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Developing an Optimal Match Within Online Communities: An Exploration of CMC Support Communities and Traditional Support

By Jeanine Warisse Turner, Jean A. Grube, and Jennifer Meyers

This study investigates the complementary nature of face-to-face and computer-mediated social support and the development of a context through which hyperpersonal communication can develop within online communities. Optimal matching theory is used as a framework for explaining how hyperpersonal communication develops within online cancer support communities. We compared online participants' perceptions of illness support from the list with the support they received from a nonmediated relationship. Respondents participated more within the online community only when they perceived that the depth and support that they received from the online community was high, and when the depth and support they received from the specific person in their life was low.

> I opened my email to a whole new family today. There were so many letters.
> . . . Can you know how great it is to find someone who knows what I have
> been through . . . it is so good to know that there is someplace I can go where
> I can talk freely about my concerns and fears and KNOW that someone under-
> stands. (Anonymous, illness-related listserv, April 23, 1998)

Online medical information and support groups are changing the nature of relationships that patients have with the people around them. A 1998 survey found that 30.8 million people (or 46% of online users) sought information via the Internet about a medical or personal problem (Green & Himelstein, 1998). In fact, Lamberg (1997a) argued that health chat rooms and discussion groups are among the most widely visited sites in cyberspace. This relatively recent outlet for communication

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and support has created new opportunities to explore why people choose to seek virtual contexts. Thus, we may begin to understand the nature of the relationship that leads to the development of hyperpersonal communication within computer-mediated communication (CMC).

Walther (1996) introduced the construct of hyperpersonal communication to describe the strong, personal relationships and exchanges that take place within some CMC. Research has explored the existence of hyperpersonal communication and described how the characteristics of CMC give rise to this existence. Hyperpersonal communication theory of CMC offers a process-based explanation of how CMC relationships come to be more rewarding than parallel face-to-face relationships under certain circumstances. What is less well known is how the context may prompt or motivate such relational communication processes. The present research adds this contextual dimension to the framework by showing how certain contexts may provide opportunities for hyperpersonal relationships to develop. Specifically, the study explores users' involvement in CMC networks in contrast with some of their unmediated social contacts to better understand the opportunities offered and relationship resources available through CMC.

In this study, we investigate the development of hyperpersonal communication within the context of online communities devoted to cancer support. In doing so, we expand on Cutrona and Russell's (1990) theory of optimal matching, which suggests that certain forms of support may be most beneficial following specific types of stress. Through the study of these online communities we suggest that online communities can provide an opportunity for optimal matching to occur, thus creating a context for hyperpersonal communication. The context of this study examines online participants' perceptions of illness support from the list in conjunction with the illness support they received from a specific significant individual within their personal lives.

This study constitutes one of the few field studies of its kind that directly compares illness-related support from an online support group with support from a significant person within an individual's life (McCann, 1998; see also Mickelson, 1998).

Literature Review

Hyperpersonal Communication

Research following online communication has moved from defining asynchronous CMC as an impersonal, lean medium (see reviews in Garton & Wellman, 1995; Walther, 1994), to showing how CMC can support interpersonal interactions (Baym, 1995; Braithwaite, Waldron, & Finn, 1999; Rheingold, 1993; Walther, 1995). In reviewing and expanding on these research findings, Walther (1996) suggested that CMC environments could be impersonal, interpersonal, and hyperpersonal. Impersonal CMC characterizes exchanges that are primarily task-based with little social interaction. Interpersonal CMC describes socially oriented exchanges between users. Finally, Walther (1996) created the construct *hyperpersonal* to describe and extend understanding of the depth of interpersonal exchanges within

CMC. Hyperpersonal communication describes the type of CMC "that is more socially desirable than we tend to experience in parallel face-to-face interactions" (Walther, 1996, p. 17). Walther (1996) proposes four characteristics of the mediated environment that may contribute to hyperpersonal communication: (a) the idealized perception of the receiver, (b) the optimized self-presentation of the sender, (c) asynchronous channels supporting information management, and (d) a feedback loop allowing intensification magnified in minimal-cue interaction. In effect, Walther (1996) suggests that hyperpersonal communication may occur within CMC based on senders' and receivers' reciprocal and hyperbolic construction of each other and their relationship, within a minimal cues environment.

This exaggerated sense of the relationship is built on social identity-deindividuation (SIDE) theory. SIDE theory predicts that in the absence of face-to-face cues and prior personal knowledge, social context cues present in CMC take on particular value and may lead to overattribution of similarity (Walther, 1996). Walther (1996) argued that CMC is hyperpersonal when "users experience commonality and are self-aware, physically separated, and communicating via a limited-cues channel that allows them to selectively self-present and edit; to construct and reciprocate representations of their partners and relations without the interference of environmental reality" (p. 33). In addition, the asynchronous nature of CMC allows participants to plan their responses more mindfully than in spontaneous, real-time talk (Hiemstra, 1982).

Online support groups provide a ripe context for the development of hyperpersonal communication because participants who join and become involved in an online group already are assuming a common identity with other group members. An individual assumes the identity of having a particular problem or concern and assumes that other online members share a similar identity. Messages that are exchanged within the online group reinforce this similar identity. Therefore, this context, coupled with the anonymity and opportunity for planned responses provides a ripe environment for senders to initiate interactions with hyperpersonal potential.

Although these characteristics of CMC provide the opportunity for hyperpersonal communication to take place, all CMC is not hyperpersonal. One theory that provides a foundation for understanding the context through which these hyperpersonal communication relationships develop is optimal matching theory.

Optimal Matching Theory

Optimal matching theory argues that social support is a multidimensional construct and that certain types of social support may be most effective when matched with certain types of stressful incidents (Cutrona & Russell, 1990). Cutrona and Russell's theoretical model suggests that three characteristics of life events: desirability, controllability, and domain (whether the stressor is related to assets, relationships, achievement, or social roles) determine the types of support required for positive health outcomes to occur. Of these characteristics, the most influential determinant of social support needs was controllability. Uncontrollable events necessitate more emotional support whereas controllable events require more instrumental support.

Coping with medical illness, specifically an illness that is life threatening, can be categorized as a negative and uncontrollable event requiring emotion-focused coping to address the fear, anger, and depression that can result from a serious illness (Cutrona & Russell, 1990). Both Bloom (1982) and Dimond (1979) found that emotional support and esteem support were associated with fewer declines in social functioning and, in Dimond's (1979) study, fewer medical problems.

Optimal matching theory suggests that a person's development of a medical illness creates a strong need for social support. Furthermore, as an illness constitutes an uncontrollable event that may influence several domains of an individual's life (income, contact with others, sense of achievement, physical capacity), support from others that responds to each of these domains can help achieve optimal adjustment (Cutrona & Russell, 1990). Unfortunately, available support from others who understand the impact of the illness on these various life domains is not always available. Individuals may not be able to attend a support group targeted at their specific needs. However, with the advent of online support communities addressing specific concerns within individuals' lives, and the thousands of participants within these communities, the mathematical probability of a person finding someone with the same illness and treatment alternatives increases exponentially. For example, a patient can return home from being diagnosed, log in to an online community concerning the diagnosis, and ask about treatment alternatives or just express concern. Within minutes, that patient can receive specific responses to the posting. Similarly, the patient can learn about the diagnosis simply by reading the discussions taking place. The participants within online communities provide receptivity, interest, and disclosure, despite that they are strangers otherwise, because they can share a critical commonality. Therefore these large groups provide a strong probability that participants can find one or many other individuals who share similar specific symptoms, treatments, reactions, problems, and challenges.

This research compares the support offered by a specific significant relationship within an individual's life to the support offered by an online community. Such comparisons allow us to examine the extent to which the existence or characteristics of other outlets of support may influence the potential of a participant to develop a hyperpersonal relationship within an online community. This emphasis is particularly important since much of past social support research in traditional environments (or "non-online communities") focused on single relationship designs, which may neglect "the possible effects that other relationships might have on the nature of the relationship under investigation, as well as impacts that the relationship being studied might have on other relationships" (Sarason, Sarason, & Pierce, 1994, p. 249).

Communicating Support Online

Camosy (1996) defines a support network as "a group of people devoted to promotion of proper diagnosis, treatment, and prevention of a specific condition, primarily through patient education and support" (p. 278). Most patients are looking for encouragement from someone who has been through the same illness or has experienced similar treatment. Whereas patients used to be limited to face-to-

face groups to receive this support, the advent of the Internet and online listservs has created an online alternative.

Email and the Internet are renegotiating the boundaries of communication within medical-related discussion groups. Patients can share personal stories, medical information, and support with other patients experiencing similar concerns. Researchers have found that CMC discussion groups have provided new avenues of social support for patients (see, for example, Braithwaite, Waldron, & Finn, 1999; Brennan, Moore, & Smythe, 1992; Lamberg 1997b; Lieberman, 1992; Mickelson, 1998; and Scheerhorn, Warisse, & McNeilis, 1995).

Individuals join a social support online community because they are seeking information, empowerment, encouragement, emotional support, and empathy regarding their specific concern (Hamilton, 1998; Mickelson, 1998; Scheerhorn et al., 1995; Sharf, 1997). An individual does not have to travel physically to participate. Online communities can provide this support wherever the individual is located. Having other people share very similar concerns within the comfort and convenience of a patient's own home, office, and so forth, provides a strong incentive for online participation. In addition, some of the other characteristics of online communication (e.g., anonymity, self-presentation, and idealized "other") make CMC support groups within illness-related communities a welcome alternative to traditional support groups in face-to-face environments (Scheerhorn et al.; Walther & Boyd, in press). Another advantage of online discussion groups within illness-related communities is availability. Participants are free to post 24 hours a day, 7 days a week. Since patients may be awake in the middle of the night due to their illness or anxiety associated with their illness, access to a community of people who can provide comfort and company day or night is important (Scheerhorn et al.; Walther & Boyd, in press).

Another advantage of online communities is their ability to provide "weak tie" support. Weak-tie relationships exist outside the pressures and dynamics of close family relationships and often are contextual in nature (Adelman, Parks, & Albrecht, 1987). A person goes to a specific place to receive weak-tie support. This place might be a church to talk to a priest or an online community to talk with other sufferers of a similar illness. In fact, some researchers suggest that the support offered by weak ties can provide anonymity and objectivity not found in close personal relationships, thus providing a helpful alternative for social support (Adelman et al.; Walther & Boyd, in press; Wellman & Gulia, 1999).

Mediated channels create many opportunities for support from weak-tie relationships. Researchers studying telephone hotlines as a context for weak ties suggested that the channel provided added support because callers could remain anonymous, take greater risks in expressing feelings, have immediate access 24-hours a day, and not be limited by geographic barriers (Adelman et al.,1987). Wellman and Gulia (1999) and Walther and Boyd (in press) support the concept that online communication fosters development of weak ties because discussion often concentrates on the topic most salient to the user. In addition, more expertise may be brought to bear on the problem because such groups tend to be more heterogeneous relative to strong-tie groups of close personal relations.

As optimal matching theory suggests, uncontrollable events like the develop-

ment of an illness requires support specific to the losses involved (Cutrona & Russell, 1990). In general, illness-related online support communities may provide a form of empathy and support to patients that may not be available from strong-tie connections by offering a deeper understanding of fears, feelings, and family reactions associated with the illness.

Finally, the sheer numbers of people participating in online support groups mathematically suggests the possibility for individuals to find a match with their specific type of illness or diagnoses regimen. With literally hundreds of individuals subscribing at any one time to a specific listserv or electronic bulletin board (as compared with 10 or 11 individuals in a face-to-face support group), the likelihood of meeting others experiencing a similar context increases.

Measuring Support

This research adopts an interactional-cognitive perspective to the study of support in that we study behavior in the context of situational, intrapersonal, and interpersonal factors (Sarason et al., 1994). This perspective argues that social support is the product of a person's experience interacting with individuals in a variety of situations. These experiences shape an individual's behavior and their assessment of support within specific situations. The present research compares participants' experience with support from the listserv with their experience receiving support from a significant other person in face-to-face interactions. We will refer to this significant other as a "face-to-face partner" throughout this paper.

The Quality of Relationships Inventory

The Quality of Relationships Inventory (QRI) was developed to assess three features of close relationships: support, depth, and conflict (Pierce, Sarason, & Sarason, 1991; Pierce, 1994). The *support* dimension "reflects the extent to which the relationship participant believes that a specific individual is available to provide assistance across a variety of situations." The *depth* dimension "reflects the perceived importance of the relationship." Finally, the *conflict* dimension "reflects the perceptions of conflict that a relationship participant has regarding a specific individual" (Pierce, 1994, pp. 250–251). For this study, we examined both support and depth dimensions.

The QRI helps us to explore optimal matching theory as a context for hyperpersonal communication by comparing distinct dimensions of online and face-to-face relationships, thereby increasing our understanding of the context through which hyperpersonal communication develops. The support dimension allows us to explore the explicit function of the listserv, and the depth dimension helps us to operationalize hyperpersonal communication by exploring the extent to which participants feel their relationship with the listserv is significant and that others in the listserv are committed to the relationship as well.

The QRI is a reliable and valid measure that allows us to investigate the role of specific features of relationships within a specific interpersonal context (Pierce, 1994). This perspective is critical in that it allows researchers to target specific relationship types and their connection to specific outcomes (Sarason, Sarason, & Gurung, 1997). Within the present study, we use the QRI to explore the relation-

ship that the participant has with a specific individual that provides them support regarding their illness, as well as the relationship the participant has with their specific listserv. Although the QRI was created to be used in conjunction with a singular relationship, rather than a collection of relationships (like "the list"), discussions with the QRI's creator suggested that its use with a list could be appropriate. Additionally, we were interested in participants' relationship with the list in general as opposed to their relationship with a specific person on the list. Because participants post to "the list" and read messages from "the list," we proposed that participants would be able to target the list as the focus of support (G. R. Pierce, personal communication, February 3, 1998).

Research Hypotheses

Optimal Matching Theory as a Framework for Understanding Hyperpersonal Communication and Its Influence on Behavior
Past research has investigated the development of supportive CMC communities and has explored the characteristics of these communities. However, no research has explored the contexts that may lead to an individual's willingness to engage in specific behaviors within a CMC community and thus hyperpersonal communication. This study explores one contextual variable—the nature of the relationship with a significant face-to-face partner—and its influence on the development of hyperpersonal communication within online communities.

Direct comparison between the list and face-to-face partner. Although recent research suggests that online communities can provide support for people with illness, it is unclear how such support compares to more traditional face-to-face support. Therefore, we explore this as a research question:

> RQ1a: How do participants' perceptions of support from the listserv differ from the perceived support received from their face-to-face partner?

> RQ1b: How do participants' perceptions of depth from the listserv differ from the perceived depth received from their face-to-face partner?

Building on assumptions of optimal matching theory, we suggest that participants who find a more socially acceptable support environment online than they do from their conventional, face-to-face sources of support may turn to online support more often. We explore this by first looking at the relationship between support and the amount of time spent reading. Next, we examine the relationship between the time spent reading, posting, seeking private relationships online and face-to-face, and the influence of these face-to-face interactions on online activity.

Time spent reading. Research has found that isolation may predict online participation. One study of online single mothers with young infants found that a participant's degree of social isolation predicted his or her likelihood of participating in the online community. The more socially isolated the participants felt from their peer group, the more likely they were to participate in online discussions

(Dunham, Hurshman, & Litwin, 1998). Cancer patients, with few peers experiencing the same concerns, also would feel socially isolated. Therefore, their initial motivation for getting onto a listserv may be to find some source of support, either in the form of information or more relational support. Subsequently, the more support that individuals receive from the list, the more time they will spend reading messages within an online community.

> H1a: As an individual's perception of support from the list increases, so does the amount of time spent reading.

Albrecht, Burleson, and Goldsmith (1994) note, however, that "individuals engaged in supportive relationships do not exist in a vacuum" (p. 439). Other relationships within the social network of an individual's life influence their perceptions and behavior in any one relationship. Therefore, we suggest that the nature of the relationship between perceived online support and time reading is moderated by the amount of perceived support received from an important face-to-face partner regarding the user's illness.

> H1b: As the magnitude of the relationship between perceived online support and amount of time reading increases, support from an individual's face-to-face partner decreases.

Time spent reading, posting, and seeking private email relationships. Although the individual initially may seek support in the form of information, online interaction can create more personal relationships within an online community. These personal relationships then can be broadened through use of other channels as well (Parks & Floyd, 1996). As individuals become more actively involved in a listserv they are more likely to increase their postings, as well as develop relationships with members of the list offline (Parks & Floyd). Similarly, we argue that the deeper the relationship that individuals perceive with the list, the more likely they will be to spend time reading and posting. Additionally, as participants' relationship with the list moves from impersonal information gathering to more relationally oriented communication, these participants may expand their communication with a general "anonymous" list to developing personal communication with specific individuals through private email.

> H2a: There is a positive relationship between perceived depth from the list and the amount of time an individual spends reading.

> H3a: There is a positive relationship between perceived depth from the list and the number of people contacted by private email.

> H4a: There is a positive relationship between perceived depth with the list and the number of times an individual posts.

We predict that this movement toward a deeper relationship with the list and development of specific relationships through private email is more likely when

the relationship with the user's face-to-face partner is lacking in depth specific to his or her illness.

> H2b: As the magnitude of the relationship between perception of depth with the list and the amount of time spent reading increases, the perceived depth with the user's face-to-face partner decreases.

> H3b: As the magnitude of the relationship between perception of depth with the list and the number of private emails increases, the perceived depth with the user's face-to-face partner decreases.

> H4b: As the magnitude of the relationship between perception of depth with the list and the number of postings increases, the perceived depth with the user's face-to-face partner decreases.

Influence of face-to-face interaction on online activity. Parks and Floyd (1996) suggest the "relationships that begin online rarely stay there" (p. 92). Therefore, we suggest that as a deeper relationship with the list evolves, these individuals will be more likely to meet face-to-face with individuals from the list.

> H5: There is a positive relationship between depth with the list and the number of listserv participants who met face-to-face.

Finally, we speculate that meeting face-to-face will increase an individual's commitment to and involvement with the list relative to those who have not made face-to-face contact. The behavioral manifestations of such commitment and involvement will be more time spent reading, staying in contact via private email, posting more frequently, and electing not to go "no mail" relative to subjects who have not made face-to-face contact. When participants go "no mail," they explicitly post that they will be away and not have access to the list for a specific period of time.

> H6: Individuals who have made face-to-face contact spend more time reading, post more often, stay in contact with individuals through private email, and are less likely to go "no mail" relative to those individuals who have not made such contact.

Methods

Survey

Predictor variables. As previously discussed, we used the QRI results to illustrate the contrast between support received face-to-face and that received from CMC relationships to identify contexts through which CMC offered the potential for hyperpersonal communication. Part 1 of the survey directed the participants to respond to the statements concerning support and depth with the list in mind. Part 2 directed the participants to answer the same questions with a specific person who provided face-to-face support in mind.

We chose one specific significant face-to-face partner, as opposed to a traditional face-to-face group, as a basis for comparison to online support for three reasons. First, comparing one significant face-to-face partner to the online community may help limit the number of potentially confounding variables in the study of support across groups. For example, it was previously noted that online support communities could offer 24-hour support for the person in need, as compared to weekly meetings of a face-to-face community that might be difficult to schedule. Such differences in availability may account for differences in perceived support across comparison groups. Using a comparison base that is more similar to the online communities on important dimensions may help better to elucidate relationships.

The second reason for using a significant face-to-face partner as the comparison is that research on optimal matching theory suggests that uncontrollable events, like that of the diagnosis of an illness, requires "greater levels of emotional support, with an emphasis on emotional support that comforts, fosters acceptance, and draws attention to the degree to which one is loved" (Cutrona & Russell, 1990, p. 330). In providing support for optimal matching theory, Cutrona and Russell cite studies demonstrating that family and spousal relationships provide emotional support and recipients of this support make a better psychological adjustment than those without such support. Thus, the research in the domain of illness suggests that face-to-face partners are important. Finally, a third reason that we chose a significant relationship with a face-to-face partner as a comparison with an online community is that we believed such a measure would have greater face validity. Individuals may be better able to assess their relationship with a face-to-face individual versus a face-to-face group. We did not see the general listserv as problematic because, although individuals post to many people at once when they post to a listserv, they are still addressing one entity.

Criterion variables. Participation was operationalized as five behaviors: reading time, private email, face-to-face meeting, going "off" the list, and number of times respondents posted to the list. Reading time was measured by asking participants, "How much time do you spend reading the postings on the list during a seven day period?" (hours). The number of posts was measured by asking, "How many times do you post to the list during a seven day period?" Private email was measured by asking participants, "How many people do you stay in contact with through private email that you have met on the list?" We also asked respondents about their face-to-face contact, "How many people have you met face-to-face that you communicate with on the list?" We also asked respondents if they had ever gone "no mail" for a period of time (yes or no). We speculate that, all else being equal, going "no mail" may indicate less involvement with the listserv. Additionally, we were interested in whether participants kept in contact with individuals through private email when they went "no mail." Finally, we also asked participants how many times they posted to the list during a 7-day period. There were 13 response categories (e.g., $1 = 1$–5 times; $13 =$ over 60 times). The distributions for all behavioral measures (except the dummy-coded variable "no mail") were negatively

skewed. Adding a constant to each case and then taking the natural logarithm produced more normal appearing distributions for the other four behavioral variables.

Sample

Participants were recruited through cancer-related listservs on the Internet. Although we initially had planned to limit our study to a specific type of cancer, we expanded our scope so as to improve response rate. First, we made a request explaining the study to the Breast-Cancer Listserv list and asked permission from the owner to post an inquiry to the list. Although obtaining list owner approval is not required, we wanted to demonstrate respect for the participants within the community. We chose this list because it is an unmoderated listserv with a large subscriber base of approximately 500 members that generates up to 150 messages per day. After receiving approval from the list owner, we posted a message that included an introduction of one of the authors, description of the particulars of the project including the university approval to conduct human subjects research, approval of the list owner, and directions for participating (see Appendix A for message text). After waiting 1 month and experiencing a low response rate, we posted a reminder to the Breast-Cancer Listserv and decided to expand the study to all cancer-related listservs listed at http://www.Liszt.com (February 1998). Liszt.com is a mailing list directory of 90,095 mailing lists. This directory can be searched by subject or keyword to locate listservs devoted to a specific topic area. A search of cancer-related listservs revealed 10 lists. We sent facilitators of each of these lists a similar request for participation and obtained approval from seven of the list owners. After the initial postings within each listserv, we posted two reminders 2 weeks apart to increase our sample size. The seven lists in our study included the Breast-Cancer Listserv, BRAINTMR, the Colon Cancer Mailing List, the Esophageal Cancer Mailing list, Kentucky Breast Cancer, MALEBC, and the Testicular Cancer Online Support Group. Participants who agreed to fill out the survey could choose to receive an emailed survey or go to a specific Web address and respond to the survey from that location.

As Walther and Boyd (in press) suggest, "Sampling procedures in organic electronic spaces raise a number of troubling issues" (p. 14). For example, all lists contain some nonworking addresses, not every member reads every message, and some addresses may correspond to more than one individual. This study of online communication is no exception. The listservs that were a part of the study and their approximate number of list members are noted in Table 1. However, it is not possible to determine how many individuals were reached by these postings.[1]

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[1] It is difficult to estimate response rate because there is no indication that the subscriber base is a true estimate of the number of people who received the postings. After receiving the posting describing the study, participants then had to go to a specific website to fill out the survey or ask for a survey through email. Every individual who asked for a survey, completed the survey. We don't know whether everyone who visited the survey website completed the survey.

Table 1. Listserv Subscriber Base, History, and Participation Statistics (as of February 1998)

Listserv contacted	History	Subscriber base	Average daily postings
Breast-Cancer Listserv	Unavailable	500 subscribers	150 messages per day
BRAINTMR	Unavailable	Unavailable	Unavailable
Colon cancer mailing list	Started 1996	450 subscribers	100 messages per day
Esophageal cancer mailing list	Started 1995	50 subscribers	Unavailable
KYBREASTCANCER	Started 1997	26 subscribers	Relatively inactive. No postings for days at a time
MALEBC	Started 1996	62 subscribers	1–2 postings per day
Testicular cancer	Started 1996	308 subscribers	4–10 posts per day

Results

Sample Description

Of the 42 self-selected respondents, 71% were female, ages ranged from 20 to 79 (median age between 40–49), and a bachelor's degree represented the median education. Sixty-four percent either had survived breast cancer or presently had breast cancer, 14% had testicular cancer, 7% colon cancer, 12% brain cancer, and 3% had or had survived some other form of cancer. When asked to identify a specific person in their lives who provided them with support regarding their illness, 50% indicated their spouse; 14%, a friend; 14%, clergy; and 12%, a relative. The majority (57%) read from a cancer-related listserv and found out about the listserv while "searching" (28.6%) for information about a specific type of cancer. Others located the list from a specific website (16.7%), from a friend (16.7%), or by "surfing" (11.9%).

QRI Factor Analysis

We analyzed the support and depth subscales for both the list and face-to-face partner using a factor analysis with a principle components extraction and Varimax rotation. Because of the small sample size, we ran a separate factor analysis for each scale based on a priori items identified in previous empirical studies employing the QRI (Pierce, 1994). Factors were retained on the basis of the "scree" plot and the requirement that eigenvalues be greater than 1.0. An item was retained if it had loadings exceeding .40 on a factor and no cross loadings exceeding .30. A partial assessment of construct validity of the support scales was made by computing the correlation between items comprising the support scales and two gen-

Table 2. Descriptive Statistics, Pearson Correlations, and Reliabilities^a

Study variables	Mean	SD	1	2	3	4	5	6	7	8	9
1. List support	3.12	.62	.71								
2. List depth	2.80	.60	.69	.82							
3. Person support	3.27	.57	-.24	-.24	.78						
4. Person depth	3.48	.60	-.01	.09	.54	.89					
5. Reading time	7.67	6.63	.29	.29	-.27	.04	—				
6. Number of posts	2.52	1.51	.17	.17	-.03	-.06	-.01	—			
7. Private email	4.5	4.13	.33	.21	-.21	-.08	.28	.31	—		
8. Face-to-face	9.5	19.51	.24	.33	-.30	.09	.24	.14	.46	—	
9. Go off list	1.45	.50	-.20	-.21	.34	.01	-.47	-.01	-.47	-.54	—

^a*N* = 42; coefficient alphas appear on the diagonal.

All correlations greater than or equal to .30 are statistically significant (*p* < .05; two-tailed).

eral questions that asked respondents: "On a scale of 1–10, with 10 being the greatest and 1 being the least, indicate the extent to which the list (person) provides me with support."

Results of the factor analysis for the list support items demonstrate a single factor as expected. All items comprising the scale had a significant (two-tailed) bivariate correlation with the generalized list support scale.

When items comprising the person support scale were factor analyzed, two factors emerged from the analysis but only one item—"To what extent can you count on this person to give you honest feedback, even if you might not want to hear it?"—had a clean loading on the second factor. Results of the correlation analysis with the generalized support scale show that this item was the only question that did not have a significant relationship with perceptions of overall person support *r* = .034; *p* =. 832. Removing this item resulted in a one-factor solution. Based on these analyses, we decided to drop this item in the person scale as well as the list scale to maintain identical measures. Coefficient alphas for the list and person were .71 and .78 respectively.

The person depth scale supported one factor, but two factors emerged for the list depth scale. The single item with cleanest loading on the second factor was "How responsible do you feel for the well-being of the list?" This seems to make better sense when dealing with face-to-face relationships than when addressing the list. When a factor analysis was performed without this item, a one-factor solution emerged. This item had the lowest corrected item-total correlation when we examined all items in both the person scale and list scale. For these reasons,

Table 3. Results of Moderated Regression Analysis

Predictor variables			Criterion variables			
	Time reading		Private email		# of posts	
Step 1	Beta	*t*				
List support	.24	1.55				
Person support	-.21	-1.39				
*R*² change	.13					
F	2.86					
Step 2						
List X person support	-.42	-2.72**				
*R*2	.27					
Adjusted *R*²	.21					
Change in *R*²	.14**					
F	4.68**					
Step 1	Beta	*t*	Beta	*t*	Beta	*t*
List depth	.29	1.85*	.22	1.43	.22	1.10
Person depth	.01	.09	-.10	-.62	-.09	-.51
*R*² change	.08		.06		.03	
F	1.75		1.14		.68	
Step 2						
List X person depth	-.27	-1.76**	-.30*	1.89*	-.12	-.74
*R*²	.15		.14		.05	
Adjusted *R*²	.08		.07		-.03	
Change in *R*²	.07		.08		.01	
F	2.26+		2.00		.63	

+*p* < .10; *p* < .05; **p* < .01

we dropped this item from the scales. Cronbach alpha reliabilities for the list and person measures were .82 and .89, respectively.

Descriptive Statistics

Table 2 presents descriptive statistics and bivariate correlations for all variables. As evidenced by the bivariate correlations, common method variance did not appear to influence the results in any obvious way; the relationships between same dimensions across different sources were correlated only modestly.

Our first focus was to understand what, if any, differences in communication exist between the two sources (listserv and specific personal relationship). Results of simple *t*-tests demonstrate that the mean levels of depth for the face-to-face partner were greater for the face-to-face relationship with that specific person (*M* = 3.49, *SD* = .60, *n* = 42) than for the listserv (*M* = 2.8, *SD* = .60, *n* = 42), *t* = 5.48, *p* ≤ .0001. However, there were no mean differences between support from the

specific person (*M* = 3.27, *SD* = .57, *n* = 42) and support from the listserv (*M* = 3.13, *SD* = .62, *n* = 42), *t* = -1.03, *p* ≤ .311.

Multiple Regression
Support and time spent reading. Table 3 displays the multiple regression results. Perceived support from the list predicted the time spent reading only when support from their face-to-face partner was low; therefore, the main effect (hypothesis 1a) was not supported. However, the interaction effect explained 14% of additional variance in time spent reading, thus confirming hypothesis 2b.

   Depth and time spent reading, posting, and seeking private email relationships. As noted in Table 3, depth of the relationship with the listserv was associated with an increase in the amount of time spent reading, which supports hypothesis 2a. However, list depth did not predict how many people respondents stayed in contact with via private email or how frequently they posted to the list; thus, hypotheses 3a and 4a were not supported.

   The interaction between list depth and person depth explained additional variance in both time spent reading and the number of people respondents stayed in contact with via private email. More specifically, when both the depth of the relationship with the list was high and depth of the relationship with their face-to-face partner was low, subjects spent more time reading and staying in contact via email, thus supporting hypotheses 2b and 3b. There was not a significant interaction effect with respect to the number of postings; thus, hypothesis 4b was not supported.

   Hypothesis 5 suggested that list depth would be positively associated with the number of people subjects met face-to-face. As predicted, the relationship was significant, *r* = .33; *p* = .017 (one-tailed).

   Finally, we postulated that mean levels of behaviors manifested by those individuals who had met face-to-face versus those who had not would be different (hypothesis 6). As predicted, those individuals who had met face-to-face had significantly (two-tailed) higher mean levels for time spent reading the listserv, *t* = 2.02, p ≤ .05, stayed in contact with more people through private email, *t* = 4.03, *p* < .000, were less likely to go "no mail," *t* = 3.41, *p* < .002, and spend more time posting to the listserv, *t* = 2.90, *p* < .006.

Discussion

The study makes important contributions toward a better understanding of participation within online support communities. First, the nonsignificant difference between participants' perceptions of the list and their perceptions of their face-to-face partner regarding support for their specific illness demonstrates that listservs provide an important function. The implications of this finding are that online communities can provide an important, additional alternative to patients seeking support.

   Second, the type of relationship that individuals have with their face-to-face partners may foster the development of hyperpersonal communication relationships. This finding provides direct support for the benefits that the listserv may

provide to the optimal matching process. As the data indicate, support and depth from the list did not directly influence time spent reading, posting, or using private email, nor did support have a positive relationship with reading. Rather, the relationship with a face-to-face partner interacted with the depth and support from the listserv to influence online behaviors. Those who found support within the listserv relationship read more only when the support associated with a specific person within their life was low. Similarly, when depth from the list was high and depth from a specific person within their life was low, respondents read more and were more likely to meet list members in private email. The listserv may have provided these participants with a "match" of some aspect of support and understanding concerning their illness that was missing from the face-to-face partner, providing support for optimal matching theory and its extension to online communities.

Some additional support for this assertion may be found in the insignificant correlation between perceived overall person support and the question, "To what extent can you count on this person to give you honest feedback even if you might not want to hear it." Perhaps strong-tie members are more likely to withhold honest feedback in order to "protect" the ill family member. This finding corresponds with Goldsmith's (1992) suggestion that attention to face concerns can lead to indirect support. Face-to-face partners may encounter a number of conflicting support goals when it comes to providing support to their partners, whereas online support communities may be more focused on one specific goal. For example, face-to-face partners may want to provide support and simultaneously not want to offend their partner so they communicate in a more indirect way. Online support members may be less concerned with preserving face and may communicate support in a more "bald on record" way.

It is not clear why depth with the person did not moderate the relationship between depth with the list and the number of posts made to the list. It could be that collapsing the measure of posts into 13 categories unduly restricted the variance in the number of posts. Because 65% of the respondents chose the 1–5 times per week category, a reframing of this option could have created different results. In summary, although Walther (1996) provides us with an important concept to help us understand how CMC enables close relationships to develop and flourish, most relationships do not occur in a vacuum but in the context of a network of supportive relationships inside and outside the virtual community. It is these other relationships, the needs of the participants, and the common cancer experience of the listserv that appear to interact with and cumulatively influence the development of hyperpersonal relationships.

Future Research

As optimal matching theory suggests, support can be categorized in a number of ways. Cutrona and Russell (1990) categorized stressors or needs for support by the desirability, controllability, and domain of the event. They suggested that a medical illness could be characterized as a negative, uncontrollable event involving the loss of physical assets. Thus, Cutrona and Russell suggested a need for

emotional support and emotion-focused coping. This study has shown that online support groups can provide the needed support for those with a medical illness, specifically cancer. Other stressors may not "match" well within online communities. For example, Cutrona and Russell suggest that controllable events may require less need for support in the specific domain of the event than uncontrollable events. Future research should explore different categories of events to determine when online support can be most helpful in providing an optimal match.

Given our findings on the interaction between list support and depth and face-to-face partners, more research should be directed toward a better understanding of these face-to-face relationships. In particular, what specifically is the online community offering to these cancer patients that they do not receive from their face-to-face partners? Future research should examine further online support communities as compared to face-to-face partners, so as to more clearly identify the basis for an "optimal match." A better understanding of this matching may help caregivers identify appropriate online alternatives for patients with respect to specific types of cancer, treatment, and stages of disease progression.

Another area may be to address what, if any, are the disadvantages of promoting online communities for cancer patients? We suggested earlier that an individual with strong-tie connections to the ill person might avoid giving negative feedback in an attempt to protect the individual with cancer. However, it is also likely that patients who are ill "protect" their families by not talking about the cancer and therefore may need to reach out to those less personally involved. As they reach out to the online communities, do they cease to relay important information to family members concerning their disease? Kraut, Patterson, Lundmark, Kiesler, Mukopadhyay, and Scherlis (1998), for example, suggest that online relationships might displace strong-tie connections. As research continues to identify more positive outcomes associated with online communities, it is important to ask what, if any, negative influence this has on personal face-to-face relationships. The present research found an increase in online use when the depth and support of the face-to-face partner was low. It may be important to discover to what extent this situation intensifies as online use increases.

The individuals who read everyday but never post also comprise an interesting group. These participants are obviously hard to reach but the impact of the online messages on their own support and commitment to the online community would be important to understand. To what extent might their relationship with the online community become deeper as they read messages that "match" their needs.

Results of this study indicate that participants who met face-to-face with some of their online community demonstrated behaviors suggesting greater listserv involvement (posting, staying in contact through private email) than those subjects who had not met with online members. A more complete understanding of online relationships may be gained by examining what causes some online participants to cross over and meet face-to-face with online members. Perhaps, for these individuals, the online community is simply an avenue for gaining access to face-to-face relationships.

Limitations

As with all studies, this one has limitations. First, the QRI scale was developed for use within the context of a specific relationship rather than a collective (like a listserv). Although members post to one entity when they post to the list, they may not conceive of it as a specific relationship with an individual person. Some support for this may be found in the results of the factor analysis where items such as "To what extent to you feel responsible for the list" failed to load cleanly with other items that seemed better suited when referring to the list.

Through our conceptual framework we are suggesting that the support and depth with the online communities drives online participation. However, because the data are cross-sectional, absolute proof of the causal direction of these relationships is not possible. For example, it could be argued that use of private email leads to a greater depth in the relationship and that the deeper relationship then leads people to increase their use of private email. Only for the last hypothesis is there some peripheral evidence on causal direction. More specifically, it seems somewhat unlikely that an individual would meet face-to-face before having prior communication through reading, posting, and using private email. However, it is likely that this is a reciprocal relationship (i.e., commitment and involvement leads to online behaviors, which lead to face-to-face meetings, which lead to more commitment and involvement and online behaviors) that should be tested in future studies.

Whether or not these results and the proposed model generalize to listserv participants beyond cancer patients is unknown. It seems likely that this model would apply equally well to individuals with or without illness but that requires further research to substantiate this claim.

Initially, the low response rate from these bulletin boards with large subscriber bases was surprising. The author who posted was a subscriber to the Breast-Cancer list and had posted infrequently to the list. However, she does not have cancer and most of her participation was through reading. In thinking about the implications of involvement within these virtual online communities, it makes sense that the response rate was low for four reasons. First, motivating individuals to participate in a study can be difficult. In an online community, where the researcher is not a recognized member, the incentives for participation are small. Second, individuals do not come to the listserv to participate in a study but for support and community. The posting concerning a study may be considered an "interruption" within an online discussion. Third, in deference to the list subscribers, we posted an invitation to participate and then asked participants to send an email or go to the website to fill out the survey. We did not post the survey directly to the listserv. As a result, instead of receiving the survey along with their other messages, participants had to leave their online group and go to a specific site to fill out the survey, or respond to the message asking specifically for the survey. This extra step may have limited our sample size even more. Fourth, it is unclear how many members of the subscriber base actually were reached by the research posts. Although members may subscribe, they do not necessarily read all of their posts. Also, some subscribers may change their email addresses and may never receive the post. Finally, we do not know how many of the subscribers them-

selves had cancer, which also may influence motivation to participate. Further research into the unique data collection considerations within computer-mediated communities will be important.

Conclusion

Given the proliferation and availability of online communication technology and the escalating health-care costs, much of which falls under the broad heading of mental health, this study should be of considerable interest to practitioners and families as well as research communities. Continued study of the development of hyperpersonal communication within a variety of mediated contexts will give us further understanding of how supportive relationships can develop. Advances in telecommunications infrastructures have allowed the "network" of support for patients and their families to span the globe technologically. We are just beginning to understand how this technological capability can affect patients and their families.

Appendix A

The message sent to listservs requesting participation resembled the following:

Hello, my name is Jennifer McCann. I am a graduate student in the new Communication, Culture, and Technology program at Georgetown University. I am also a research coordinator for a nuclear cardiologist at Georgetown University Medical Center and came to nuclear cardiology from nuclear medicine—a department many of you have visited from time to time. I am working on a research project exploring how people receive support from listservs. I am particularly interested in illness-related listservs. So now, after receiving approval from ********, I am turning to you—the experts on this topic—for help.

I have a questionnaire that I would like you to answer. It should take you approximately 20–25 minutes. There are two ways you can respond. You can send an email to me at ********** and I will send you the survey to your email address OR you can go to the following webpage and submit the survey from there *******. This research project has been approved by the University's human subjects committee. Thank you for taking the time to read this message and hopefully for participating in my survey. Jennifer McCann

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