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# Communications of the Association for Information Systems

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## Not Just for Support: Companionship Activities in Healthcare Virtual Support Communities

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### Abstract:

The phenomenon of social support—aid and assistance exchanged through social relationships and interpersonal transactions—has been studied extensively for decades. In the context of healthcare virtual support communities, researchers have focused on exploring community members' support behavior and its effects on individuals' health outcomes. This emphasis, however, has led to the neglect of another type of social interaction that also promotes individual health—companionship activities. We argue that in order to gain a deeper insight into the online support phenomenon, the consideration of companionship activities, in addition to social support exchange, is necessary. To bridge this gap in the literature, this article attempts to contrast community members' support behavior and companionship activities in two large healthcare virtual support communities—one for patients with breast cancer and the other for patients with prostate cancer. Based on the identification of the two types of social activities from the two cancer support communities, the relationship between individuals' participation in these activities, and gender differences in their activity engagement are also hypothesized and tested. Our goal is to advance the understanding of online socio-behavioral dynamics of virtual support communities. We also wish to provide insights into the design of such communities and the delivery of patient-focused healthcare interventions.

**Keywords:** virtual support community, social support, companionship activity, social network analysis

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## I. INTRODUCTION

The Internet has brought social and behavioral changes to various aspects of our everyday lives, including individual healthcare behavior. It is reported that in 2009, 61 percent of American adults searched for health information online, compared to 25 percent in 2000, and 20 percent of those who searched for health information online also participated in virtual support communities where they could talk to experts and share experiences with other patients [Fox and Jones, 2009]. As patients become increasingly educated about their health, they are turning to each other to “crowdsource” information about health outcomes and to exchange emotional support. The Internet is a technological enabler for the empowerment of such patients as it enables them to access health information resources or to band together and create support groups. This has resulted in an increase in the number of healthcare virtual communities to nearly 500 in 2009 from around thirty-five in 2005 [Haynes, 2009]. In general, health seekers go online in order to “become informed, to prepare for appointments and surgery, to share information, and to seek and provide support” [Fox and Fallows, 2003, p. ii]. Although the information exchange in these virtual support communities is not generally moderated by healthcare professionals, an analysis found that most information posted is accurate and any inaccuracies are quickly corrected by other participants [Esquivel, Meric-Bernstam, and Bernstam, 2006]. This suggests that there are public health benefits to healthcare virtual communities, such as reduced unnecessary consultations with healthcare professionals [Bhatia and Sharma, 2008]. In addition to financial savings, these communities can reduce perceived isolation and increase motivation to cope with illness [Laubie and Elie-Dit-Cosaque, 2012].

In this article, the phenomenon of individual online participation in healthcare virtual support communities is investigated. Virtual support communities are formed by people with similar life situations (e.g., pregnancy) or illnesses (e.g., cancer) to discuss their feelings and thoughts and to search for support anonymously at any time and from any place [Pfeil, 2009]. A recent survey [Fox, 2011] suggests that nearly one in four Internet users with chronic diseases, such as cancer, have gone online to interact with others with similar health concerns and to exchange information and support. “The Internet gives patients and caregivers access not only to information, but also to each other” [Fox, 2011, p. 2]. Thus the purpose for which patients seek out these resources is beyond that of simply gaining information [Keselman, Logan, Smith, Leroy, and Zeng-Treitler, 2008].<sup>1</sup>

The growth in online support communities has inspired researchers from various fields—communication, psychology, sociology, healthcare, information systems, etc.—to explore the socio-behavioral dynamics of these communities. While information system-based social support studies focus on issues such as the relationship between social support exchange and system use [Lin, 2011], community design that facilitates support exchange [Leimeister, Ebner, and Krcmar, 2005; Preece and Shneiderman, 2009; Ren, Kraut, and Kiesler, 2007], or social determinants of support provision [Ridings, Gefen, and Arinze, 2002; Wasko and Faraj, 2005], social support studies in other fields generally focus on different issues such as supportive message content [Braithwaite, Waldron, and Finn, 1999; Finn, 1999; Klemm, Reppert, and Visich, 1998], gender differences [Blank, Schmidt, Vangsnæs, Monteiro, and Santagata, 2010; Durant, McCray, and Safran, 2012], community characteristics and their relationship to the exchange of support [Nambisan and Nambisan, 2009; Wright and Bell, 2003], or the impact of online support exchange [Beaudoin and Tao, 2008; Eysenbach, Powell, Englesakis, Rizo, and Stern, 2004]. However, all these studies of virtual support communities jointly contribute to the knowledge of the online social support phenomenon. Knowledge about the behaviors and interactions of participants in virtual support communities could provide insight into the impact that online social activities have on individual well-being. It would also allow practitioners to provide more patient-focused healthcare interventions [Keselman et al., 2008], healthcare organizations to better collaborate with patients to enhance the quality of their offerings [Nambisan and Nambisan, 2009], and website administrators to design virtual support communities that are more effective in facilitating community members’ exchange of social support [Ren, Kraut, and Kiesler, 2007].

Existing literature on participants’ social behavior in virtual support communities typically focuses on the types of support exchanged among online users (e.g., Bambina, 2007; Braithwaite et al., 1999; Gooden and Winefield, 2007). Similar to the findings of social support exchange in offline settings, researchers of virtual support communities generally identify support behavior that falls into two main categories—informational support and

<sup>1</sup> Note that although most participants in these virtual support communities are patients, the membership does include others who are simply supporters, and, thus, for the remainder of this article we refer to the members as participants rather than patients.

emotional support [Pfeil, 2009]. This emphasis on the exchange of social support at the time of crisis in virtual support communities, however, has led to the neglect of a key factor that drives individual participation in virtual communities—the search for companionship and a sense of belonging [Ridings and Gefen, 2004]. Ignoring such social activity, which takes place regardless of the existence of negative events, would be tantamount to ignoring the evidence of the contribution of everyday positive events to individual well-being [Wills, 1985]. Social behavior for the enjoyment of being together—engagement in companionship activities—is an especially critical factor that drives individuals to go online in the age of Web 2.0, where user online participation and interaction are facilitated [Huang and Güney, 2012; Kim, Yue, Hall, and Gates, 2009; O'Reilly, 2005]. Rook [1987, 1990] points out that informational/emotional support and companionship activities function differently on individual well-being, and the motivations for individuals to participate in these two types of social activities also differ: “While friendships may also provide information and social support, seeking these exchanges does not necessarily indicate the desire for friendship” [Ridings and Gefen, 2004]. Thus, in order to fully understand the social behavior of members in virtual support communities and the effects of community participation on their physical and mental health, research on virtual support communities has to take into consideration the social interactions for the purpose of seeking companionship and intimacy among participants. In other words, we claim that a deep insight into the socio-behavioral dynamics of virtual support communities comes from the understanding not only of community participants’ interaction for the “extrinsic,” “utilitarian” purpose of exchanging support, but also on their interactions for the “intrinsic” purpose of companionship and being involved with others [Rook, 1987].

The goal of this study is to bridge a gap in the literature on virtual support communities by analyzing community members’ participation in companionship activities, in addition to social support exchange. We define *companionship activities* as engaging in social interaction in order to satisfy the intrinsic needs of social integration and enjoyment, rather than for problem-solving purposes. In order to stress the significance of social interaction for the purpose of searching for companionship in virtual support communities, this study attempts to identify and categorize online message threads that are initiated, not for requesting or providing social support during stressful times, but for the pure enjoyment of social interactions. This differentiation can be recognized by analyzing the content of online message threads. In addition, the Social Support Behavior Codes framework created by Cutrona and Suhr [1992] is adopted to perform a qualitative content analysis of the types of social support exchanged in virtual support communities. Two large, U.S.-based virtual cancer discussion boards are used as the target populations for this study. Based on the findings, an analysis of the correlation between support social networks, formed through individual participation in support exchange, and companionship activity networks is conducted using social network analysis (SNA) techniques. Moreover, gender differences in community participants’ involvement in support exchange and companionship activities are also hypothesized. Our hope is that this study will provide new insights into the research on virtual support communities in information systems and other fields.

This article is organized as follows. In Section II, the theoretical foundations of this study and the research questions and hypotheses are provided. The methods used to identify and categorize online social interaction for support exchange and companionship activities, and to test the proposed hypotheses, are presented in Section III. This is followed by the presentation of the results in Section IV. Next, the findings and limitations of this study are discussed, and the final section provides conclusions.

## II. THEORETICAL BACKGROUND

### Social Support and Virtual Support Communities

Various definitions on the meaning of social support exist. For example, Cobb [1976, p. 300] defined social support as “information leading the subject to believe that he is cared for and loved, esteemed, and a member of a network of mutual obligations.” Pfeil [2009, p. 124] defined social support as “the exchange of verbal as well as nonverbal messages in order to communicate emotional and informational messages that reduce the retriever’s stress.” For Lakey and Cohen [2000, p. 187], social support is “aid and assistance exchanged through social relationships and interpersonal transactions.” In general, social support concerns supportive interactions embedded within interpersonal relationships. The social-support phenomenon has been studied for decades as researchers endeavor to theorize about social support functions and to investigate the role that social relationships and the embedded social support play in mediating individuals’ life stressors. Social support has been found to have positive effects on individuals’ physical and psychological health [Cohen and Wills, 1985; Pfeil, 2009; Wills, 1985; Wright and Bell, 2003].

When individuals facing similar life situations are connected, formally or informally, to foster social support exchange, social support groups are formed. Such groups feature face-to-face, small group interactions, with an emphasis on personal participation, voluntary attendance, and an acknowledged purpose of solving problems collectively or providing social support [Katz and Bender, 1976; Taylor, Falke, Shoptaw, and Lichtman, 1986]. Social

support groups are based on the premise that people who share similar difficulties, disease, condition, or distress would be better able to empathize with one another and exchange support [Barak, Boniel-Nissim, and Suler, 2008].

In this study, the concept of social support is used to connote supportive messages that are “actually” exchanged when one is facing stressful life events [Cobb, 1976; Cohen and Wills, 1985], rather than one’s subjective “perception” of being cared for and supported by others [Barrera, 1986; House and Kahn, 1985]. The former is the “enactment” perspective of social support, whereas the latter is the “social-cognitive view” of social support [Lahey and Cohen, 2000]. Note that the relationship between the perception or belief of being supported and individual health does not depend on the existence and level of stress [Lahey and Cohen, 2000]. For example, a negative perception of support availability is sufficient to negatively affect one’s psychological health. By contrast, research focusing on the “enactment” perspective of social support generally studies the buffering effects of social support on individuals when facing stressful situations [Cohen and Wills, 1985], i.e., social support is provided to help support recipients deal with the stressor and/or adapt to it. In the context of this study, *social support* can be defined as “functions performed for a distressed individual by significant others” [Thoits, 1986, p. 417], and the provision of social support can be conceptualized as support providers’ active participation in receivers’ stress-management efforts [Thoits, 1986].

Among the social support studies based on the support providers’ viewpoint, the types of supportive resources that are exchanged and their distinct functions have been a common interest. As stressed by Schaefer, Coyne, and Lazarus [1981], “social support can have a number of independent components serving a variety of supportive functions” (p. 385). These functions can be the elevation of self-esteem and perception of self-efficacy, the facilitation of problem-solving, or the protection or recovery from emotional losses, which contribute to different aspects of individual health. As a result, researchers have been trying to categorize exchanged support in order to investigate different types of support individuals provide in various social settings and to clarify the effect that each category of support has on an individual. Various support classifications have been proposed so far. For example, Schaefer et al. [1981] classified social support into emotional, tangible, and informational support. House [1981] identified four support categories: emotional, instrumental, informational, and appraisal. Cutrona and Suh’s [1992] Social Support Behavior Code (SSBC) contains five types of social support:

- Informational support: Providing information about the stress itself or how to deal with it
- Tangible support: Providing or offering to provide goods or services needed in the stressful situation
- Emotional support: Communicating love or caring
- Network support: Communicating belonging to a group or persons with similar interests and concerns
- Esteem support: Communicating respect and confidence in abilities

In the Internet age, the number of virtual support communities has grown exponentially [Haynes, 2009]. Through message forums, listservs, chat rooms, or newsgroups, community participants engage in social interaction with peers who are facing or have gone through similar life stresses [Wright and Bell, 2003]. Virtual support communities, compared to the offline ones, have some distinctive features such as weak-tie connections, anonymity, invisibility, delayed reactions, and neutralizing of status [Barak et al., 2008]. These features allow community participants to access diverse information, disclose information about self safely without the fear of being stigmatized, create solidarity, and enhance the feeling of personal empowerment [Barak et al., 2008; Wright and Bell, 2003]. The growing trend of online participation in support communities has drawn social support researchers’ attention as well. Examples of research on online social support include: the examination of the effectiveness of virtual support communities [Lieberman, Golant, and Giese-Davis, 2003], the differences between online support communities and its offline counterpart [Klemm et al., 1998; Pfeil, 2009], the features of computer-mediated online environments and their implications for support exchange [Wright and Bell, 2003], the formation of identities, norms, and values in virtual support communities [Maloney-Krichmar and Preece, 2005], the gender differences in terms of online support behavior [Klemm, Hurst, Dearholt, and Trone, 1999], and the characteristics of online support social networks and their relationships to support behavior [Bambina, 2007]. Virtual support communities can be formed for any kind of life crisis, and, as a result, researchers also study online support exchange in virtual support communities for different distress topics, such as patients with chronic diseases [Klemm et al., 1998], rare diseases [Coulson, Buchanan, and Aubeeluck, 2007], children and adolescents [Tichon and Shapiro, 2003], older adults [Wright, 2000], pregnant women [Drentea and Moren-Cross, 2005], and stepmothers [Craig and Johnson, 2010].

As with the studies of social support in offline settings, researchers of virtual support communities have taken great efforts to identify the types of support exchanged among community participants and explore the socio-behavioral dynamics of virtual support communities. Some researchers adopt existing offline support classification, while others inductively create new support categorizations. For example, Klemm et al. [1998] inductively identified categories of

support behavior including information giving/seeking, personal opinions, encouragement/support, personal experiences, thanks, humor, and prayer exchanged in a virtual cancer support community. Adopting grounded theory, Gooden, and Winefield [2007] inductively discovered informational and emotional support exchanged among individuals in a virtual cancer support community. Braithwaite, Walden, and Finn [1999], on the other hand, applied Cutrona and Suh's [1992] Social Support Behavior Codes to study a virtual support community for individuals with disabilities. Despite the different frameworks of support classification that these studies used or discovered, informational and emotional support have generally emerged as the most common types of social support exchanged online [Pfeil, 2009].

### Social Support and Social Companionship

In the literature on social support studies, online or offline, there is one type of social behavior that has received little attention—engaging in social interaction in order to satisfy the intrinsic needs of social integration and enjoyment, rather than for problem-solving purposes [Baumeister and Leary, 1995; Rook, 1987; Wills, 1985]. Researchers call this type of social interaction *companionship* [Rook, 1987, 1990], *positive social interaction* [Barrera and Ainlay, 1983], *social participation* [Phillips, 1967], or *socializing* [Hirsch, 1980]. Instead of exchanging social support when one is facing life stresses, individuals participate in companionship activities, whether or not stressful events are present. Similar to social support that is exchanged during life stressors, companionship activities, such as dinners, outdoor activities, and chats, are also found to contribute to individual wellness [Wills, 1985]. For example, for mentally ill patients, more frequent companionship activities are positively associated with their degree of happiness [Phillips, 1967]. It has also been shown that companionship activities contribute to marital satisfaction [Spanier and Lewis, 1980] and overall life satisfaction [London, Crandall, and Seals, 1977]. The following quotation is an example of companionship activities initiated by a virtual support community member trying to involve others for chatting and exchanging ideas:

*Favorite holiday traditions ... One of my favorite things to do is make chocolate fudge. My husband and I make it together and it is delicious.... What does everyone else do for the next month? Please share and maybe we can pick up some new traditions!*

Social support researchers have found that companionship activities function on an individual's health differently from social support (e.g., Rook, 1987; Wills, 1985). For instance, Rook [1987] showed that social support functions as a buffer between stressful life events and an individual's mental health, whereas companionship has a direct, main effect. That is, while social support helps restore disrupted mental function due to stressful events, companionship activities directly promote an individual's current level of psychological well-being, regardless of exposure or nonexposure to stress [Rook, 1987, 1990]. In the same vein, Wills [1985] argued that companionship activities and social support may make independent contributions to different aspects of personal well-being. Furthermore, companionship activities have been found to be more positively related to friendship satisfaction and decreased loneliness than social support is [Rook, 1987]. As a result, Rook [1985, 1987] claimed that the two forms of social interactions benefit individuals in rather different contexts, and social support studies that ignore the measurement of companionship activities underestimate the importance of this type of activity. The omission of companionship activities in many social support studies, according to Barrera and Ainlay [1983, p. 136], may also "reflect the tendency to regard support as a resource for the remediation of stress," i.e., research generally focuses on the buffering aspect of social support.

Some researchers recognized that in order to acquire the full view of supportive functions afforded by interpersonal relationships, the incorporation of companionship activities into the study of social support is needed (e.g., Barrera and Ainlay, 1983). For example, in her discussion of social support studies, Rook [1987] argued that social interactions should not only serve as utilitarian functions for exchanging support, such interactions should also be sought for pleasurable companionship and intimacy. Berkman and Glass [2000] also pointed out that one should not assume that social support is the most critical social transaction within social networks that lead to physical and mental health; other social interactions, such as companionship activities, can also be a contributing factor that affects individual health. Hays and Oxley [1986] found that companionship activities, but not social support, positively correlated to university freshmen's adaptation to college life. These authors argued that, "to best understand the health-promotive potential of social relations, researchers should examine social processes that are not directly 'supportive' in purpose" (p. 312).

While some authors see the commonality between companionship activities and other forms of social support in their health-promoting capabilities and thus treat companionship activities as a form of social support (e.g., Tichon and Shapiro, 2003; Wills, 1985; Wellman and Wortley, 1990), in the current study we recognize their distinct functions and differentiate between the two types of social activities. In other words, we treat social support as a social exchange by which "interpersonal relationships presumably buffer one against a stressful environment" [Cohen and McKay, 1984, p. 253]. Companionship activities, on the other hand, are sought for purely pleasurable

interaction [Rook, 1990]. This helps us to emphasize and contrast the two forms of social interactions that take place in virtual support communities and also to facilitate the analysis of the relationships between them.

The need for incorporating companionship activities into social support studies in order to analyze and contrast the distinct functions of the two types of social interactions is even more pronounced in the study of social support in online settings. This is because the social nature of the Internet is expected to afford multiplex social relationships—"the strengthening of relationships through interactions in multiple roles and social arenas"—among individuals [Wellman and Gulia, 1999, p. 180]. For example, Furlong [1989] studied SeniorNet, a virtual community initiated originally for the purpose of educating older adults with computer skills and providing information such as finance and healthcare, and found that older adults participated in the community not just for seeking information, but mainly to exchange emotional support and for companionship activities such as chatting with others of similar interest. In addition, Wright's [2000] study found that participants of SeniorNet have significantly larger companionship networks than supportive networks. This finding implies that older adults interact with each other in virtual communities more for reasons of companionship than for exchanging support [Wright, 2000]. Sproull and Faraj [1997] also gave an example of an online information-sharing mailing list that was expanded to allow the exchange of emotional support and for companionship activities. In the virtual world, people meet with others of various locations and backgrounds to exchange information and support and to make friends, forming multiplex relationships [Ridings and Gefen, 2004].

Given that recent studies of virtual communities reported that intimate friendships and strong bonds are generated in online settings [Kavanaugh, Carroll, Rosson, Zin, and Reese, 2005; Parks and Floyd, 1996; Wellman and Gulia, 1999] and that seeking friendship is one of the main reasons that individuals participate in health-related virtual communities [Ridings and Gefen, 2004], it is reasonable to expect that virtual support communities not only enable participants to form support-exchanging relationships, but also enable them to engage in companionship activities with peer participants. Thus, in order to study the complexities of social activities in virtual support communities, one should consider support exchanged among individuals, as well as social interactions for the enjoyment of friendship.

Only a handful of online social support studies have considered companionship activities. For instance, Bambina [2007] created the "companionship support" category along with the subcategories "chatting," "humor/teasing," and "groupness" in her support classification, which is an extension of the offline social support classification created by Cutrona and Suhr [1992]. Bambina's study, nevertheless, did not recognize the difference between "companionship support" that is provided for the purpose of consolation [Cutrona and Suhr, 1992] and companionship activities (the "chatting" subcategory in her classification) that are for the purpose of enjoyment. A relevant study to the current one is the work of Tichon and Shapiro [2003]. They studied an email support group for children and adolescents and identified informational support, emotional support, and companionship activities that are exchanged by participants of the support group. They also found that companionship activities were the most exchanged type of social activities in their target support group. However, their study didn't attempt to theoretically recognize and contrast the motivations that drive individual engagement in companionship activities and support exchange (for enjoyment vs. for problem solving), nor did they further investigate the relationships between the two types of social activity. The two types of activity, as indicated by other researchers, exhibit motivational differences and have different effects on individuals [Rook, 1987, 1990]. Thus, in order to acquire a deeper insight into support behavior in virtual support communities, a clear differentiation between social support and companionship activities is necessary. It is only when social relationships that are formed and maintained for different purposes are identified in virtual support communities that we can further examine the interactions between these different types of behavior and the ultimate impacts of these relationships on an individual's well-being. As a result, our research questions are:

*RQ1:* To what extent are message threads initiated by members of the target virtual support communities primarily for the purpose of problem-solving (i.e., social support exchange) versus for pure enjoyment (i.e., companionship activities)?

*RQ2:* What are the types and frequencies of social support and companionship activities manifested in the messages of the target virtual support communities?

This study is focused on differentiating between those social interactions in virtual support communities that are motivated by problem solving, and those that are motivated by pure enjoyment and the need to be socially included. In order to perform a more meaningful analysis of the communication patterns in both these kinds of social interactions that take place in virtual support communities, below we will investigate (1) the relationship between one's participation in social support and companionship activities—studying this relationship will add to our knowledge about their interaction and mutual-dependence—and (2) gender differences in individual participation in the two types of social activities—these differences have been widely explored in online contexts and have been found to have a strong impact on communication. It is important to consider both these issues, therefore, in order to help unfold the socio-behavioral dynamics of virtual support communities.

## Relationship Between Social Support and Companionship Activities

Through participation in companionship activities, members of virtual support communities have higher connectedness with others in the community and, thus, have better access to others' information and support and, subsequently, higher awareness of others' needs [Ryan, Agnitsch, Zhao, and Mullick, 2005; Wellman and Wortley, 1990]. Such people are also more likely to receive requests from others for help [Granovetter, 1982; Ryan et al., 2005; Wellman and Wortley, 1990]. This results in higher opportunities for these people to engage in supportive interactions. Wills [1985, p. 73] claims that "people who engage in more social companionship activity probably have access to more instrumental support and probably more esteem support." Likewise, Langner and Michael [1963, p. 294] have also noted "participation [in], membership in, or interaction with a group lends a sense of strength to the individual, and brings the emotional support that many people crave."

On the other hand, in virtual support communities where participants are unlikely to know each other at the beginning, personal relationships often begin with social support exchange, as highlighted by Walther and Boyd [2002, p. 155] in their study of Computer-mediated Communication (CMC): "Unlike face-to-face support relationships, most CMC support exchange begins by discussing the topic of concern, immediately and often in very personal terms, rather than leading up to these concerns after establishing relationships based on other commonalities." Still, studies have shown that deep friendships with strong bonds do develop in virtual communities [Parks and Floyd, 1996; Wellman and Gulia, 1999], especially when participants exchange intimate personal information [McKenna, Green, and Gleason, 2002; Mesch and Talmud, 2006]. People facing stressful situations participate in virtual support communities because of their need for affiliation since they may fear being stigmatized or feel socially isolated in offline settings [Wright and Bell, 2003]. The anonymous nature and lack of social cues in virtual support communities allow community members to share personal thoughts and feelings and self-disclosure, fostering the formation of close relationships [Barak et al., 2008]. The engagement in social support exchange with peers should thus eventually lead to the formation of friendship and the spending of time in virtual support communities not only for problem-solving, but also for companionship purposes. Based on the above discussion of the relationship between companionship activities and support exchange, we hypothesize that a target community member's participation in the two types of social activities are correlated.

In the formation of such hypothesis, merely counting and comparing the frequencies of one's postings for support exchange and for companionship activities would implicitly measure each community member's individual characteristics but not the features of dyadic relationships. In other words, a high correlation between the frequencies of the two types of activities could be attributed to personal characteristics such as outgoing, popular, or shy. Thus frequencies cannot adequately capture the characteristics of online multiplex relationships. For a dyadic relation formed in virtual support communities, the connected peers may begin their relationship by exchanging social supports and then evolve into friendship and jointly engage in companionship activities, or vice versa. Social Network Analysis techniques [Wasserman and Faust, 1994] address this issue. For each pair of online community members, SNA allows for the measurement of the correlation between their relationships formed through support exchange and that created via joint companionship activities. Such a correlation signifies the possible formation and transition of dyadic relations from one social network to another. Therefore, we hypothesize:

*H1:* The social network formed through one's participation in companionship activities is positively correlated to one's social support exchange network in the target virtual support communities.

## Gender Differences in Virtual Support Communities

Previous research has indicated that men and women have different communication characteristics in terms of behavioral, cognitive, and linguistic patterns (e.g., Burleson, 2003; Coates, 2004; Spence and Helmreich, 1978; Tannen, 1990). For example, Ahlgren and Johnson [1979] found that, while men place higher value on power, politics, and competition, women value the development of reciprocal relationships more. Tannen [1990] described men's oral communication as "Report" talk: more fact- and information-oriented, and women's oral communication as "Rapport" talk: more relationship-oriented. These gender differences also manifest in online user behavior (e.g., Boneva, Kraut, and Frohlich, 2001; Gefen and Ridings, 2005; Hargittai and Shafer, 2006). For example, Boneva et al. [2001] found that women are more likely than men to use email to maintain and expand friendship and family social networks. Herring, Kouper, Scheidt, and Wright [2004] observed that, in blog keeping, women are more interested in writing personal diaries, while men focus more on external, non-personal events (such as news or politics).

In the social support and stress coping realm, a consistent finding is that women are more likely to engage in comforting behavior and also to seek emotional support, while men have a higher tendency to exchange instrumental/informational support (e.g., Ashton and Fuehrer, 1993; Trobst, Colling, and Embree, 1994). For example, by studying 100 communications between physicians and patients during office visits, Bylund and Makoul [2002] found that female patients tend to make more emotionally intense expressions than male patients in order to

elicit an empathic response, and female physicians tend to make higher degrees of empathic response than male physicians to patients. Women are more inclined than men to provide highly “person-centered” messages in order to comfort distressed others (e.g., Barbee, Gulley, and Cunningham, 1990; Samter, 2002).

In studies of social support groups, researchers also pointed out that men and women show different tendencies in types of support sought and provided, both online (e.g., Gefen and Ridings, 2005; Gooden and Winefield, 2007; Huang, Nambisan, and Uzuner, 2010; Klemm et al., 1999; Seale, Ziebland, and Charteris-Black, 2006) and offline (e.g., Gray, Fitch, Davis, and Phillips, 1996). More specifically, compared to men, women are more likely to exchange emotional support. On the other hand, men are more likely to exchange informational support.

Despite extant findings regarding gender differences in virtual support communities, researchers have not yet focused on the contrast between men and women’s friendship behavior in virtual support communities. Given that members of virtual support communities interact not only for the purpose of support exchange in order to solve problems, but also for the enjoyment of being together and the formation of friendship, it is also important to investigate gender differences in community members’ participation in companionship activities. As indicated in previous studies, during oral or written discourse, men place higher value on the exchange of facts and information [Savicki, Lingenfelter, and Kelley, 1996; Tannen, 1990]. Women, on the other hand, focus more on “creating rapport and a social knitting with others” [Gefen and Ridings, 2005] and, thus, are more likely than men to form online friendships [Parks and Floyd, 1996]. Therefore, it is reasonable to hypothesize that women are more likely than men to engage in companionship activities and, as a result, form larger companionship networks. Men, on the other hand, may focus more on information exchange without further investment of time and effort in developing closer relationships. In addition, we also hypothesize that the correlation between the social networks formed through support exchange and companionship activities would be greater for women.

In this study we study breast cancer and prostate cancer support communities to identify gender differences. These two types of cancer support groups have been widely adopted in the study of gender differences, since the majority of breast cancer patients are women, and prostate cancer is a man’s disease. In addition, breast cancer and prostate cancer have similar age of onset, and morbidity and mortality rates, thus providing comparable sources of analysis [Gooden and Winefield, 2007; Gray et al., 1996; Klemm et al., 1999; Seale et al., 2006] and, therefore, are suitable to this study. As a result, we hypothesize:

*H2a:* Members of the target breast cancer community are more likely than members of the prostate cancer support community to engage in companionship activities.

*H2b:* Members of the target breast cancer community have larger companionship activity social networks than members of the prostate cancer community.

*H3:* The correlation between breast cancer support community members’ companionship activity social network and their social support exchange social network is higher than that between prostate cancer support community members’ companionship network and support network.

### III. METHOD

This study falls within the positivist case study paradigm [Orlikowski and Baroudi, 1991; Cavaye, 1996; Sarker and Lee, 2002; Yin 1994], which guides our formation of research questions and hypotheses, and also the collection and analysis of data. Epistemologically, our study deductively applies and empirically tests existing theoretical frameworks regarding online social relationships, social support, and gender differences in order to gain insights into the socio-behavioral dynamics of virtual support communities. Methodologically, this study combines both qualitative and quantitative methods in order to address the relevant research questions and hypotheses. For instance, we use qualitative content analysis to first distinguish between companionship activities and support exchange, and then continue to use it to further categorize messages. Next, we apply social network analysis techniques to calculate correlations between the networks and degree centralities for each network. Finally, we use both parametric and nonparametric statistical tests to compare gender differences. Such a combination of methods, as argued by Kaplan and Duchon [1988], introduces both testability and social-cultural context into the research, resulting in a fuller picture of the socio-behavioral dynamics of the target virtual support communities.

Although we focus on two cases: the breast cancer and prostate cancer communities, our intention is not to explore a new phenomenon that occurs specifically in the two target communities, nor are the two cases the targets of the consideration of generalizability. Rather, we draw on the two virtual support communities in order to pursue a high level of “analytic generalizability” [Yin, 1994] toward the existing findings on online social relationships. According to Yin [1994, p. 31], analytic generalization is a method of generalization in which “a previously developed theory is used as a template with which to compare the empirical results of the case study.” In contrast to the so-called “statistic generalization” (the most common way of generalizing when conducting cross-sectional studies), analytic

generalization is what (deductive) case studies rely on; it concerns the generalization of “a particular set of results to some broader theory” [Yin, 1994, p. 36]. In our study, the broader theories to which we attempt to compare the results of this study are the above-mentioned findings that strong ties and multiplex relationships do happen online, and the findings that males are more likely to engage in report-talk and females are more rapport-oriented. In this situation, the criterion of generalizability is to be applied to the theorizings behind the research questions and hypotheses, and not to the case study [Sarker and Lee, 2002]. We explore whether similar findings can also be found in virtual support communities. If so, our study may not only contribute to the social support literature by claiming that in virtual support communities, the impact of companionship activities on individual health should not be underestimated, but its results are also generalizable to and validated by previous findings regarding online relationships to virtual support communities. In addition, in this study we focus on two cancer virtual support communities (i.e., a multiple-case study). If similar findings are found in the two communities, for example, that a certain amount of community members’ online participation are for the purpose of companionship activities, in addition to support exchange, then a replication of findings can be claimed [Yin, 1994] and the level of analytic generalization to previous studies would be high.

## Data Collection

The target virtual support community for this study is a large, U.S.-based online cancer support community hosting discussion boards for various kinds of cancers. The community has more than a hundred thousand registered members, who post hundreds of messages every day. Postings on these discussion boards are organized as message threads, in which each thread is initiated by a community member and is followed by asynchronous responses through which members discuss a topic. Breast cancer and prostate cancer discussion boards, the two most active discussion boards of this virtual community, were chosen as the data source. Breast cancer support groups have been one of the most studied by researchers of online and offline social support, and many studies have compared breast cancer and prostate cancer support groups in order to explore gender differences in group members’ social behavior (e.g., Blank et al., 2010; Gooden and Winefield, 2007; Klemm et al., 1999; Seale et al., 2006). The selection of these two cancer discussion boards as our data source not only allows us to better examine the generalizability of the research results to previous studies [Yin, 1994], but also helps us to further investigate and contrast male and female engagement in companionship activities.

Online message threads initiated during the first seven days of May 2011 and October 2011 respectively, were downloaded from the breast cancer discussion board. This resulted in 100 message threads, containing 1,291 messages in total. From the prostate cancer discussion board, message threads initiated during the months of May 2011 and October 2011 were downloaded, resulting in eighty-four message threads, containing 762 messages. The choice of periods of different lengths from the two discussion boards was to ensure a comparable number of messages from the two discussion boards. The collection of data spanning two different time periods, from each board, allowed us to account for possible behavioral differences across different time periods [Ahuja, Galletta, and Carley, 2003]. The resultant number of message threads from the two discussion boards provided a balance among the efforts required to conduct manual analysis, the generation of meaningful analysis results, and the collection of data large enough to be representative. This data collection approach has been adopted by many previous studies on virtual support communities (e.g., Klemm et al., 1998; White and Dorman, 2000).

Registration for accessing the contents of the virtual support community is not required; however, registration is needed to post messages on the discussion boards. Based on the user ID, which is unique for each registrant, a total of 185 community members from the breast cancer discussion board and 132 members from the prostate cancer discussion board were identified from a preliminary analysis of the collected messages. A possible limitation of recognizing members based on member ID is the fact that in online environments, a community member may create more than one ID. As a result, the identified 185 and 132 IDs from the target discussion boards may not necessarily represent the number of distinct community members in the collected data. However, due to the anonymous nature of the virtual community in which personal information is given only spontaneously in their postings and, since demographic information on members is limited, we were not able to determine if any member had multiple IDs.

## Ethical Concerns

Ethical issues of personal privacy and potential psychological harm should be considered before conducting qualitative research on virtual communities [Eysenbach and Till, 2001]. Given the public nature of the target virtual support community, all the personal postings are publicly accessible without user registration and can be searched through search engines such as google.com or social networking sites such as facebook.com (through bing.com). As a result, we regarded the target virtual community as a public space and no informed consent is needed, as argued by Sudweeks and Rafaeli [1995, p. 122] that “the object of analysis is the communication that is openly posted and distributed, not the personalities involved.” In addition, the membership of this virtual support community

is more than 100,000, which far exceeds the number of less than 100 that may require privacy concerns pointed out by Eysenbach and Till [2001]. Still, there have been debates regarding the private versus public issue in conducting online research [Bruckman, 2002; Sharf, 1999], and social support communities are considered inherently vulnerable. In order to ensure that there were no ethical concerns and the findings of this study would do no harm to any community member, the virtual community is not named in this article, quotes from the message content were paraphrased, and any information that could potentially identify members of the virtual support community was not disclosed. This practice resulted in a “heavy” level of disguising of the collected data [Bruckman, 2002] and the protection to the human subjects is expected to be maximized.

## Content Analysis

Content analysis—“a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns” [Hsieh and Shannon, 2005, p. 1278]—is one of the most commonly applied methods for investigating virtual support communities [Pfeil, 2009] and is the preferred method for studying online social interactions [Pfeil and Zaphiris, 2007]. Accordingly, we employed qualitative content analysis to analyze the online message content. To guide the identification of types of social support exchanged online, the Social Support Behavior Code (SSBC) developed by Cutrona and Suhr [1992] was adopted. According to Cutrona and Suhr [1992], SSBC was designed to assess the frequency of occurrence of support intended communication behaviors that fall into five main support categories—informational support, tangible assistance, emotional support, network support, and esteem support [Cutrona and Suhr, 1992].

The SSBC was originally developed for the study of support behavior that happened in offline settings. However, it also has been widely adopted in the study of social support that takes place in virtual support communities (e.g., Braithwaite et al., 1999; Coulson et al., 2007; Eichhorn, 2008). Braithwaite et al. [1999] also pointed out that SSBC incorporates the social support categories most frequently encountered in the social support literature. SSBC, therefore, is suitable for the current study. The SSBC and the definitions of its twenty-three subcategories are listed in Table 1. In this study, we focused on only the five main support categories. We did not attempt to categorize the messages into the subcategories of supportive behaviors since the examination of detailed support strategies that individuals follow has been conducted extensively by many previous studies (e.g., Braithwaite et al., 1999). Although we did not consider the twenty-three subcategories in our support classification task, their definitions were used to help us clarify the type of support a message conveyed and the main support category it belonged to.

In addition to identifying “support provision” behavior using SSBC, we also needed to code the “support request” behavior so as to capture all the messages that are posted for the purpose of support exchange. As a result, a “support request” category was created to recognize individual requests for social support. Content analysis was also applied inductively to recognize and categorize message threads that were initiated to involve others for companionship purposes.

## Unit of Analysis

To help identify types of support exchanged online and also to differentiate support messages from messages for companionship activities, the individual message posting was chosen as the basic unit for coding. Each support message was classified into one of the five support provision categories based on Cutrona and Suhr’s [1992] SSBC coding framework, or the support request category. If more than one support strategy was provided in a support message, the primary focus or the predominant one was selected.

For the coding of companionship activities, our focus was on the identification of the topic of each message thread that was not initiated for support exchange, but for pleasurable social interactions. Many previous studies have classified this type of social activity as a single “chat,” “unrelated,” “off-topic,” or “miscellaneous” category [Bambina, 2007; Braithwaite et al., 1999; Eichhorn, 2008; Finn, 1999; Klemm et al., 1998; Pfeil and Zaphiris, 2007]. We considered most social interactions that happen in virtual support communities to be either social support exchange or companionship activities and thus didn’t attempt to take into account other possibilities. This assumption is supported by Ridings and Gefen’s [2004] finding that almost all the survey respondents had joined virtual communities either for the purposes of informational/emotional support (60.7 percent) or for companionship activities (32.7 percent). This categorization of message content in virtual support communities as either support exchange or companionship activities was also adopted by researchers to study the dynamics of virtual support communities (e.g., Yan and Tan, 2010). Consequently, any social activity that was identified as not belonging to either of the two activity categories was discarded.



**Table 1: Definitions of Social Support Behavior Codes [Cutrona and Suhr, 1992]**

Support type	Definition
<b>Informational support</b>	
Suggestion/advice	Offers ideas and suggests actions
Referral	Refers the recipient to some other source of help
Situation	Reassesses or redefines the situation
Teaching	Provides detailed information, facts, or news about the situation or about skills needed to deal with the situation
<b>Tangible support</b>	
Loan	Offers to lend the recipient something
Direct task	Offers to perform a task directly related to the stress
Indirect task	Offers to take over one or more of the recipient's other responsibilities while the recipient is under stress
Active	Offers to join the recipient in action that reduces the stress
Willingness	Expresses willingness to help
<b>Emotional support</b>	
Relationship	Stresses the importance of closeness and love in relationship with the recipient
Physical affection	Offers physical contact, including hugs, kisses, hand-holding, shoulder patting
Confidentiality	Promises to keep the recipient's problem in confidence
Sympathy	Expresses sorrow or regret for the recipient's situation or distress
Listening	Attentive comments as the recipient speaks
Understanding/empathy	Expresses understanding of the situation or discloses a personal situation that communicates understanding
Encouragement	Provides the recipient with hope and confidence
Prayer	Prays with the recipient
<b>Esteem support</b>	
Compliment	Says positive things about the recipient or emphasizes the recipient's abilities
Validation	Expresses agreement with the recipient's perspective on the situation
Relief of blame	Tries to alleviate the recipient's feelings of guilt about the situation
<b>Network support</b>	
Access	Offers to provide the recipient with access to new companions
Presence	Offers to spend time with the person, to be there
Companions <sup>2</sup>	Reminds the person of availability of supportive companions, of others who are similar in interests or experience

## Coding Procedure

### Coding Types of Social Activities

The analysis of the 2,053 downloaded messages (1,291 from the breast cancer discussion board, 762 from the prostate cancer discussion board) was first conducted on a thread-by-thread basis. That is, each discussion thread was first analyzed to see whether the discussion topic of the thread was about support exchange or companionship activity. To facilitate this process, the first message—the message that was initiated to set up the topic of a thread—of each of the 184 message threads was checked to determine if the message was to exchange support or to engage in companionship activity. If it was for support exchange, the whole thread of conversation underwent support identification, and SSBC and the “support request” category was used to analyze all the messages in this thread. Otherwise, the whole thread was considered to belong to the companionship activities category. This strategy was adopted 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.

Even if there were support-related responses in a thread initiated for companionship purposes, posters do so through their participation in companionship activities, which is the topic set up by the first message of a thread. Admittedly, while participating in companionship activities, information about the potential support provider and receiver may be exchanged and their needs identified, enabling them to ventilate their stress, which is conducive to support exchange [Barnes and Duck, 1994]. However, these outcomes of support exchange during participation in companionship activities, according to Barnes and Duck [1994], are the implicit results that emerge from the latent functions of companionship activities. That is, support exchanges that are embedded in companionship activities are

<sup>2</sup> Note that, although in SSBC “companions” is a subcategory of network support, our use of the term *companionship* is different from the companion support. Companion support represents a form of social support that is exchanged when one is facing a stressful event in order to remind the receiver of supportive others. Companionship activities, however, are engaged by community members with or without stresses for the intrinsic need to enjoy life and for social belongingness.

“neither intended nor recognized” [Merton, 1968, p. 105], and thus should be differentiated from discussion threads that are initiated intentionally for support exchange. The same rationale holds for those who post companionship-activity-related responses in a thread initiated for support exchange: they do so through their participation in support exchange. As a result, the use of the first message of a thread as the target of analysis is reasonable.

Two of the authors of this study conducted the content analysis task independently for the 184 discussion threads. Cohen’s [1960] Kappa, which takes chance agreement into consideration, was adopted to measure inter-coder reliability, which was .86 for breast cancer message threads and .85 for prostate cancer threads. Both the Kappa values, according to Landis and Koch [1977], represent “almost perfect” (above .80) agreement between the coders. Disagreements about the classification of message threads were resolved through discussion.

### Coding Support Exchange

A preliminary analysis on a portion of the collected message threads was first conducted, resulting in the elimination of the “Tangible assistance” subcategory in SSBC. Instances of the subcategories of tangible assistance, including “loan” (to lend recipient something), “direct task” (to perform a task directly related to the stress), “indirect task” (to take over some of the recipient’s responsibilities), “active participation” (to join the recipient in action that reduces the stress), and “willingness” (express willingness to help [in person]) [Cutrona and Suhr, 1992], were not discovered in the pilot analysis and the subsequent full text analysis. This is reasonable because, in the virtual world, tangible assistance of direct aid or services are very rare, as users of virtual support communities are generally dispersed geographically and can rarely meet to provide tangible assistance [Pfeil, 2009]. As a result, each message in the threads for social support exchange was classified into one of the remaining four main categories of the SSBC, or the support request category.

The preliminary analysis also resulted in some changes to the subcategories of the original SSBC. Some of these changes were due to the characteristics of the online environment, and some new subcategories emerged from the analysis of downloaded message contents. For example, one subcategory of emotional support, “listening,” which represents listeners’ attentive comments as the support recipient speaks, was removed since it is unlikely to happen in asynchronous interactions. Another subcategory of emotional support, “physical affection,” meaning the offering of physical contact such as hugs and kisses, was eliminated for the same reason. In addition, we identified a type of information that provided personal experience (about a treatment, medication, or overall cancer experiences) in response to support request, without any suggestion of action to be taken, any personal opinion to guide decision making, or any attempt to teach the recipient. Therefore, we created a new subcategory of informational support and named it “personal experience.” These modified subcategories of SSBC were used to guide the coding of the support provision messages into one of the four main categories.

One of the authors first coded all the downloaded messages of the discussion threads initiated for support exchange. In addition to the four categories of the modified SSBC, the “support request” category is also included in the task of classifying messages for support exchange. Another co-author was trained and categorized 10 percent of the support exchange messages independently. Cohen’s Kappa was calculated to measure inter-coder reliability, resulting in the value of .90. Disagreements were resolved through discussion, and messages in discussion threads that were not support- or companionship activity-related were discarded.

### Coding Companionship Activities

For message threads that were initiated for companionship activities, content analysis was adopted inductively to help the development of categories of topics in which members of virtual support communities were involved. During the coding process, constant comparison strategy [Glaser and Strauss, 1967; Strauss and Corbin, 1998] was used to constantly compare new data with existing developed categories, compare data in different categories, and revise existing categories if necessary in order to achieve category saturation and exhaustion.

As mentioned above, since our purpose was to identify non-support-related message threads and determine the topics over which participants of the thread engaged in conversation, the message that initiated a thread and the responses that followed in the thread were treated as the same category of companionship activity. In other words, for each thread that was identified to be about companionship activity, its first message was classified into a topic category, and the remaining message responses in that thread were considered as belonging to the same category. One of the authors first analyzed the messages for companionship activities and came up with topic categories for companionship activities inductively and implemented a coding scheme for them. Another co-author was trained to use this coding scheme and reviewed and categorized 10 percent of the companionship activity messages independently. The measurement of inter-coder reliability, based on Cohen’s Kappa, was .84.

## Social Networks in Virtual Support Communities

As mentioned earlier, SNA allows for the measurement and the identification of the characteristics that are embedded within social relations. In order to test the hypotheses in this study, social networks for the community members' participation in support exchange and companionship activities were created and measured using social network analysis techniques. Specifically, two matrices were generated, one for community members' engagement in support exchange and one for companionship activities. In a social network matrix  $X$ , a non-zero value in an entry  $X_{ij}$  represents a tie and its corresponding strength between network actors  $X_i$  and  $X_j$ , and a zero in the entry indicates that  $X_i$  and  $X_j$  are not related. The two social networks for each member represent two kinds of social relationships among community members—social support exchange and companionship activities—which reflect our argument that multiplex relationships are able to form in virtual support communities. Social network matrices were created and analyzed in this study with the help of the UCINET VI software package [Borgatti, Everett, and Freeman, 2002].

An important decision when creating social network matrices to represent online social relationships is the determination of what represents a tie between social actors. In the context of our study, we needed to determine how members of virtual support communities were linked. Some common practices of constructing dyadic links between participants of threaded discussions include linking a poster of a message in a thread to the one who initiated the thread (e.g., Wasko and Faraj, 2005), linking a poster of a message in a thread to the poster of the predecessor message (e.g., Aviv, Erlich, Ravid, and Geva, 2003), or linking a poster of a message in a thread to all the others who posted in the same message thread (e.g., Ngamkajornwivat, Zhang, Koru, Zhou, and Nolker, 2008). This decision, as stressed by Howison, Wiggins and Crowston [2011], will affect the validity of a study and should be theoretically supported.

In our study, a tie is formed between community members if they participate in the same discussion threads. In other words, in a social network matrix, each cell entry is calculated based on the number of discussion threads that the two corresponding community members both participate in and the number of messages each of the corresponding members post in these threads. The rationale behind our decision is that, in a discussion thread, merely creating a tie between each poster and the thread initiator or between a poster and the immediately previous poster in the thread (the "write" relationship) fails to address the idea that posters of a thread are also likely to read other postings in the same thread, forming a (read) relationship [Rafaeli, Ravid, and Soroka, 2004]. Both the "read" and "write" activities equally allow one to know other message posters, their personal experiences, expertise, and needs, which result in higher opportunities for these people to engage in both supportive interactions and companionship activities.<sup>3</sup> By taking this perspective, we treat a member's participation in a discussion thread as an active participation in a social activity—support exchange or companionship activities—with those who also participate in the same thread. Thus, posters of a thread are related due to their co-affiliation in the same thread instead of a message-response relationship. Such a "participation" perspective is more appropriate to the context of our study.

To create social network matrices based on this approach, each cell in a matrix is the summation of the number of messages, posted by corresponding members, which happen in the same threads, regardless if they are the initial posting or following responses. For example, suppose members  $i$  and  $j$  co-participate in two message threads. In the first thread, member  $i$  posted one message and member  $j$  posted two, and in the second thread both of them posted two messages. The resulting value in the matrix cell  $X_{ij}$  (i.e., the strength of their relationship) is 7. Social networks formed in this way result in un-directional (i.e., it doesn't matter whether a social tie is linking member  $i$  to member  $j$  or vice versa), valued (i.e., the strength of the social tie between a pair of members depends on the degree to which they co-participate in message threads), and symmetric (i.e., the strength of the social tie linking member  $i$  to member  $j$  equals the strength of the social tie linking  $j$  to  $i$ ) relationships that are codified as social network matrices. Such social networks have the following characteristics: (a) the more messages one posts in a thread, the more the poster and others of the same thread are related to each other; (b) the more threads a member participates in, the more community members are related to him/her; (c) the more responses that a message thread generates, the more members will be related to each other through their participation in this thread.

To test the correlation between support exchange and companionship activity networks (H1), the quadratic assignment procedure (QAP), which calculates the Pearson's correlation coefficient between two social network matrices [Krackhardt, 1987, 1988], was conducted using UCINET VI. QAP first calculates the correlation coefficient and then randomly permutes the rows and columns of one matrix, followed by recalculation of the correlation coefficient. This procedure is repeated thousands of times to estimate the standard error in the network data,

<sup>3</sup> Admittedly, those who do not post in a thread may also read messages in the thread and get to know those message posters. Since this "lurking" information is unable to be captured and traced in the target support community, we simplified the message reading phenomenon and restricted the formation of relationships to those who posted in the thread.

addressing the problem of non-independent observations that is inherent in dyadic data sets, which is problematic if using OLS regression.

## Gender Differences

To study gender differences in community members' participation in companionship activities (H2a), we used Pearson's Chi-square to test if members of the breast cancer and prostate cancer discussion boards differ significantly in their engagement in support exchange and companionship activities.

Mann-Whitney U-test was applied to test if members of the breast cancer discussion board have larger social networks formed through their participation in companionship activities than members of the prostate cancer discussion board do (H2b). A nonparametric test was used since existing studies suggested that differences in social network sizes were not normally distributed (e.g., Durant et al., 2012; Llewellyn and McConnell, 2002). The network size of a given community member was measured by counting the number of community members connected to him/her—the "degree centrality" of the member [Freeman, 1979]—in the corresponding companionship activity network, regardless of its values (strength of ties). To test the difference in network size, UCINET VI was first used to measure the degree centrality of each community member. This resulted in two lists of degree centrality values for community members; one was calculated from the companionship activity network of the breast cancer discussion board, and the other was calculated from that of the prostate cancer board. Mann-Whitney U-test can then be used to test the significance of the difference between the two lists of degree centralities.

To study gender differences in the correlation coefficient between community members' support network and companionship network in the two discussion boards (H3), Fisher's z-transformation [Fisher, 1915] was applied to the two identified correlation coefficients to transform the Pearson's r values into a z-statistic in order to test their difference. The standard error of the difference between the two transformed z values is:  $\sqrt{1/(N_b - 3) + 1/(N_p - 3)}$ , in which  $N_b$  is the number of community members in the sample from the breast cancer discussion board, and  $N_p$  is the number of community members in the sample from the prostate cancer discussion board. Based on these measures, we were able to test our hypothesis. Table 2 summarizes the research questions, hypotheses, and the corresponding methods used to test them in this study.

**Table 2: Summary of the Research Questions and Hypotheses in This Study**

Research questions/hypotheses	Descriptions	Methods
Research question 1	The extent to which message threads are initiated for either activities	Content Analysis
Research question 2	The types and frequencies of either activities	Content Analysis
Hypothesis 1	Positive correlation between social networks formed based on either activities	Quadratic Assignment Procedure (QAP) of Social Network Analysis
Hypothesis 2a	Breast cancer board members are more likely to engage in companionship activities.	Pearson's Chi-square
Hypothesis 2b	Breast cancer board members have larger companionship activity social networks.	Mann-Whitney U-test
Hypothesis 3	Higher correlation between the social networks formed based on either activities in the target breast cancer board	Fisher's z-transformation

## IV. RESULTS

### Support Exchange vs. Companionship Activity

To answer the first research question about the extent to which members of virtual support communities engage, not only in support exchange but also in companionship activities, and if so, the type and extent to which they participate in these activities, we analyzed the downloaded discussion threads. As per our assumption that most activities take place in virtual support communities are either for support exchange or for companionship activities, we considered only those two types of discussion threads. Our findings show that, based on the collected 184 message threads, all non-support exchange message threads were initiated for companionship purposes. Of the messages contained within these threads, however, some were not related to support exchange or companionship activities and thus were discarded. For example, one poster was complaining about another member's non-response and wrote:

*Chihiro: I have written one response to you, so far no answer. Please at least respond, tabxxx@abcd.com.*

Someone also posted a message regarding technical issues:

Today I was not able to edit my post. I also couldn't get into chat. I don't know what is wrong....

There are still others who posted duplicate messages, and thus these messages were removed.

The data analyzed contains 100 threads (1,274 messages, excluding discarded, non-support- or companionship-related messages) from the breast cancer discussion board and eighty-four threads (735 messages, excluding discarded ones) from the prostate cancer discussion board. The findings shown in Tables 3–5 juxtapose results from the breast cancer discussion board with those from prostate cancer board in order to contrast the social activities in which members of the two discussion boards participated.

Table 3 summarizes the frequency of message threads initiated for support exchange and companionship activities. As can be seen, 40 percent of the discussion threads from the breast cancer discussion board and a quarter of the threads from the prostate cancer discussion board are initiated not for the purpose of support exchange, but for companionship activities. These percentages persist when considering the total number of messages as well. Although the number of messages per thread are consistently higher for the breast cancer board, it is interesting that the average thread length is slightly greater for support exchange in the breast cancer board, whereas the average thread length is higher for companionship activities in the prostate cancer board. Overall, these findings confirm our claim that since the Internet allows for the formation of multiplex social relationships, members of virtual support communities do not merely interact for the purpose of support exchange, companionship activities is also a reason for them to interact with each other.

**Table 3: Number of Threads and Messages Posted for the Purpose of Support Exchange and Companionship Activities in the Target Breast Cancer and Prostate Cancer Message Boards**

	Type of activity	Number of threads	Number of messages	Average # of messages per thread
Breast cancer discussion board	Support exchange	60 (60.0%)	795 (61.92%)	13.25
	Companionship activity	40 (40.0%)	479 (38.08%)	11.98
Total		100 (100%)	1,274 (100%)	
Prostate cancer discussion board	Support exchange	63 (75.0%)	544 (74.01%)	8.63
	Companionship activity	21 (25.0%)	191 (25.99%)	9.10
Total		84 (100%)	735 (100%)	

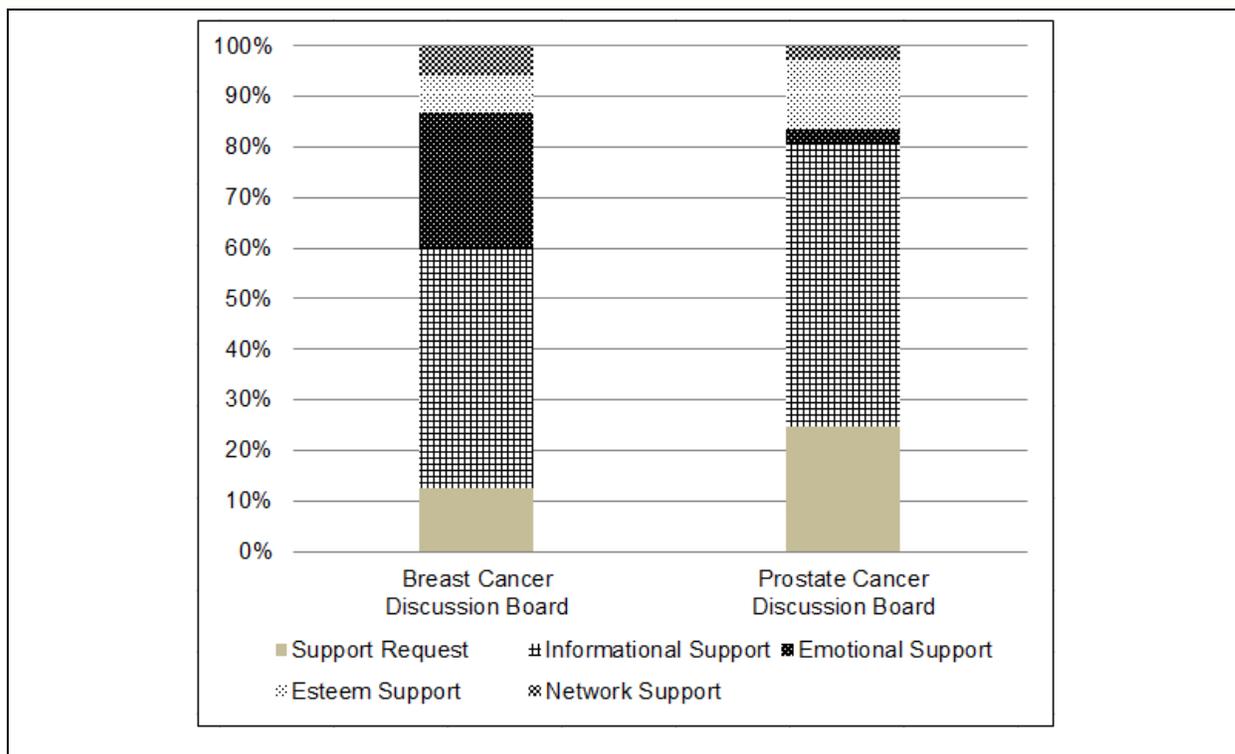
#### Online Support Exchange Behavior

As to the social support exchange behavior that takes place in the target support communities (RQ2), Table 4 and Figure 1 report the frequencies of the types of support messages, according to the modified SSBC, and the support requests that are exchanged by community members. As the table and figure show, five categories of support exchange behavior have been identified from both breast cancer and prostate cancer discussion boards. Descriptions of these categories of support behavior and examples of message excerpts from these categories are presented below.

**Table 4: Frequencies of the Types of Support Exchange Behavior that Take Place in the Target Breast Cancer and Prostate Cancer Message Boards**

	Support type	Frequency of support	% of total
Breast cancer discussion board	Support request	99	12.45%
	Informational support	379	47.67%
	Emotional support	213	26.79%
	Esteem support	57	7.17%
	Network support	47	5.91%
Total		795	100%
Prostate cancer discussion board	Support request	135	24.81%
	Informational support	304	55.88%
	Emotional support	15	2.76%
	Esteem support	75	13.79%
	Network support	15	2.76%
Total		544	100%





**Figure 1. Proportions of the Types of Support Exchange Behavior That Take Place in the Target Breast Cancer and Prostate Cancer Message Boards**

*Support request:* Messages of this category normally initiate a message thread by requesting information or expressing his/her distress with the expectation of emotional support. Sometimes, a thread initiator may further add to or clarify his/her questions within threads that were started by him/her. Message posters who are not the initiator of the thread can also respond by asking questions based on the thread initiator's request or other members' comments. As an example of a message belonging to this category, one poster asked:

*... I am just a mean old lady these days and I am so confused. Has anyone experienced anything like this and what did u do? Help an old lady.*

*Informational support:* Informational support is provided to help recipients make decisions or acquire knowledge about a disease, medication, treatment, etc. This type of support is provided in order to reduce the uncertainty regarding the situation s/he is facing, or to guide the recipient's decision making or action. For example, in response to a message asking for advice on seeing a dentist during chemo, one member replied:

*If you are in pain by all means talk to your oncologist about seeing your dentist....*

In the following example, a support provider responded to a poster's question about differences between two medications by describing his/her personal experience as follows:

*I was first put on Femara. However, I had to switch to Tamoxifen as I could not tolerate the side effects of the Femara....*

*Emotional support:* The provision of emotional support is not to help solve a stressful event but to express care for and to console the recipients. For example, one member expressed her concern for another member who had not posted to the message board for a while and said:

*Our dear MOLA, Shout out ... How are you doing, dear, sweet Sister?*

One can also empathize with the support recipient and stress one's understanding of the recipient's current situation or feeling, perhaps by describing an experience from one's own life or from others to convey one's understanding. For example, to show empathy to a poster who was newly diagnosed with breast cancer, one member said:

*Gosh, that's a lot to put on your shoulders, especially when you need direction and advice.*

Support providers sometimes post messages to encourage and give hope to the support recipients facing stressful events. In one message, the poster encouraged a recipient who was complaining about the side effects of chemo s/he was experiencing by saying:

*Before I saw the doctors I thought I would always feel so much pain, that things would never get any better. Now I'm working towards healing, and hopeful towards the future.*

**Esteem Support:** This type of support concerns one's positive regard toward the recipient to help increase the recipient's self-image. It is often intended to convey a positive assessment of the recipient with regard to his/her abilities. For example:

*You are such an inspiration to all of the pink sisters.*

Esteem support can also be provided to express appreciation, acknowledgement toward the recipient, or to provide positive feedback and agreement with the recipient's idea or action. In one message, the support provider agreed with a recipient on her comments and said:

*You've made the right choice! Just as this journey is different for each of us, so are the decisions we have to make....*

Esteem support also is provided to help alleviate the recipient's feelings of guilt. For example, in responding to a poster who complained about her bad relationship with her boyfriend after cancer treatment, a message said:

*I just want you to know that don't think it's you ... it's something in him ... please don't take it personally....*

**Network Support:** Network support is provided with the intention to inculcate, within the recipient, a sense of belonging with members of the virtual support community. For example, one poster led the recipient to another community member while responding to a message asking for suggestions on whether to have chemo or not:

*I hope Gina chimes in. She recently was faced with the same decision of whether or not to have chemo and she ended up taking it. I'm sure she could relate and offer some advice.*

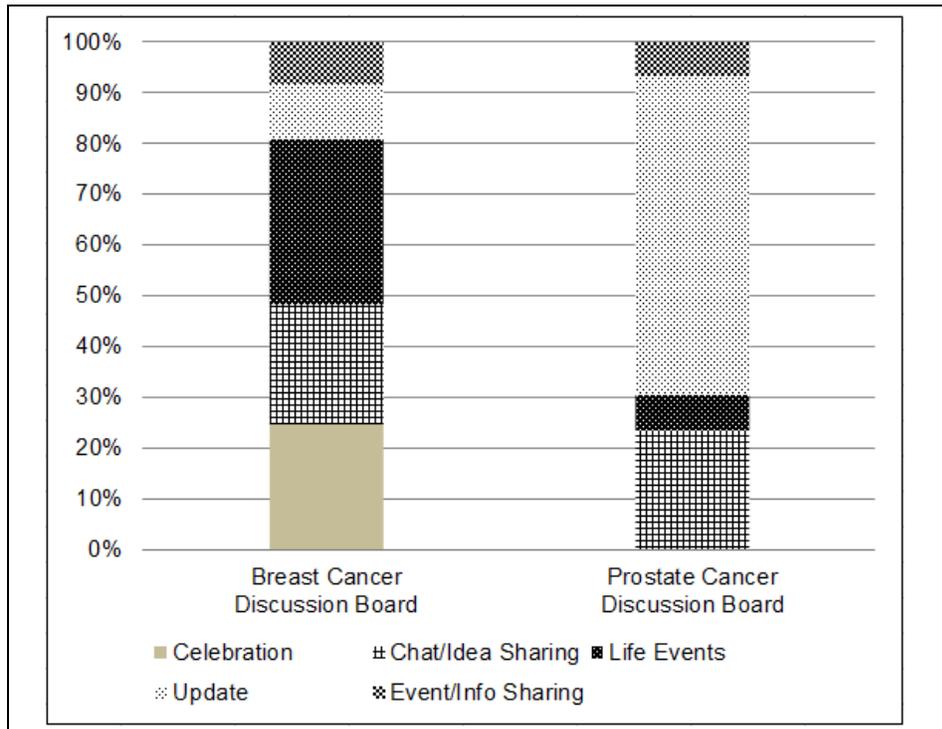
As another example, one poster reminded recipients about others who had gone through similar experiences and were willing to provide support in the community:

*We have to be glad for the prayer warriors out there ... they never stop praying for any of us. You and I and many like us have to remember that. Someone is praying now.*

### Online Companionship Activities

Table 5 and Figure 2 illustrate different types of companionship activities in which members of the breast cancer and prostate cancer discussion boards participate. Five categories of companionship activities were identified and created—celebration, chat/idea sharing, life events, update, and event/info sharing—representing types of topic these activities are about. Each category of the companionship activities is described below.

Table 5: Frequencies of the Types of Companionship Activities in Which Individuals Engage in the Target Breast Cancer and Prostate Cancer Message Boards				
	Type of companionship activity	Number of threads	Number of messages	Average # of messages per thread
Breast cancer discussion board	Celebration	11 (27.50%)	118 (24.63%)	10.73
	Chat/idea sharing	6 (15.00%)	114 (23.80%)	19.00
	Life events	11 (27.50%)	155 (32.36%)	14.09
	Update	4 (10.00%)	53 (11.06%)	13.25
	Event/info sharing	8 (20.00%)	39 (8.14%)	4.88
Total		40 (100%)	479 (100%)	11.98
Prostate cancer discussion board	Celebration	0 (0%)	0 (0%)	N/A
	Chat/idea sharing	2 (9.52%)	45 (23.56%)	22.5
	Life events	2 (9.52%)	13 (6.81%)	6.50
	Update	15 (71.43%)	120 (62.83%)	8.00
	Event/info sharing	2 (9.52%)	13 (6.81%)	6.50
Total		21 (100%)	191 (100%)	9.10



**Figure 2. Proportions of the Types of Companionship Activities in Which Individuals Engage in the Target Breast Cancer and Prostate Cancer Message Boards**

*Celebration:* This category of topic is initiated to celebrate other members' special days, such as birthday or anniversary, and to induce others of the same community to participate in the celebration. For example, on a member's birthday, one poster wrote:

*Today is gogers's Birthday! Hoping your day is filled with wonderful surprises and love all around you!*

*Chat/Idea Sharing:* Members of the breast cancer discussion board often initiate discussion topics for the purpose of chatting and exchanging ideas with others. For example:

*Mother's Day! What's the best piece of advice your Mother ever gave you? This will not only be fun to do, but will also pass along great words of wisdom from our Moms!!*

This type of topic can also be initiated when community members want to talk with others over some interests such as a TV show, movie, or music. For example, a member initiated a thread to discuss a TV show with others:

*Is Anyone Watching "Dancing With The Stars?" I really didn't think I was going to like it this time, but I have to admit that I love it now. I guess it just takes some time to get to know the celebrities on there before I pass judgment....*

*Life Events:* In some discussion threads, one writes down events s/he encountered in his/her daily life to share with others. This type of thread is initiated purely for the purpose of sharing a story and not to directly/indirectly seek support from others. For example, one member posted:

*Can you believe the comments of some people about this ordeal? I just finished chemo, and everyone loved my new curly hair. Then one of my neighbors said "Wow it almost makes you want to have chemo to get thick hair!" What a jerk. If only they knew.*

*Update:* Sometimes members of the discussion board want to initiate a thread to share the (generally positive) results of a recent test or treatment and his/her feelings with others without directly/indirectly requesting support. For example:

*Just a quick update. Had my 2 month post-op PSA, it was 0.03. As of right now no chemo or rads needed. Thank God! I am a true survivor!*

*Event/Info Sharing:* This type of companionship activity is to share non-cancer-problem-related information such as a website or an event. For instance, a thread is initiated to share information about an event that members of the discussion board can participate in to exchange small gifts with others:

*Junk Swap is coming. The "rules" are—How much or how little you want to send is up to you. While it is a "Junk Swap"—it is not a "garbage swap" but nothing is too small or silly to send....*

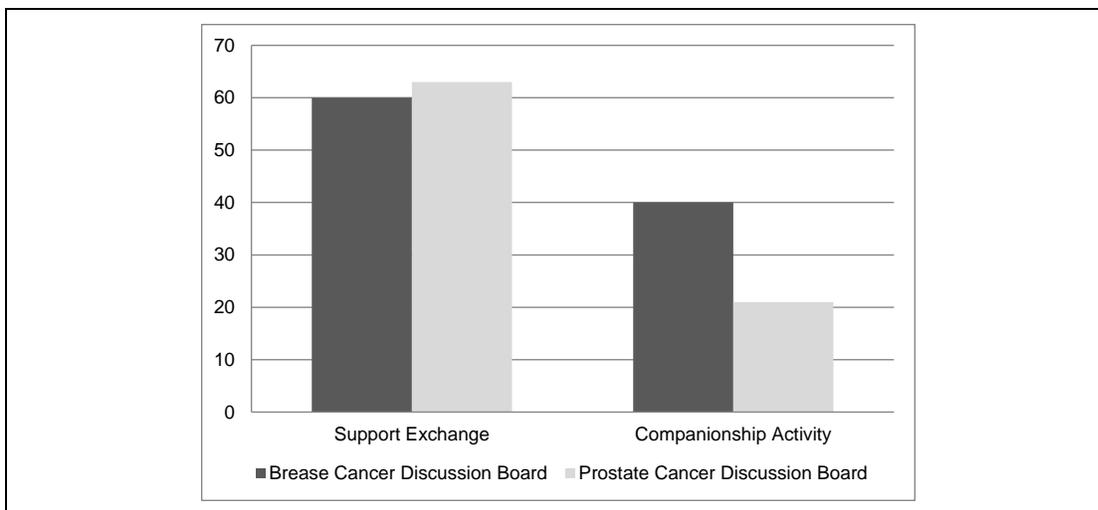
### Correlation Between Support Network and Companionship Network

Hypothesis 1 predicted that in the target cancer support communities, the social network formed through community members' participation in companionship activities is positively correlated to the support exchange network. We apply QAP analysis to test the correlation between the two social networks. The results show that the two networks generated from the breast cancer discussion board are positively correlated to one another ( $N = 185, r = .247, p < .001$ ), as are the two networks generated from the prostate cancer discussion board ( $N = 132, r = .255, p < .001$ ). Thus, Hypothesis 1 is supported.

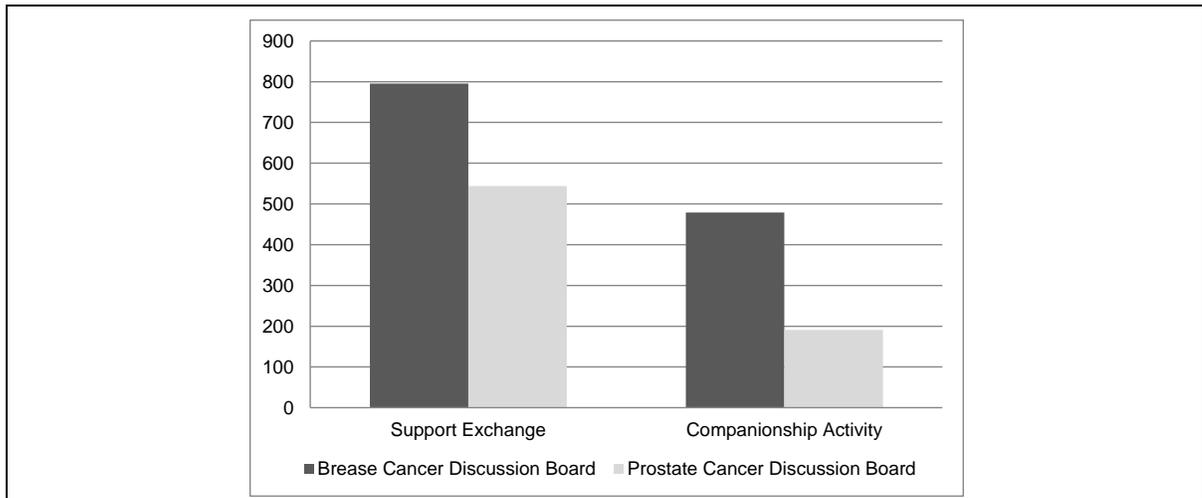
### Gender Differences

Pearson's Chi-square test was performed to test Hypothesis 2a that there exists a gender difference in the participation in social support exchange and companionship activities between breast cancer and prostate cancer discussion board members. The identified frequencies of these activities from the two support communities are listed in Table 3. Figure 3 illustrates the frequencies of discussion threads initiated for either type of activities, and Figure 4 shows the number of messages belonging to each activity category. The test results show that gender differences also exist in the participation in the two types of social activities. Specifically, members of breast cancer and prostate cancer discussion boards differ in their initiation of discussion threads for support exchange and companionship activities ( $\chi^2(1, N = 184) = 4.63, p < .05$ ). Members of the target breast cancer discussion board are more likely to initiate a thread for companionship purpose (40 percent) than members of the target prostate discussion board (25 percent). Moreover, members of the target breast cancer discussion board are more likely to engage in companionship activities, through message postings (38.08 percent), than members of the target prostate cancer discussion board (25.99 percent) ( $\chi^2(1, N = 2,009) = 28.27, p < .001$ ), supporting Hypothesis 2a.

Hypothesis 2b predicted that members of the breast cancer discussion board have larger social networks formed through their participation in companionship activities. Mann-Whitney U-test was used to test if community members' degree centrality values generated from the companionship activity network for the breast cancer discussion board were significantly greater than those values formed through the companionship activity network for the prostate cancer discussion board. The test result showed that the hypothesis was supported, that women with breast cancer tend to have larger social networks through companionship activities than men with prostate cancer ( $z = -5.425, p < .001$ ).



**Figure 3. Contrasting the Number of Discussion Threads That Are Initiated for Support Exchange and Companionship Activities in the Two Discussion Boards**



**Figure 4. Contrasting the Number of Messages That Are Posted for Support Exchange and Companionship Activities in the Two Discussion Boards**

Finally, to test for gender difference in the correlations between the support and companionship networks generated from the breast cancer discussion board, and between those networks generated from the prostate cancer discussion board, we applied Fisher's z-transformation and tested the significance of the difference between the two transformed z values. The difference between the two correlations coefficients was not significant ( $p = 0.941$ ), and thereby no gender difference was discovered between the association of support networks and companionship networks. As a result, Hypothesis 3 is not supported. Table 6 summarizes the findings in this study.

Table 6: Summary of the Findings in This Study		
Research questions/hypotheses	Descriptions	Findings
Research question 1	The extent to which message threads are initiated for either activities	Table 3
Research question 2	The types and frequencies of either activities	Tables 4–5 and Figures 1–2
Hypothesis 1	Positive correlation between social networks formed based on either activities	Supported
Hypothesis 2a	Breast cancer board members are more likely to engage in companionship activities	Supported
Hypothesis 2b	Breast cancer board members have larger companionship activity social networks	Supported
Hypothesis 3	Higher correlation between the social networks formed based on either activities in the target breast cancer board	Not supported

## V. DISCUSSION

In order to acquire a deeper understanding of the socio-behavioral dynamics of virtual support communities and the impact of the participation in these communities on individual well-being, focusing on the types of social support exchanged is not enough. A comprehensive view of the social relationships formed in these communities should also include companionship activities in which these community members engage. To the best of our knowledge, this study is one of the first attempts to systematically investigate and compare online companionship activities to the support behavior of members of virtual support communities. In this study we investigated both kinds of social activities that members of a breast cancer discussion board and a prostate cancer discussion board participated in and contrasted gender differences in their online social activities. The results of our study are discussed below.

### Support Exchange vs. Companionship Activity

We first analyzed 184 message threads, containing a total of 2,009 messages downloaded from a breast cancer discussion board and a prostate cancer discussion board. The results of our content analysis show that more than a third of message threads (40 percent, containing 479 messages) from the breast cancer discussion board and a quarter of the threads (25 percent, containing 191 messages) from the prostate cancer discussion board are initiated not for support exchange but for various companionship activities (see Table 3). This suggests that individuals join online support communities not just to exchange social support, but also for a sense of belonging and to engage in

companionship activities. Both these activities have been found to be beneficial to individual health (e.g, Rook, 1987, 1990). This finding supports our claim that social relationships that are formed over virtual support communities tend to be multiplex, which is also analytically generalizable to previous findings of online social behavior [Ridings and Gefen, 2004; Wellman and Gulia, 1999].

Rook [1985, 1987] highlighted that social support studies should grant companionship activities a conceptual status as important as that typically granted to social support. The findings of this study support this claim and contribute to the literature of online social support. Researchers should not only focus on types of social support that are exchanged, but also consider the formation of friendship ties and their maintenance through participation in companionship activities, whether or not stressful events are present. Future studies can also focus on the interactions between the two activity types, such as how individual participation in the two types of activity jointly affect and foster each other, and the design of virtual support communities or healthcare interventions supporting one type of social activity in order to facilitate another.

Likewise, designers of virtual support communities should be aware of the high proportion of companionship activities that may take place and design features such as instant messaging and chat rooms that lead to high social presence [Ma and Agarwal, 2007; Shen and Khalifa, 2009] and foster community members' engagement in companionship activities. Such engagement in socialization has been found to facilitate the formation of friendship ties and strong bonds [Preece and Maloney-Krichmar, 2003; Ren et al., 2007], and are further conducive to online contributions to help others [Ma and Agarwal, 2007], sustaining the longevity of the community [Kollock and Smith, 1996; Preece, 2001].

#### Online Support Exchange Behavior

Of all the 795 messages for support exchange in the breast cancer discussion board, informational support and emotional support are the two most prominent support behaviors, followed by support request, esteem support, and network support (see Table 4). This ranking changed in the prostate cancer support community, as their members engaged in support exchange mostly to provide informational support and make support requests. Emotional support in this discussion board was the least provided support type. Still, all the four types of support provision are identified in the two target discussion boards, which supports existing findings from studies of support provision in virtual support communities (e.g., Braithwaite et al., 1999). Our results also support the claim that tangible support of SSBC is less likely to happen in online settings [Pfeil, 2009].

In the prostate cancer discussion board, the number of messages for requesting support (in the "Support Request" category from Table 4,  $N = 135$ ) far exceeds the number of threads initiated for support exchange ( $N = 63$ , from Table 3). In addition, the distribution of support request and provision in the prostate cancer discussion board is significantly different from that of the breast cancer discussion board ( $\chi^2(1, N = 1,339$  messages for support exchange) = 34.23,  $p < .001$ ). That is, members of the prostate cancer discussion board have higher tendency than members of the breast cancer discussion board to post support requests. This suggests that, in the prostate cancer discussion board, those who initiate a thread for requesting support are more likely to follow up to clarify or further their questions, and other members are also likely to ask for support based on the message initiators' questions. Given the finding that members of the prostate cancer discussion board are more likely to provide informational support ( $\chi^2(1, N = 1,105$  messages for support provision) = 43.10,  $p < .001$ , 74.33 percent of the messages for support provision are informational support), the finding here may be due to the fact that community members tend to engage in discussion on cancer-related information exchange. This possible explanation is also supported by the fact that men's conversations are more "report"-oriented [Tannen, 1990], discussing facts, and that men are more likely to seek informational support than emotional support [Ashton and Fuehrer, 1993]. Future studies can focus on subcategorizing the approaches community members adopt to solicit social support through, for example, Winzelberg's [1997] coding framework, and exploring the relationship between different categories of support request and categories of support provision.

#### Online Companionship Activities

In this study five types of companionship activities are identified. As shown in Table 5, the most frequently initiated discussion topic for companionship purpose in the breast cancer discussion board is "celebration" (27.5 percent,  $N = 11$ ). As indicated above, strong bonds are expected to be formed among members of virtual support communities. Consequently, knowing some members' special days, such as birthdays or anniversaries, and initiating a thread for celebration is common. Online celebration seems to signify the existence of an intimate relationship between the thread initiator and the one who is being celebrated. This is also supported by existing studies saying that women tend to form close, dyadic relationships [Cross and Madson, 1997]. In addition, for those members who reveal their personal information, such as birth date, in virtual support communities, it may represent that they tend to show trust

toward the community and its members [Dwyer, Hiltz, and Passerini, 2007] and make “themselves appear to be more than just a stranger” [Ridings et al., 2002, p. 278].

“Life events” is another type of companionship activity that is often initiated (27.5 percent, N = 11), and generated the largest number of messages of all companionship activities identified in this discussion board (32.36 percent, N = 155). Through the participation in discussion threads about “life events,” personal daily experiences are disclosed and exchanged. This finding also suggests the formation of trust among members of the breast cancer discussion board through companionship activities. Cutler [1995, p. 17] states that “the more one discloses personal information, the more others will reciprocate, and the more individuals know about each other, the more likely they are to establish trust, seek support, and thus find satisfaction.” Future research can investigate differences in the effects of self-disclosure through companionship activities and through support exchange on the formation of trust and individual health in virtual support communities.

Another type of companionship activity, “share,” has a moderate number of discussion threads initiated in the breast cancer discussion board (20 percent, N = 8). However, on average each thread of this type has the least number of messages involved (4.88 messages per thread). This finding also holds in the prostate cancer discussion board (N = 2, 6.5 messages per thread). It seems that members of virtual support communities show less interest in non-cancer related information or events. It could also be that this type of thread would instigate other members to send private messages or emails to the original poster for more information. Although a deeper understanding of companionship activities in virtual communities requires more thorough investigation, the findings here do lead us to conclude that close-knit relationships exist among members of the breast cancer discussion board.

As to the companionship activities that members of the prostate cancer discussion board participate in, the most frequently initiated type of thread is “update” (71.43 percent, N = 15), which signifies a different behavioral pattern. Unlike the breast cancer discussion board in which companionship activities are mainly initiated for “celebration,” “chat/idea sharing,” or “life events” purposes, members of the prostate cancer discussion board predominantly commence discussion threads by providing personal test or treatment results. In addition, many new members join the prostate cancer discussion board by introducing themselves with a history of their disease and treatments. It seems that men like to tell stories that others have experienced before, while women tend to focus on peer-to-peer relationships and personal feelings toward everyday experiences. This finding suggests that men are inclined to treat social relationships as means of social comparison and personal validation. Cross and Madson [1997] argued that men’s relationships with others may serve “as mirrors for the individual’s comparison of the self with others, as backdrops for the self-enhancing display of abilities or attributes, or as a means to demonstrate uniqueness” (p. 7). By revealing (esp. successful) stories about oneself, men are able to evaluate their health status by reading the responses by others. In contrast, women focus more on intimate dyadic relationships [Baumeister and Sommer, 1997; Cross and Madson, 1997] and thus may express deeper care toward other community members. In addition, there is a difference in the sharing of private information: men tend to disclose the “facts” about self (the “update” category)—the descriptive aspect of self-disclosure [Morton, 1978], and women tend to disclose the “feelings” about self (the “life-event” category)—the evaluative aspect of self-disclosure—during their participation in companionship activities. This also warrants further investigation.

### **Correlation Between Support Network and Companionship Network**

We also studied the correlations between the two social networks generated from individual participation in support exchange and companionship activities. In both the breast cancer and the prostate cancer discussion boards, the two social networks are significantly correlated. Our findings suggest that in virtual support communities, not only do members engage in both support exchange and companionship activities, but their participation in these two social activities affect each other. This finding, however, does not imply causality between the participation of support exchange and companionship activities, and possible explanations in either direction exist.

On the one hand, previous research suggests that community members with more friendship ties in the community are more likely to feel attached to and stay in the community [Granovetter, 1992; McPherson, Popielarz, and Drobnic, 1992; Paxton and Moody, 2003]. This feeling of emotional attachment and belonging to a virtual community, in turn, has been identified to motivate individuals to make contributions to help others in virtual communities [Bateman, Gray, and Butler, 2011]. Baumeister and Leary [1995] also suggest that “helping appears to be increased by the existence of social bonds ... when a relationship exists, people will help for relatively selfless, altruistic reasons” (p. 519). Therefore, Hays and Oxley [1986] call for research on the possible effects of companionship activity on support exchange so as to elucidate the health-promoting potential of social relations.

On the other hand, studies on self-disclosure do suggest that the revelation of personal sensitive information during, say, support exchange, leads to the formation of intimate relationships [Collins and Miller, 1994] In addition, social comparison theory [Festinger, 1954; Schachter, 1959] also posits that people under anxiety conditions are more

likely to affiliate with those who adjust better than themselves [Bennenbroek, Buunk, and van der Zee, 2002; Molleman, Pruyn, and van Knippenberg, 1986; Taylor and Lobel, 1989; Thoits, 1986]. The social nature of the Internet also facilitates the creation of strong bonds through interaction [Wellman and Gulia, 1999]. These all suggest that individual engagement in social support exchange, where sensitive information and emotional weakness are revealed and exchanged, and those “experts” who adjusted better during stressful situations are identified, promote the formation of close relationships and further engagement in companionship activities. Although our study does not attempt to examine such causal relationships in detail, it may be that joining either social activity generates positive feedback to the other.

## Gender Difference

### Social Support vs. Companionship Activities

In this study we tested for gender differences in individual participation in companionship activities. The results support our hypothesis that women with breast cancer have higher proportions of engagement in companionship activities in the target discussion board than men with prostate cancer. This suggests that members of the breast cancer discussion board tend to spend time and effort in participating in companionship activities for developing and maintaining close relationships, the so-called “rapport” talk [Tannen, 1990]. This also confirms existing studies claiming that women are socially oriented toward dyadic close relationships [Baumeister and Sommer, 1997; Gabriel and Gardner, 1999]. Cross and Madson [1997] also argue that women’s social behavior is more motivated by the goal of maintaining intimate relationships than men. Such gender differences in socio-behavioral and socio-linguistic aspects have been found in online environments (e.g., Gefen and Ridings, 2005) and is also suggested by the results of our study. Future studies can focus on gender differences in virtual support communities in more detail, taking into account linguistic patterns [Tannen, 1990], affect, motivation, and cognition [Cross and Madson, 1997], and the resulting formation of friendship ties.

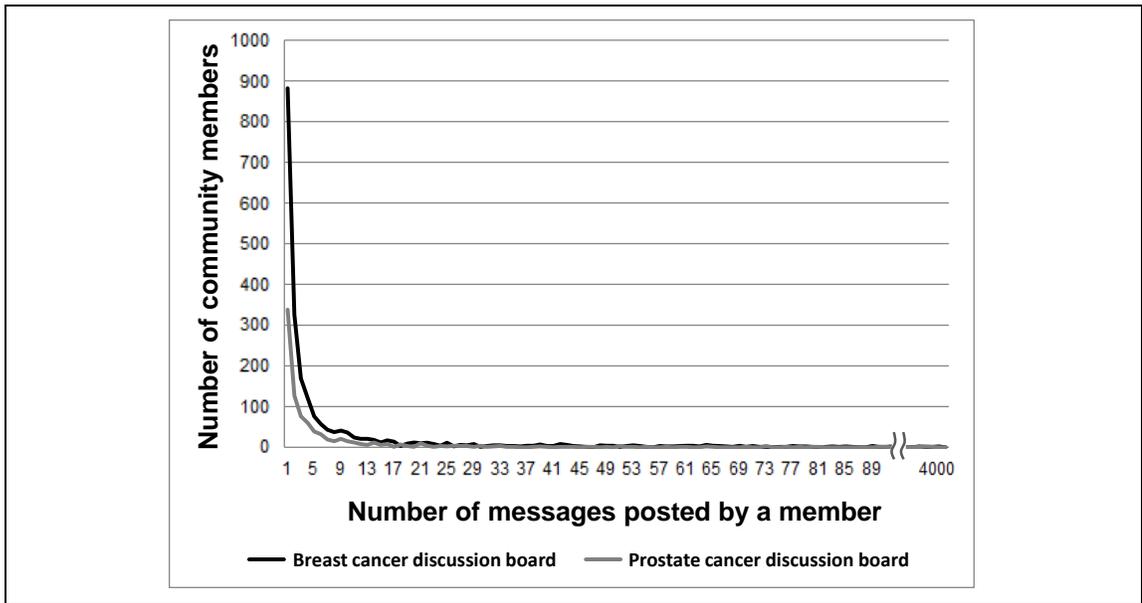
### Support Network vs. Companionship Network

Although it has been found that members of the breast cancer discussion board are more likely than members of the prostate cancer discussion board to engage in companionship activities, the correlation between support network and companionship network in the two discussion boards show no significant difference. One possible explanation is that, in both breast cancer and prostate cancer discussion boards, there exists a relatively small proportion of members who are “cores” in their respective boards and who show a high degree of engagement in both social activities. Other “periphery” members participate only sporadically in either social activity. If that is the reason, it can also explain why, in both discussion boards, the correlation between support network and companionship network is weak to moderate (.25 in the breast cancer discussion board, and .26 in the prostate cancer discussion board).

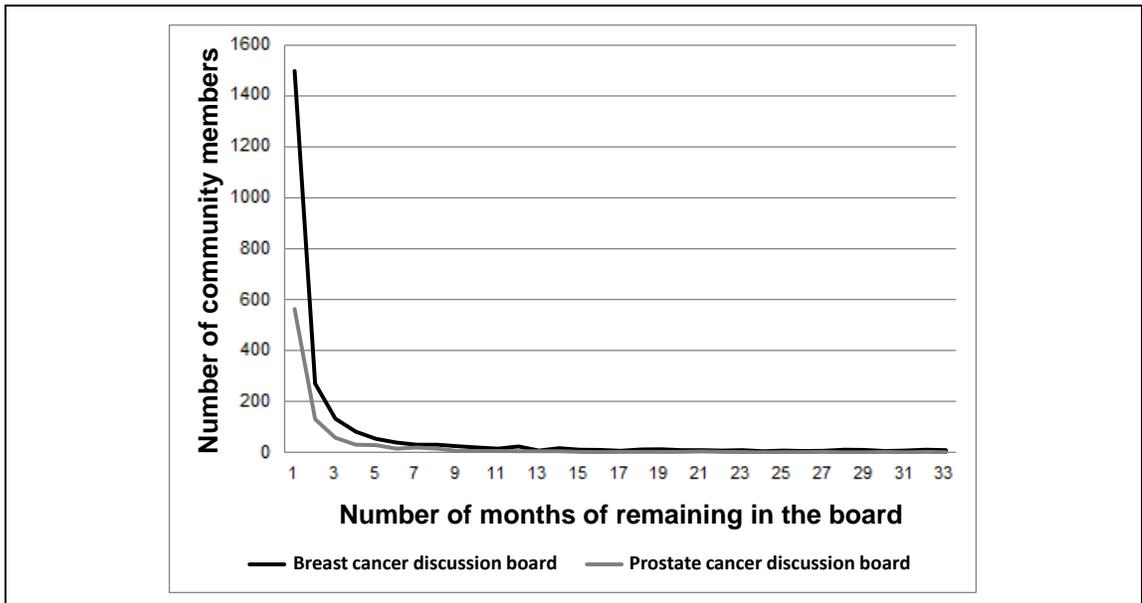
To examine this possible explanation, we first downloaded messages posted within the past three years (2010–2012) from the target breast cancer and prostate cancer discussion boards. We wanted to see if, in the discussion boards, the number of messages posted by a community member and the length of a member’s membership (i.e., the number of months that a member contributes to the boards) exhibit power-law like distributions. If so, we may say that the two discussion boards are contributed to by relatively few core members.

Figures 5 and 6 show the resulting distributions of message-posting per member and tenure (in months) of each member in the two discussion boards. In both breast cancer and prostate cancer discussion boards, the number of community members (y-axis) drops exponentially as the number of messages and the number of months (x-axis) increases. This suggests that most community members post few (under a dozen typically) messages, and most of them remain in the discussion boards for just a few months, usually less than six months.

We also conducted another test using social network analysis techniques, based on two measurements: group degree centralization and core/periphery fitness. Group degree centralization measures the extent to which actors in a social network all connect to a single actor and not to others [Freeman, 1979]. The value of group degree centralization ranges from 0 (a completely decentralized network) to 1 (a completely centralized network). Core/Periphery fitness measures the extent to which a given social network is structurally organized by a set of core members who are mutually linked and a set of periphery actors who connect only to those core members but not to each other [Borgatti and Everett, 1999]. The core/periphery fitness value ranges from 0 to 1, signifying the degree to which the network approximates a complete core/periphery structure. These two measures are applied to the two above-generated social support networks through UCINET VI. The results of the two measures are listed in Table 7. As Table 7 shows, both the support networks exhibit moderate to high degree of group degree centralization and core/periphery fitness. Based on the two sets of measurements presented here, our earlier conjecture about the cause of the non-significance in the difference between the two network correlations seems plausible. Future studies should delve into this issue and other possible explanations in more detail.



**Figure 5. Distributions of the Number of Posted Messages per Member in the Two Discussion Boards**



**Figure 6. Distributions of the Number of Months Remaining in the Board for Each Member in the Two Discussion Boards**

<b>Table 7: Resulting Measures of Group Degree Centralization and Core/Periphery Fitness Based on Support Networks in the Target Discussion Boards</b>		
	Breast cancer discussion board	Prostate cancer discussion board
Group degree centralization	.525	.587
Core/periphery fitness	.715	.528

**Limitations**

While this study opens new avenues for future research on virtual support communities, there are some limitations. First, the target virtual support communities of this study are U.S.-based. Whether the findings of this study would hold in virtual support communities located in different countries is yet to be examined. Such investigation may allow for the test of community differences in national contexts. For example, will factors such as the national differences

in cultural dimensions proposed by Hofstede [1980, 1991, 2001]<sup>4</sup> affect the findings? Will virtual support communities located in countries low in the “masculinity” or the “individualism” dimensions generate higher proportions of messages for emotional support and/or companionship activities? Will virtual support communities hosted in countries that were scored high in the “uncertainty avoidance” dimension be mostly populated by information-seeking messages, regardless of gender?

Next, in this study we recognized and inductively created sub-types of companionship activities participated in by community members (Table 5). The extent to which these sub-types of companionship activities are applicable to other virtual support communities is unknown and needs to be further tested. Will members of virtual support communities for different stressors, for different age groups, with mixed gender participants [Gefen and Ridings, 2005], and of various community types [Nambisan and Nambisan, 2009] also show similar socio-behavioral patterns in their engagement in companionship activities as those that are identified here? Studies targeting these diverse social contexts are worth pursuing in order to validate the findings regarding companionship activities presented here.

This study intentionally separated message threads into threads for support exchange or for companionship activities. Although the rationale of doing so was provided, such exclusive classification may underestimate the “messy” real world situations in which conversations in a message thread may be initiated to serve both purposes. Furthermore, a message thread initiated for one type of social activity may subsequently be redirected to another one. While this study successfully captured and contrasted the two types of social activities manifested at the level of the message thread, more insights into the complexities of online relationships require future research to reflect the nature of human conversations and social activities.

In addition, the study of gender differences by comparing the social activities of members of the two cancer discussion boards, albeit reasonable as argued, may still oversimplify the real world situation. For example, the dominance of messages for providing informational support in the prostate cancer discussion board may not only be due to the gender issue, but could also result from the characteristics of prostate cancer. This reflects one of the weaknesses of case study research: the internal validity of any conclusion is limited since one has no control over explanatory variables [Cavaye, 1996; Yin, 1994]. Future studies may also consider comparing the social behaviors of males and females with the same type of cancer, such as colorectal cancer [Klemm et al., 1998].

Another potential limitation to this study is that, although we assume that all the members in the breast cancer support discussion board are women and all the members in the prostate cancer support discussion board are men, it may not be the case. One percent of breast cancer patients are male, and it has been found that many participants of prostate cancer virtual support communities are spouses of those with cancer [Blank and Adams-Blodnieks, 2007]. It is thus reasonable that, although the two discussion boards are dominated by single-gender participants, opposite-gender members exist. However, since both males and females tend to adjust their language style toward that of the opposite gender when they participate in virtual communities that are dominated by opposite-gender participants [Herring, 1996; Savicki et al., 1996], the lack of gender-determination should have a minimal effect on the findings of this study.

## VI. CONCLUSION

This study stresses that there are two types of social activities that need to be taken into consideration when conducting studies about virtual support communities—social support and companionship activities. Caplan [1974, p. 7] distinguishes between these two types of social interactions and claims that while social support helps with the “propping up of someone who is in danger of falling down,” companionship activities serve strength-augmentation functions. The need for such differentiation is even more pronounced today when the social nature of the Internet promotes opportunities for the formation of multiplex social relationships. Although companionship activities are common in virtual communities of interest, this is among the first studies that focused on companionship activities in virtual support communities. By using a mix of qualitative and quantitative methods, this research confirms the necessity of considering virtual support community members’ socialization for the purpose of enjoyment and the desire to be involved with others. Recognizing the functional differences between social support and companionship activities that are exchanged online, this study also identified the correlation between the two activities and gender differences in the participation in such online activities. In general, our findings suggest that increasing online avenues for, and encouraging companionship activities in, any virtual support community could increase participation in support exchange, leading to improved health outcomes. These findings also contribute to the larger

<sup>4</sup> Hofstede’s [1980; 1991; 2001] national cultural framework consists of five dimensions: uncertainty avoidance, power distance, masculinity, individualism, and long-term orientation.

question of how to design healthcare virtual communities that meet patients' needs and provide opportunities for healthcare interventions, with the goal of ultimately improving the health of individuals.

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

1. These links existed as of the date of publication but are not guaranteed to be working thereafter.
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