psychology* (39:4), pp. 555-577.
- Blau P. M. 1974. "Presidential Address: Parameters of Social Structure," *American Sociological Review* (39:5), pp. 615-635.
- Bodenreider, O. 2004. "The Unified Medical Language System (UMLS): Integrating Biomedical Terminology," *Nucleic Acids Research* (32), pp. D267-D270.
- Bolino, M. C., Turnley, W. H., and Bloodgood, J. M. 2002. "Citizenship Behavior and the Creation of Social Capital in Organizations," *Academy of Management Review* (27:4), pp. 505-522.
- Brewer, M. B., and Gardner, W. 1996. "Who is this "We"? Levels of Collective Identity and Self-Representation," *Journal of Personality and Social Psychology* (71:1), pp. 83-93.
- Brown, R. E. 2001. "The Process of Community-Building in Distance Learning Classes," *Journal of Asynchronous Learning Networks* (5:2), pp. 18-35.
- Budalakoti, S., and Bekkerman, R. 2012. "Bimodal Invitation-Navigation Fair Bets Model for Authority Identification in a Social Network," in *Proceedings of the 21<sup>st</sup> International World Wide Web Conference*, Lyon, France.

- Burgoon, J. K., and Hale, J. L. 1987. "Validation and Measurement of the Fundamental Themes of Relational Communication," *Communication Monographs* (54:1), pp. 19-41.
- Burleson, B. R. 2003. "The Experience and Effects of Emotional Support: What the Study of Cultural and Gender Differences can Tell Us about Close Relationships, Emotion, and Interpersonal Communication," *Personal Relationships* (10), pp. 1-23.
- Burt, R. S. 1992. *Structural Holes: The Social Structure of Competition*, Cambridge, MA: Harvard University Press.
- Callaghan, D. E., Graff, M. G., and Davies, J. 2013. "Revealing All: Self-Disclosure Rates in Laboratory-Based Online Research," *Cyberpsychology, Behavior, and Social Networking* (16:9), pp. 690-694.
- Caplan, S. E., and Turner, J. S. 2007. "Bringing Theory to Research on Computer-Mediated Comforting Communication," *Computers in Human Behavior* (23:2), pp. 985-998.
- Cassell, J., and Tversky, D. 2006. "The Language of Online Intercultural Community Formation," *Journal of Computer-Mediated Communication* (10:2) (available at <http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.2005.tb00239.x/full>).
- Chang, H. H., and Chuang, S.-S. 2011. "Social Capital and Individual Motivations on Knowledge Sharing: Participant Involvement as a Moderator," *Information & Management* (48:1), pp. 9-18.
- Chang, R. M., Yang, S.-B., Moon, J. Y., Oh, W., and Pinsonneault, A. 2011. "A Social Capital Perspective of Participant Contribution in Open Source Communities: The Case of Linux," in *Proceedings of the 44th Hawaii International Conference on System Sciences (HICSS-44)*, Koloa, HI.
- Chin, W. W. 1998. "The Partial Least Squares Approach to Structural Equation Modeling," in *Modern Methods for Business Research*, G. A. Marcoulides (ed.), London: Psychology Press, pp. 295-336.
- Chiu, C.-M., Hsu, M.-H., and Wang, E. T. G. 2006. "Understanding Knowledge Sharing in Virtual Communities: An Integration of Social Capital and Social Cognitive Theories," *Decision Support Systems* (42:3), pp. 1872-1888.
- Code, J. R., and Zap, N. 2010. "Social Identities, Group Formation, and the Analysis of Online Communities," in *Handbook of Research on Social Software and Developing Community Ontologies*, S. Hatzipanagos, and S. Warburton (eds.), Hershey, PA: Information Science Reference, pp. 86-101.
- Cohen, J. 1960. "A Coefficient of Agreement for Nominal Scales," *Educational and Psychological Measurement* (20:1), pp. 37-46.
- Coleman, J. S. 1988. "Social Capital in the Creation of Human Capital," *American Journal of Sociology* (94), pp. S95-S120.
- Collins, N. L., and Feeney, B. C. 2000. "A Safe Haven: An Attachment Theory Perspective on Support Seeking and Caregiving in Intimate Relationships," *Journal of Personality and Social Psychology* (78:6), pp. 1053-1073.
- Collopy, F. 1996. "Biases in Retrospective Self-Reports of Time Use: An Empirical Study of Computer Users," *Management Science* (42:5), pp. 758-767.
- Cutrona, C. E., and Suhr, J. A. 1992. "Controllability of Stressful Events and Satisfaction with Spouse Support Behaviors," *Communication Research* (19:2), pp. 154-174.
- Dehghani, M., Shakery, A., Asadpour, M., and Koushkestani, A. 2013. "A Learning Approach for Email Conversation Thread Reconstruction," *Journal of Information Science* (39:6), pp. 846-863.
- Diamantopoulos, A., and Winklhofer, H. M. 2001. "Index Construction with Formative Indicators: An Alternative to Scale Development," *Journal of Marketing Research* (38:2), pp. 269-277.
- DiMicco, J., Geyer, W., Millen, D. R., Dugan, C., and Brownholtz, B. 2009. "People Sensemaking and Relationship Building on Enterprise Social Networking Site," in *Proceedings of the 42nd Hawaii International Conference on System Sciences (HICSS-42)*, Waikoloa, HI.
- Driver, R., Asoko, H., Leach, J., Mortimer, E., and Scott, P. 1994. "Constructing Scientific Knowledge in the Classroom," *Educational Researcher* (23:7), 5-12.
- Dunkel-Schetter, C., and Skokan, L.A. 1990. "Determinants of Social Support Provision in Personal Relationships," *Journal of Social and Personal Relationships* (7:4), pp. 437-450.
- Ellemers, N., Kortekaas, P., and Ouwerkerk, J. W. 1999. "Self-Categorization, Commitment to the Group and Group Self-Esteem as Related but Distinct Aspects of Social Identity," *European Journal of Social Psychology* (29:2-3), pp. 371-389.
- Fayard, A.-L., and DeSanctis, G. 2010. "Enacting Language Games: The Development of a Sense of 'Wenness' in Online Forums," *Information Systems Journal* (20:4), pp. 383-416.
- Fekete, E. M., Stephens, M. A. P., and Druley, J. A. 2007. "Couples' Support Provision During Illness: The Role of Perceived Emotional Responsiveness," *Families, Systems, & Health* (25:2), pp. 204-217.

- Festinger, L. 1954. "A Theory of Social Comparison Process," *Human Relations* (7), pp. 117-140.
- Fornell, C., and Larcker, D. F. 1981 "Evaluating structural equation models with unobservable variables and measurement error," *Journal of Marketing Research* (18), pp. 39-50.
- Fox, S., and Jones, S. 2009. "The Social Life of Health Information," *Pew Internet & American Life Project Report* (available at [http://www.pewinternet.org/files/old-media/Files/Reports/2009/PIP\\_Health\\_2009.pdf](http://www.pewinternet.org/files/old-media/Files/Reports/2009/PIP_Health_2009.pdf)).
- Füller, J., Mühlbacher, H., Matzler, K., and Jawecki, G. 2009. "Consumer Empowerment through Internet-Based Co-creation," *Journal of Management Information Systems* (26:3), pp. 71-102.
- Garrod, S., and Pickering, M. J. 2004. "Why is Conversation So Easy?," *TRENDS in Cognitive Science* (8:1), pp. 8-11
- Goodman, P. S., and Darr, E. D. 1998. "Computer-Aided Systems and Communities: Mechanisms for Organizational Learning in Distributed Environments," *MIS Quarterly* (22:4), pp. 417-440.
- Gorsuch, R. L. 1983. *Factor Analysis*, Hillsdale, NJ: Lawrence Erlbaum Associates.
- Grabner-Kräuter, S. 2009. "Web 2.0 Social Networks: The Role of Trust," *Journal of Business Ethics* (90:4), 505-522.
- Granovetter, M. S. 1973. "The Strength of Weak Ties," *American Journal of Sociology* (78:6), pp. 1360-1380.
- Gulati, R. 1995. "Does Familiarity Breed Trust? The Implications of Repeated Ties for Contractual Choice in Alliances," *Academy of Management Journal* (38:1), pp. 85-112.
- Håkansson, J., and Montgomery, H. 2003. "Empathy as an Interpersonal Phenomenon," *Journal of Social and Personal Relationships* (20:3), pp. 267-284.
- Hatfield, E., Cacioppo, J., and Rapson, R. L. 1992. "Emotional Contagion," in *Review of Personality and Social Psychology: Emotion and Social Behavior* (Vol. 14), M. S. Clark (ed.), Newbury Park, CA: Sage, pp. 151-177.
- Haynes, V. D. 2009. "Web Health Sites Harness Power of Social Networks," *The Washington Post*, (October 19) (available at <http://www.washingtonpost.com/wp-dyn/content/article/2009/10/18/AR2009101801844.html>).
- Haythornthwaite, C. 2007. "Social Networks and Online Community," in *The Oxford Handbook of Internet Psychology*, A. Joinson, K. McKenna, T. Postmes, and U.-D. Reips (eds.), New York: Oxford University Press, pp. 121-138.
- Heaney, C. A., and Israel, B. A. 2002. "Social Networks and Social Support," in *Health Behavior and Health Education: Theory, Research, and Practice* (3<sup>rd</sup> ed.), K. Glanz, F. M., Lewis, and B. K. Rimer (eds.), San Francisco, CA: Jossey-Bass, pp. 185-209.
- Heider, F. 1958. *The Psychology of Interpersonal Relations*, New York: Wiley.
- Henseler, J., Ringle, C. M., and Sinkovics, R. R. 2009. "The Use of Partial Least Squares Path Modeling in International Marketing," *Advances in International Marketing* (20), pp. 277-319.
- Hill, R. A., and Dunbar, R. I. M. 2003. "Social Network Size in Humans," *Human Nature* (14:1), pp. 53-72.
- Hinds, P. J., and Mortensen, M. 2005. "Understanding Conflict in Geographically Distributed Teams: The Moderating Effects of Shared Identity, Shared Context, and Spontaneous Communication," *Organization Science* (16:3), pp. 290-307.
- Hoffman, M. L. 2000. *Empathy and Moral Development: Implications for Caring and Justice*, Cambridge: Cambridge University Press.
- Hogg, M. A., and Abrams, D. 1988. *Social Identifications: A social psychology of intergroup relations and group processes*, London: Routledge.
- Hogg, M.A., and Terry, D.J. 2000. "Social Identity and Self-Categorization Processes in Organizational Contexts," *Academy of Management Review* (25:1), pp. 121-140.
- Houghton, D. J., and Joinson, A. N. 2012. "Linguistic Markers of Secrets and Sensitive Self-Disclosure in Twitter," in *Proceedings of the 45<sup>th</sup> Hawaii International Conference on System Sciences* (HICSS-45), Maui, HI.
- House, J.S. 1987. "Social Support and Social Structure" *Sociological Forum*, 2(1), pp. 135-146.
- House, J. S., and Kahn, R. L. 1985. "Measures and Concepts of Social Support," in *Social Support and Health*, S. Cohen, and S. L. Syme (eds.), New York: Academic Press, pp. 83-108.
- Hsu, M.-H., Ju, T. L., Yen, C.-H., and Chang, C.-M. 2007. "Knowledge Sharing Behavior in Virtual Communities: The Relationship between Trust, Self-efficacy, and Outcome Expectations," *International Journal of Human-Computer Studies* (65:2), pp. 153-169.

- Huang, K.-Y., Chengalur-Smith, I., and Ran, W. 2014. "Engagement in Healthcare Virtual Support Communities: Social Support, Companionship Activities, and Gender Differences," *Communications of the Association for Information Systems* (34), article 29.
- Huang, K.-Y., and Güney, S. 2013. "Toward a Framework of Web 2.0-Driven Organizational Learning," *Communications of the Association for Information Systems* (31), Article 6, pp. 128-152.
- Huang, K.-Y., Nambisan, P., and Uzuner, Ö. 2010. "Informational Support or Emotional Support: Preliminary Study of an Automated Approach to Analyze Online Support Community Contents," in *Proceedings of the International Conference on Information Systems (ICIS'10)*, St. Louis, MO.
- Huffaker, D. A. 2011. "The Impact of Group Attributed on Communication Activity and Shared Language in Online Communications," *First Monday* (16:4) (available at <http://firstmonday.org/ojs/index.php/fm/article/viewArticle/3450/2856>).
- Hutchins, E., and Hazlehurst, B. 1995. "How to Invent a Lexicon: The Development of Shared Symbols in Interaction," in *Artificial Societies: The Computer Simulation of Social Life*, N. Gilbert and R. Conte (eds.), London: UCL Press, pp. 132-159.
- Iacono, C. S., and Weisband, S. 1997. "Developing Trust in Virtual Teams," in *Proceedings of the 30<sup>th</sup> Hawaii International Conference on Systems Sciences (HICSS-30)*, Maui, HI.
- Inkpen, A. C., and Tsang, E. W. K. 2005. "Social Capital, Networks, and Knowledge Transfer," *Academy of Management Review* (30:1), pp. 146-165.
- Jarrahi, M. H., and Sawyer, S. 2013 "Social Technologies, Informal Knowledge Practices, and the Enterprise," *Journal of Organizational Computing and Electronic Commerce* (23:1-2), pp. 110-137.
- Jarvenpaa, S. L., and Leidner, D. E. 1998. "Communication and Trust in Global Virtual Teams," *Journal of Computer-Mediated Communication* (3:4) (available at <http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.1998.tb00080.x/full>).
- Jiang, L. C., Bazarova, N. N., and Hancock, J. T. 2011. "The Disclosure-Intimacy Link in Computer-Mediated Communication: An Attributional Extension of the Hyperpersonal Model," *Human Communication Research* (37:1), pp. 58-77.
- Johnson, J. C., and Miller, M. L. 1986. "Behavioral and Cognitive Data: A Note on the Multiplexity of Network Subgroups," *Social Networks* (8), pp. 65-77.
- Joinson, A. N. 2001. "Self-Disclosure in Computer-Mediated Communication: The Role of Self-Awareness and Visual Anonymity," *European Journal of Social Psychology* (31:2), pp. 177-192.
- Karahanna, E., and Preston, D.S. 2013. "The Effect of Social Capital of the Relationship between the CIO and Top Management Team on Firm Performance," *Journal of Management Information Systems* (30:1), pp. 15-56.
- Lang, J. C. 2001. "Managerial Concerns in Knowledge Management," *Journal of Knowledge Management* (5:1), pp. 43-57.
- Lapadat, J. C. 2002. "Written Interaction: A Key Component in Online Learning," *Journal of Computer-Mediated Communication* (7:4) (available at <http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.2002.tb00158.x/full>).
- Lauring, J., and Selmer, J. 2011. "Multicultural Organizations: Common Language, Knowledge Sharing and Performance," *Personnel Review* (40:3), pp. 324-343.
- Law, K. S., Wong, C.-S., and Mobley, W. H. 1998. "Toward a Taxonomy of Multidimensional Constructs," *Academy of Management Review* (23:4), pp. 741-755.
- Levin, D. Z., and Cross, R. 2004. "The Strength of Weak Ties You Can Trust: The Mediating Role of Trust in Effective Knowledge Transfer," *Management Science* (50:11), pp. 1477-1490.
- Lilius, J. M., Kanov, J., Dutton, J. E., Worline, M. C., and Maitlis, S. 2011. "Compassion Revealed: What We Know about Compassion in Work (and Where We Need to Know More)," in *The Handbook of Positive Organizational Scholarship*, K. Cameron, and G. Spreitzer (eds.), New York, NY: Oxford University Press, pp. 273-287.
- Limayem, M., Hirt, S. G., and Cheung, C. M. K. 2007. "How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance," *MIS Quarterly* (31:4), pp. 705-737.
- Lin, M.-J. J., Hung, S.-W., and Chen, C.-J. 2009. "Fostering the Determinants of Knowledge Sharing in Professional Virtual Communities," *Computers in Human Behavior* (25:4), pp. 929-939.
- Lindell, M. K., and Whitney, D. J. 2001. "Accounting for Common Method Variance in Cross-Sectional Research Designs," *Journal of Applied Psychology* (86:1), pp. 114-121.
- Ling, K., Beenen, G., Ludford, P., Wang, X., Chang, K., Li, X., Cosley, D., Frankowski, D., Terveen, L., Rashid, A. M., Resnick, P., and Kraut, R. 2005. "Using Social Psychology to Motivate Contributions to

- Online Communities,” *Journal of Computer-Mediated Communication* (10:4) (available at <http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.2005.tb00273.x/full>).
- Ma, M., and Agarwal, R. 2007. “Through a Glass Darkly: Information Technology Design, Identity Verification, and Knowledge Contribution in Online Communities,” *Information Systems Research* (18:1), pp. 42-67.
- Malhotra, N. K., Kim, S. S., and Patil, A. 2006. “Common Method Variance in IS Research: A Comparison of Alternative Approaches and a Reanalysis of Past Research,” *Management Science* (52:12), pp. 1865-1883.
- Mao, J.-Y., and Benbasat, I. 2000. “The Use of Explanations in Knowledge-Based Systems: Cognitive Perspectives and a Process-Tracing Analysis,” *Journal of Management Information Systems* (17:2), pp. 153-179.
- Mesch, G., and Talmud, I. 2006. “The Quality of Online and Offline Relationships: The Role of Multiplexity and Duration of Social Relationships,” *The Information Society* (22:3), pp. 137-148.
- Midlarsky, E. 1991. “Helping as Coping,” in *Prosocial behavior*, M. S. Clark (ed.), Thousand Oaks, CA: Sage, pp.238–264.
- Misztal, B. 1996. *Trust in modern societies*, Cambridge: Polity Press.
- Molleman, E., Pruyn, J., and van Knippenberg, A. 1986. “Social Comparison Processes among Cancer Patients,” *British Journal of Social Psychology* (25:1), pp. 1-13.
- Morville, P. 2005. *Ambient Findability*, Sebastopol, CA: O’Reilly.
- Nahapiet, J., and Ghoshal, S. 1998. “Social Capital, Intellectual Capital, and the Organizational Advantage,” *Academy of Management Review* (33:2), pp. 242-266.
- Nambisan, P., and Nambisan, S. 2009. “Models of Consumer Value Cocreation in Health Care,” *Health Care Management Review* (34:4), pp. 344-354.
- Nonaka, I. 1994. “A Dynamic Theory of Organizational Knowledge Creation,” *Organization Science* (5:1), pp. 14–37.
- Nonnecke, B., Andrews, D., and Preece, J. 2006. “Non-Public and Public Online Community Participation: Needs, Attitudes and Behavior,” *Electronic Commerce Research* (6:1), pp. 7-20.
- Nonnecke, B., and Preece, J. 2000. “Lurker Demographics: Counting the Silent,” in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, pp. 73-80.
- Nonnecke, B. and J. Preece 2003. “Silent Participants: Getting to Know Lurkers Better,” in *From Usenet to CoWebs: Interacting with Social Information Spaces*, D. Fisher and C. Lueg (eds), London: Springer Verlag, pp. 110-132.
- Ommen, O., Janssen, C., Neugebauer, E., Bouillon, B., Rehm, K., Rangger, C., Erli, H. J., and Pfaff, H. 2008. “Trust, Social Support and Patient Type: Associations between Patients Perceived Trust, Supportive Communication and Patients Preferences in Regard to Paternalism, Clarification and Participation of Severely Injured Patients,” *Patient Education and Counseling* (73:2), pp. 196-204.
- Orr, J. 1996. *Talking about Machines: An Ethnography of a Modern Job*, Ithaca, NY: ILR Press.
- Pennebaker, J. W., Mehl, M. R., and Niederhoffer, K. G. 2003. “Psychological Aspects of Natural Language Use: Our Words, Ourselves,” *Annual Review of Psychology* (54:1), pp. 547-577.
- Pennebaker, J. W., Francis, M. E., and Booth, R. J. 2007. *Linguistic Inquiry and Word Count (LIWC 2007)*, Mahwah, NJ: Erlbaum Publishers.
- Perdue, C. W., Dovidio, J. F., Gurtman, M. B., and Tyler, R. B. 1990. “Us and Them: Social Categorization and the Process of Intergroup Bias,” *Journal of Personality and Social Psychology* (59:3), pp. 475-486.
- Perry-Smith, J. E. 2006. “Social Yet Creative: The Role of Social Relationships in Facilitating Individual Creativity,” *Academy of Management Journal* (49:1), pp. 85-101.
- Petter, S., Straub, D., and Rai, A. 2007. “Specifying Formative Constructs in Information Systems Research,” *MIS Quarterly* (31:4), pp. 623-656.
- Pfeil, U. 2009. “Online Support Communities,” in *Social Computing and Virtual Communities*, P. Zaphiris, and C. S. Ang (eds.), Chapman & Hall, pp. 121-150.
- Pfeil, U., and Zaphiris, P. 2007. “Patterns of Empathy in Online Communication,” in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, San Jose, CA, pp. 919-928.
- Pinsonneault, A., Barki, H., Gallupe, R. B., and Hoppen, N. 1999. “Electronic Brainstorming: The Illusion of Productivity,” *Information Systems Research* (10:2), pp. 110-133.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., and Podsakoff, N. P. 2003. “Common Method Bias in Behavioral Research: A Critical Review of the Literature and Recommended Remedies,” *Journal of Applied Psychology* (88:5), pp. 879-903.

- Porter, C. E., and Donthu, N. 2008. "Cultivating Trust and Harvesting Value in Virtual Communities," *Management Science* (54:1), pp. 113-128.
- Posey, C., Lowry, P. B., Roberts, T. L., and Ellis, T. S. 2010. "Proposing the Online Community Self-Disclosure Model: The Case of Working Professionals in France and the U.K. Who Use Online Communities," *European Journal of Information Systems* (19), pp. 181-195.
- Postmes, T., Spears, R., Lee, A. T., and Novak, R. J. 2005. "Individuality and Social Influence in Groups: Inductive and Deductive Routes to Group Identity," *Journal of Personality and Social Psychology* (89:5), pp. 747-763.
- Preece, J. 2001. "Sociability and Usability in Online Communities: Determining and Measuring Success," *Behaviour & Information Technology* (20:5), pp. 347-356.
- Rafaeli, S., Ravid, G., and Soroka, V. 2004. "De-Lurking in Virtual Communities: A Social Communication Network Approach to Measuring the Effects of Social and Cultural Capital," in *Proceedings of the 37th Hawaii International Conference on System Sciences (HICSS-37)*, Waikoloa, HI.
- Reis, H. T., and Shaver, P. 1988. "Intimacy as an Interpersonal Process," in *Handbook of Personal Relationships: Theory, Research and Interventions*, S. W. Duck (ed.), Oxford, England: John Wiley & Sons, pp. 367-390.
- Richardson, H. A., Simmering, M. J., and Sturman, M. C. 2009. "A Tale of Three Perspectives: Examining Post Hoc Statistical Techniques for Detection and Correction of Common Method Variance," *Organizational Research Methods* (12:4), pp. 762-800.
- Ridings, C. M., Gefen, D., and Arinze, B. 2002. "Some Antecedents and Effects of Trust in Virtual Communities," *Journal of Strategic Information Systems* (11), pp. 271-295.
- Rimé, B., Mesquita, B., Philippot, P., and Boca, S. 1991. "Beyond the Emotional Event: Six Studies on the Social Sharing of Emotion," *Cognition and Emotion* (5:5-6), pp. 435-565.
- Ringle, C. M., Wende, S., and Will, A. 2005. *SmartPLS*. Hamburg, Germany (available at <http://www.smartpls.de>).
- Robert, L. P. Jr., Dennis, A. R., and Ahuja, M. K. 2008. "Social Capital and Knowledge Integration in Digitally Enabled Teams," *Information Systems Research* (19:3), pp. 314-334.
- Rook, K. S. 1987. "Social Support versus Companionship: Effects on Life Stress, Loneliness, and Evaluations by Others," *Journal of Personality and Social Psychology* (52:6), pp. 1132-1147.
- Ryan, V. D., Agnitsch, K. A., Zhao, L., and Mullick, R. 2005. "Making Sense of Voluntary Participation: A Theoretical Synthesis," *Rural Sociology* (70:3), pp. 287-313.
- Schachter, S. 1959. *The Psychology of Affiliation*, Stanford, CA: Stanford University Press.
- Sebastiani, F. 2002. "Machine Learning in Automated Text Categorization," *ACM Computing Surveys* (34:1), pp. 1-47.
- Skeels, M.M. and J. Grudin 2009. "When Social Networks Cross Boundaries: A Case Study of Workplace Use of Facebook and LinkedIn", in *Proceedings of the ACM 2009 International Conference on Supporting Group Work (GROUP '09)*, Sanibel Island, FL: ACM Press, pp. 95-104.
- Spears, R., and Lea, M. 1994. "Panacea or Panopticon? The Hidden Power in Computer-Mediated Communication," *Communication Research* (21), pp. 427-459.
- Steinfeld, C., DiMicco, J. M., Ellison, N. B., and Lampe, C. 2009. "Bowling Online: Social Networking and Social Capital within the Organization," in *Proceedings of the fourth international conference on Communities and technologies*, pp. 245-254.
- Strehl, A., Ghosh, J., and Mooney, R. 2000. "Impact of Similarity Measures on Web-page Clustering," in *Proceedings of the AAAI Workshop on AI for Web Search*, Menlo Park, CA.
- Subramani, M. 2004. "How Do Suppliers Benefit from Information Technology Use in Supply Chain Relationships?," *MIS Quarterly* (28:1), pp. 45-73.
- Sun, Y., Fang, Y., Lim, K. H., and Straub, D. 2012. "User Satisfaction with Information Technology Service Delivery: A Social Capital Perspective," *Information Systems Research* (23:4), pp. 1195-1211.
- Tajfel, H. 1972. "La catégorisation sociale [Social categorization]," in *Introduction à la psychologie sociale* (vol. 1), S. Moscovici (ed.), Paris: Librairie Larousse, pp. 272-302.
- Tajfel, H. 1978. "Social Categorization, Social Identity and Social Comparison," in *Differentiation between Social Groups: Studies in the Social Psychology of Intergroup Relations*, H. Tajfel (ed.), London: Academic Press, pp. 61-76.
- Tanis, M. 2007. "Online Social Support Groups," in *The Oxford Handbook of Internet Psychology*, A. Joinson, K. McKenna, T. Postmes, and U.-D. Reips (eds.), New York: Oxford University Press, pp. 139-154.

- Taylor, S. E., and Lobel, M. 1989. "Social Comparison Activity under Threat: Downward Evaluation and Upward Contacts," *Psychological Review* (96:4), pp. 569-575.
- Thoits, P. A. 1986. "Social Support as Coping Assistance," *Journal of Consulting and Clinical Psychology* (54:4), pp. 416-423.
- Thoits, P.A. 2011. "Mechanisms Linking Social Ties and Support to Physical and Mental Health," *Journal of Health and Social Behavior* 52(2), pp. 145-161.
- Tidwell, L. C., and Walther, J. B. 2002. "Computer-Mediated Communication Effects on Disclosure, Impressions, and Interpersonal Evaluations: Getting to Know One Another a Bit at a Time," *Human Communication Research* (28:3), pp. 317-348.
- Van Kleef, G. A., De Dreu, C. K. W., and Manstead, A. S. R., 2010. "An Interpersonal Approach to Emotion in Social Decision Making: The Emotions as Social Information Model," *Advances in Experimental Social Psychology* (42), pp. 45-96.
- Walther, J. B. 1992. "Interpersonal Effects in Computer-Mediated Interaction: A Relational Perspective," *Communication Research* (19), pp. 52-90.
- Walther, J. B. 1996. "Computer-Mediated Communication: Impersonal, Interpersonal and Hyperpersonal Interaction," *Communication Research* (23:1), pp. 3-43.
- Walther, J. B., and Boyd, S. 2002. "Attraction to Computer-Mediated Social Support," in *Communication Technology and Society: Audience Adoption and Uses*, C. A. Lin, and D. Atkin (eds.), Cresskill, NJ: Hampton Press, pp. 153-188.
- Walther, J. B., and Bunz, U. 2005. "The Rules of Virtual Groups: Trust, Liking, and Performance in Computer-Mediated Communication," *Journal of Communication* (55:4), pp. 828-846.
- Walther, J. B., and Burgoon, J. K. 1992. "Relational Communication in Computer-Mediated Communication," *Human Communication Research* (19:1), pp. 50-88.
- Wang, Y.-C., Kraut, R., and Levings, J. M. 2012 "To Stay or Leave?: the Relationship of Emotional and Informational Support to Commitment in Online Health Support Groups," in *Proceedings of the 2012 ACM Conference on Computer Supported Cooperative Work (CSCW'12)*, Seattle, WA.
- Wasko, M. M., and Faraj, S. 2000. "'It is What One Does': Why People Participate and Help Others in Electronic Communities of Practice," *Journal of Strategic Information Systems* (9:2-3), pp. 15-173.
- Wasko, M. M., and Faraj, S. 2005. "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice," *MIS Quarterly* (29:1), pp. 35-57.
- Wellman, B., and Gulia, M. 1999. "Virtual Communities as Communities: Net Surfers Don't Ride Alone: Virtual Communities as Communities," in *Communities in Cyberspace*, P. Kollock, and M. Smith (eds.), London: Routledge, pp. 167-194.
- Wellman, B., and Wortley, S. 1990. "Different Strokes from Different Folks: Community Ties and Social Support," *The American Journal of Sociology* (96:3), pp. 558-588.
- Wheless, L. R., and Grotz, J. 1977. "The Measurement of Trust and its Relationship to Self-Disclosure," *Human Communication Research* (3:3), pp. 250-257.
- Wiertz, C., and de Ruyter, K. 2007. "Beyond the Call of Duty: Why Customers Participate in Firm-Hosted Online Communities," *Organization Studies* (28:3), pp. 347-376.
- Wright, K. B., and Bell, S. B. 2003. "Health-Related Support Groups on the Internet: Linking Empirical Findings to Social Support and Computer-Mediated Communication Theory," *Journal of Health Psychology* (8:1), pp. 39-54.
- Yan, L., and Tan, Y. 2010. "Feel Blue So Go Online: An Empirical Study of Online Supports among Patients," *Working paper, Foster School of Business: University of Washington* (available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1697849](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1697849)).
- Zhao, J., Abrahamson, K., Anderson, J. G., Ha, S., and Widdows, R. 2013. "Trust, Empathy, Social Identity, and Contribution of Knowledge within Patient Online Communities," *Behaviour & Information Technology* (32:10), pp. 1041-1048.