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# Empathic Exchanges in Online Cancer Support Groups: Distinguishing Message Expression and Reception Effects

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Past studies on the efficacy of participation in online cancer support groups have primarily focused on the role of *expression* in the accrual of health benefits for participants. Unfortunately, few steps have been taken to determine whether this observed effect arises solely from the internal mental processes underlying the act of expressing or, perhaps, owes something to a nuanced, multidimensional understanding of expression that includes reception of responses to what is expressed. To test for the multilayered effect, we attend to one of the key concepts in the online support community scholarship: empathy. Our findings suggest that it is a combination of empathy expression and reception that is crucial to attaining optimal benefits for cancer patients. Further, our finding supports the buffering hypothesis that empathic expression provides a salutary effect for patients who experienced a higher degree of concern associated with their cancer diagnosis and follow-up treatments.

Breast cancer is the most common form of cancer and the second leading cause of cancer-related death among women in the United States (American Cancer Society, 2007). Not surprisingly, past research has shown that, along with the direct physical effects of the disease, breast cancer patients also face a variety of psychological challenges related to body image and sexuality (Gustafson et al., 2005), experiences of isolation and loneliness (Anderson, 1992),

and feelings of anxiety, distress, and depression (Spiegel, 1997). Given the high prevalence of breast cancer and the extent of life trauma associated with the diagnosis and subsequent treatments, it is essential to understand how various coping mechanisms may help reduce anxiety and improve quality of life for cancer patients.

A review of the relevant literature suggests that an increasingly common way women with breast cancer cope with their illness is participation in computer-mediated social support (CMSS) groups (Han et al., 2008; Shaw, Hawkins, McTavish, Pingree, & Gustafson, 2006; Shaw et al., 2007). This line of inquiry has examined how specific *expressions* within the CMSS groups are associated with

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various educational and psychosocial benefits, building on Pennebaker's groundbreaking work on the healing power of writing about emotional upheavals (see Pennebaker, 1997). The research methodology that produced these insights about expression in online support groups employed word-counting software to code participants' text messages for various linguistic dimensions (e.g. emotion, religion, and insight words) and relating the presence of these dimensions to their mood, health-related concerns, and emotional and physical well-being (see Shaw et al., 2006).

Unfortunately, the methods applied to examine these relationships limit the conclusions that can be drawn regarding both the *nature of the expression* and *effects of that expression*. There are certain complexities concerning how these expressions are accurately represented and then related to psychosocial outcomes that must be addressed before more definitive conclusions about expression effects can be drawn. In this article, we argue that the effects attributed to the production of certain content may be confounded by participants' consumption of that same type of content. Or the effects of expression may be amplified by a set of interactions involving both expression and the subsequent reception of the responses that the expression evokes from others within the online support community (Pingree, 2007). Thus, our aim here is to advance both theory and method regarding research on the effects of participation in CMSS groups.

To look for more definitive answers, we attend to one of the key concepts in the online support community scholarship: empathy. Despite the growing interest in online empathy phenomena (Preece & Ghazati, 2001), it remains an open question whether the effects of empathy expression are discernable from the reception of empathic messages. Furthermore, most studies on the effects of empathy have examined the disclosure procedure among a healthy population, and, to our knowledge, there is no extant research that explores whether the process can contribute to improved outcomes in clinical samples. Accordingly, this study draws upon three types of data collected from a large-scale e-health intervention study of breast cancer patients that includes (a) a more flexible and precise computer-aided content analysis of empathic messages posted within CMSS groups, (b) action log data analysis of the message relevant behaviors (i.e., posting vs. reading empathic messages), and (c) longitudinal survey data collected before and after the intervention. This approach provides highly granular data on the nature of the exchanges occurring within CMSS groups and offers an avenue to exploring effects previously inaccessible for testing due to the limits of extant research methodologies.

## EMPATHY AS A TYPE OF EMOTIONAL SUPPORT

Previous research has identified empathy as a unique type of emotional support (Braithwaite, Waldron, & Finn, 1999;

Cutrona & Suhr, 1994). Cutrona and Suhr (1994) originally developed a five-category system of social support (i.e., informational, emotional, esteem, network, and tangible support) and many subcategories within each of these five categories. Within subcategories of emotional support, empathy is identified as one of the subtypes and conceptualized differently from others such as relationship, prayer, encouragement, physical affection, sympathy, and confidentiality. Similarly, Braithwaite et al. (1999) adopted and modified Cutrona and Suhr's (1994) framework and examined the types of social support messages in CMSS group with disabilities. They found that emotional support messages were the most frequently enacted, with subcategories such as empathy and encouragement accounting for the largest portion of these exchanges. Prayer and confidentiality were the least enacted subcategories of emotional support. Relying on these studies, we understand that empathy, the primary focus of current study, is not only a subtype of emotional support but also a unique construct differing from other subtypes such as encouragement.

## Empathy Online

Empathy has received extensive investigation as a fundamental psychological factor in social relationships. Early studies examined empathy within the context of face-to-face communication and found that it functions as a social lubricant by promoting altruistic behaviors (Eisenberg & Miller, 1987) and effective communication in medical interactions (Bylund & Makoul, 2002). More recent studies have examined the role of empathy in CMSS groups focusing on health concerns (Braithwaite et al., 1999; Pfeil & Zaphiris, 2007; Preece & Ghazati, 2001). According to Pfeil and Zaphiris (2007), CMSS groups provide patients with a space to share their illness experience, feelings/moods, or concerns, and these self-disclosing activities stimulate empathic response from others. Meier and her colleagues (2007) also found that expressions of empathy were most common in cancer survivor communities, followed by informative, religious, and supportive expressions.

Similarly, previous studies on breast cancer patients also confirmed that women both give and receive empathy in CMSS groups. Using an existential-phenomenological approach, Shaw, McTavish, Hawkins, Pingree, and Gustafson (2000) revealed that patients not only share their illness experience and treatment information but also express their understandings, feelings, and emotions, which in turn stimulate empathic responses from other patients. From a longitudinal content analysis of postings from an online breast cancer bulletin board, Rodgers and Chen (2005) found that emotional support is the major characteristic of online breast cancer support groups. In particular, they found that breast cancer patients actively exchange emotional support when they are feeling depressed. Although past studies found that empathic expressions appeared most

frequently in patient or emotional support communities (Preece & Ghazati, 2001), little attention has been paid to examining the effects of empathy on patient's health outcome. We address this agenda and investigate whether and under what conditions empathic communication potentially improves breast cancer patients' quality of life.

### Defining Empathy

Scholars have examined a broad array of theoretical directions and applications of empathy (e.g., Levenson & Reuf, 1992). Although various conceptualizations have been proposed, most definitions share aspects of three main elements: (a) cognitive understanding, (b) affective responses, and (c) helping behavior (Levenson & Reuf, 1992; Bylund & Makoul, 2002; Hakansson & Montgomery, 2003).

First, cognitive understanding is one of the most frequently used constituents in conceptualizing empathy. Many scholars agree that the intellectual identification is crucial to the empathic process (Hakansson & Montgomery, 2003). For example, Preece and Ghazati (2001) define empathy as the capacity to identify with and understand another person's situation and feelings. Similarly, Ickes (1997) defines empathy as "complex psychological inference in which observation, memory, knowledge and reasoning are combined to yield insights into the thoughts and feelings of others" (p. 2). Duan and Hill (1996) dubbed this definition of empathy as "intellectual empathy" in order to distinguish this dimension of empathy from others. Second, empathy has been often defined as an empathizer's emotional experience (Hoffman, 1987). For example, Hoffman (1987) defines empathy as "an affective response more appropriate to another's situation than one's own" (p. 48). In a phenomenological study, Kerem and his colleagues (2001) suggested that emotional components of empathy reflect more meaningful relational experience than cognitive understanding alone. Spiro (1993) also argues that empathy must be conceptualized as more than just cognitive understanding. According to his argument, there is no empathy if an intellectual identification is not accompanied by an emotional identification as well.

Finally, another line of research suggests that empathy is conceptualized as a social behavior, such as supportive expression. According to Hakansson and Montgomery (2003), intellectual identification of another person's difficulties brings about a motivation to act for the target's well-being. This argument is associated with the more general assumption that empathy involves an altruistic motivation to help other people (e.g., Batson, 1991). Research on the relation between emotion and action found that emotions provide people with the energy to respond to the target of emotion (Frijda, Kuipers, & ter Schure, 1989). In this sense, empathy can be regarded as an emotional mechanism that provides energy for helping other people (Hakansson & Montgomery, 2003).

Taken together, extant research illustrates that empathy is a multifaceted concept, composed of cognitive, affective, and supportive components. Accordingly, this study understands empathy as a type of emotional support but different from other types of emotional support such as encouragement or prayer (Braithwaite et al., 1999; Cutrona & Suhr, 1994; Meier et al., 2007). This is consistent with prior scholarship that has studied encouragement and prayer as discrete forms of emotional support (e.g., Meier et al., 2007; Shaw et al., 2007). From this perspective, empathy is defined as "communicative ability to understand and identify with another person's feelings and to respond compassionately to their distress." In the context of online cancer support groups, this definition emphasizes the behavioral component of writing/reading empathic messages among those who share similar thoughts and feelings. This is consistent with general definitions (Levenson & Reuf, 1992), health-specific conceptions (Posma, van Weert, Jansen, & Bensing, 2009), and online-specific understanding (Braithwaite et al., 1999).

### DISTINGUISHING MESSAGE EXPRESSION AND RECEPTION EFFECTS

Most effects of communication research are assumed to result from message reception, as the ideas that people encounter either inform or persuade (i.e., reception-effects paradigm) (Fishbein & Cappella, 2006). This approach closes off a number of avenues to theorizing, including that "the act of expression might change the message sender, that expressed ideas often do not exist intact, if at all, in the speaker's mind prior to expression, and that attention to—and thus effects of—received messages may result from the expectation of being able to respond" (Pingree, 2007, p. 2). Of course, expression and its effects cannot be understood in isolation; rather, the expression effects must be distinguished from the subsequent effects of the responses they produce and the reception of those responses.

This is particularly relevant to research on health informatics. Recent studies by Shaw et al. (2006, 2007) have found that insightful disclosure, as well as religious expression, among breast cancer patients involved in online support groups can produce a range of psychosocial benefits. These include improvements in terms of self-reported emotional and physical well-being. It was originally thought that expression produces this effect because withholding feelings about emotionally traumatic events has physiological consequences on the autonomic and immunological systems (Pennebaker, 1997). However, more recent work suggests that it is the mental processes underlying the actual composition of language that produce the benefits (Pennebaker, 1997). Expression's health benefits may in fact not be effects of disclosure in the literal sense of revealing preexisting memory contents. Instead, they may result from the creation

of new understanding during language composition, the outcome of a self-reflexive process.

With this in mind, the present study implements the new, more robust methodological structures described earlier to examine whether the provision of empathy to others within CMSS groups could potentially contribute to improved mental health outcomes. Evidence suggests that demonstrations of understanding, caring, and concern for others have a therapeutic effect (Yalom, 1970). It has been found that the use of one's own personal experiences to help and support others can lead to increased feelings of competence, strength, and independence (Roberts, Salem, Rappaport, Toro, Luke, & Seidman, 1999). Because the major benefits patients obtained from participation in CMSS groups come from communicating with other people who share similar situations and problems, expressing empathy will help them feel more competent and less isolated and avoid self-focused preoccupations with their own illness (Yalom, 1970). It will also help them reappraise and assimilate painful experiences, and cope more effectively with the traumatic event (Pennebaker, 1997). Further, past research has found that positive emotion is associated with reduction of ruminative thinking and an increase in positive appraisals, including those related to bodily sensations (Han et al., 2008). These lead to the following hypothesis:

*H1: Empathy expression within CMSS groups will be associated with fewer breast cancer-related concerns.*

Breast cancer patients typically do not have anyone within their personal networks who shares the similar experience at the onset of their illness. Yet, according to research, receiving support and understanding from others may be linked to positive benefits for cancer patients who participated in CMSS groups. In a CMSS group study interviewing 12 breast cancer patients, Shaw et al. (2000) found that patients attributed the effectiveness to emotional support and encouragements from others who were experiencing similar struggles. Indeed, consuming empathic messages containing understanding, affective response, and support may help people learn about many different perspectives on a given problem. This may also help patients feel less isolated and increase their understanding about the illness and treatment processes, thus reducing the worry and distress that is often part of living with a cancer diagnosis. Accordingly, we propose the second hypothesis:

*H2: Empathy reception within CMSS groups will be associated with fewer breast cancer-related concerns.*

The third hypothesis examines the possibility that emotional and psychological benefits may actually be amplified by a set of interactions involving both expression and reception of the empathic responses that such exchanges may generate from others within the online support community. According to equity theory, which is rooted in

social exchange theory, individuals will try to maximize mutual benefits by making equal contributions within their relationships. In other words, the perception of the self as either under-rewarded or over-rewarded can foster distress, which, in turn, motivates the individual to act to restore equity within relationships with others (Walster, Berscheid, & Walster, 1973). The same is true within social support communities because an individual's mutual exchange of experiences and feelings might be central to the continuation of relationships as well as their benefit/satisfaction within the community (Preece & Ghazati, 2001). This suggests a more participatory understanding of the salutary effects of empathic message consumption to include an additional, positive amplifying effect for those who consume such content concurrent with their efforts to provide empathic support of their own. Maton (1988) also tested a similar hypothesis in a social support context and found that those who both give and receive support report a more positive sense of well-being than those who either give or receive it. Based on this past work and our argument for previous hypotheses, the following hypothesis is proposed:

*H3: The reduction of breast cancer-related concerns that may occur from empathy expression will be more pronounced among those who receive more empathy than those who do not.*

The fourth and fifth hypotheses examine whether expressing/receiving empathic messages buffers or alleviates mental and physical health problems associated with a cancer diagnosis. A sizable body of social support literature suggests that social support may buffer the harmful effects of a stressful life event on psychological and physical well-being. Specifically, the buffering hypothesis posits that "social support exerts the greatest effects on well-being among stressed individuals, presumably because it encourages more benign appraisals of the stressful situation and facilitates more effective coping resources" (Spitzberg & Cupach, 1998, p. 376). For instance, social support was related to the alleviated depression level only for those who have undergone higher levels of life stress (Dahlem, Zimet, & Walker, 1991). Similarly, in research about the effect of breast cancer patients' support system, Koopman and his colleagues (1998) noted that the buffering effect on mood disturbance was found only among patients under greater life stress.

We think that empathy will function in a similar way. Individuals who express and receive empathy will be better equipped to handle their distress and traumatic situations than those who do not. Based on our argument for H1/H2 and the logic of the buffering hypothesis, we propose that the expression and reception of empathic communication within CMSS groups will produce greater benefits among those who experienced higher level of concerns associated

with a cancer diagnosis and follow-up treatments. Thus, the following hypotheses are proposed:

*H4: The reduction of breast cancer-related concerns that may occur from empathy expression will be more pronounced among those who have a higher level of breast cancer-related concerns at baseline than those who do not.*

*H5: The reduction of breast cancer-related concerns that may occur from empathy reception will be more pronounced among those who have a higher level of breast cancer-related concerns at baseline than those who do not.*

## METHODS

### Participants

The data analyzed in this study were collected as a part of a larger Digital Divide Pilot Project (DDPP) where underserved women with breast cancer in rural Wisconsin and Detroit, MI, were given access to the Comprehensive Health Enhancement Support System (CHESS) for 4 months (Gustafson et al., 2005). The particular Interactive Health Communication System (IHCS) was called the "Living with Breast Cancer" program, which is an Internet-based system that provides patients and their families with a range of conceptually distinct services (Gustafson et al., 2005). DDPP was a population-based study to examine the feasibility of reaching low-income women with breast cancer with this e-health system. Of those 341 eligible patients who were initially recruited, 286 joined the study and 55 refused. Both the pretest and a 4-month posttest surveys were conducted with a sample of 231 (81% retention rate from 286 subjects). Study participants were identified through a variety of sources, including the National Cancer Institute's Cancer Information Service, hospitals and clinics, public health departments, and the Medicaid program. Detroit recruitment started in June 2001 and ended in April 2003, and Wisconsin recruitment began in May 2001 and ended in April 2003.

Eligibility criteria required that participants were at or below 250% of the federal poverty level, not homeless, within 1 year of diagnosis with early-stage breast cancer or within 1 year of a diagnosis of metastatic breast cancer, and able to read and understand an informed consent letter. Once a patient was referred to the study, a research team member explained the purpose of the study, reviewed eligibility criteria with the patient, and explained the risks and benefits of being involved, including that they would need to fill out pre- and posttest surveys and that their computer use would be monitored. Subjects were paid \$20 for each completed survey. After submitting their pretest, all study participants were loaned a computer and given Internet access for 4 months. They also received personal training to learn how to use the computer and the Internet, but the majority of time was spent on teaching participants how to use

CHESS, including how to post and read messages in CMSS groups.

CMSS groups within CHESS are text-based, asynchronous bulletin boards allowing users to anonymously share information and support. Groups are monitored by a trained facilitator to ensure that discussions are supportive and do not contain unchallenged inaccurate or harmful information, though the facilitator does not take an active role in guiding the topics of communication and rarely intervenes. Our analysis included two online support groups: a general discussion group and a prayer and meditation group. The reason we employed multiple discussion groups in our population study was to help participants find a comfortable environment and facilitate further interactions among system users.

Of the 231 participants who completed both pre- and posttest surveys, 177 women either wrote or read messages in CMSS groups during the 4-month study period. Among them, 24 women did not write any message while 174 women read at least one message. We limited our analysis to women who wrote or read at least one message because some demonstrated participation seems to be a reasonable lower limit to require when investigating the association between participation in CMSS groups and health benefits. Based on this criterion, 177 participants were included in the subsequent analyses. Among the 177 participants, 104 (about 60%) participated in both general discussion and prayer and meditation groups, but 33 participated in the general discussion group only and another 40 solely participated in the prayer and meditation group. There was no difference in empathic content produced and consumed between those who uniquely participated in the general group or the prayer and meditation group ( $|t| = 1.81, p = .074, |t| = .76, p = .45$ , respectively). Additionally, to determine differences in baseline scores (i.e., demographics, disease factors, and pretest score of the dependent variable) between those who are included in our analysis ( $n = 177$ ) and those who are not ( $n = 54$ ), we performed both the  $t$ -test and the chi-square test. The results revealed that our study sample had more Caucasians and a higher level of education than those who are excluded from the analysis ( $\chi^2 = 62.612, p < .001; |t| = 2.244, p < .05$ , respectively).

### Message Coding and Action Logs

Two thorny methodological issues are tackled in this research. First, previous studies have commonly applied word-counting programs as a tool for examining the vast number of patient posts in CMSS groups. The focus has been on patients' word usage and associated physical and psychosocial benefits (for example, Lieberman & Goldstein, 2006). However, these efforts often struggle with the syntactical complexities of language when attempting to code for the presence of latent content, resulting in errors in the coding process. Second, it is logical to assume that expressions

in CMSS groups potentially produce responses from other participants that must also be accounted for when estimating effects or have influence on others with the IHCS when they encounter these messages (Pingree, 2007). It is therefore crucial for an investigation into these expressions to engage a procedure that is finely grained enough to distinguish effects arising from the mental processes underlying the initial expression and those that emerge from message reception and the expression/reception nexus.

To address the first issue, we apply a more flexible and precise computer-aided content analytic system to code for key ideas and idea combinations in participant message texts through the implementation of a dynamic rule structure that is geared to code the syntactical complexity of natural language (see Shah, Domke, Watts, & Fan, 2002). To address the second issue, we integrate the discussion message coding with action log data, which track the message as a chain of expression and reception events. Thus, the current study employs a more refined message measurement and more granular action measurement, combining content coding of text messages with the action log file database. This allows us to obtain a more nuanced understanding of the content of message expression and reception. These data are combined with survey data to examine how empathy expression and reception relate to psychosocial health outcome to patients.

**Computer-aided content analysis.** Examination of empathic content in this study was accomplished through use of the InfoTrend computer-aided content coding system (Shah et al., 2002). Unlike other mechanistic approaches to computer-aided analysis, the analyst uses the computer language to enter (a) idea categories, (b) words that tap or reveal those idea categories, and (c) rules that allow pairs of ideas in the text to be combined to form more complex meaning. Compared to widely available word-counting programs such as Diction or qualitative content analysis programs such as Nudist, Infotrend operates through the generation of layered coding rules written in the Filtscor language that allow for large-scale natural-language processing. These rules are then tested iteratively against actual textual content. Once a high level of consistency is achieved between the human programmers' "reading" and the computer software's "coding" of a sample of the content, then all textual content is coded with the assistance of the computer. This avoids the inherent problems with word-counting software, which is inattentive to changes in meaning based on linguistic context. Such programs struggle with homographs (e.g., "shift," a period at work, vs. "shift," to move quickly), heterophones (e.g., "bass," a stringed instrument, vs. "bass," a freshwater fish), qualification (e.g., a physical "wound" vs. an emotional "wound"), and negation (e.g., "helping" vs. not "helping"). And unlike qualitative coding programs, the coding rules are developed based on a sample of the text to be coded rather than reviewing and tagging all content.

For the purposes of this study, we employed this system to content analyze the 19,695 messages posts produced by DDPP participants during the study period. Consistent with norms of CMSS groups, a discrete message post was the unit of analysis. As noted earlier, our approach was computer-aided content analysis—that is, the ideas, idea categories, and rules were created and refined by human coders through a series of iterations testing their performance against content before the computer was permitted to code all content. These steps led to greater and greater precision in the computer's application of the automated content analysis.

Through this process, seven content categories were coded, six covering different aspects of emotional support and one focusing on instrumental support. The six emotional support categories included: (1) expressions of empathy and understanding, (2) statements offering encouragement and support, (3) requests of help, (4) offers of prayer, (5) mentions of Christian beliefs, and (6) indications of general religious/spirituals views. In addition, we coded for talk about medical treatment, which was shared as a form of instrumental support. Many of these categories correspond with the typology of social support behavior proposed by Cutrona and Suhr (1994). For example, categories (1), (2), (4), (5), and (6) are types of emotional support according to their framework. Category (2) corresponds with their encouragement subtype of emotional support. Likewise, their prayer category is further divided into three subcategories.

The empathy category was coded to capture the following types of statements as they occur in natural language: "I'm so sorry for you," "Sorry to hear about . . .," "My heart goes out to you," "You have my sympathy," "Glad to learn that . . .," and "I know this has been a hard time for you." This was done, for example, by making idea categories that represent the meaning of several words, such as "recognition" (sorry, glad, happy etc.) and "notice" (hear, find, see, etc.). After defining the idea categories, coding schemes can be developed to only code the combining of those categories, such as "*Recognition A 20 Notice = Empathy*," which means code for *Empathy* only if a *Recognition* word appears 20 characters ahead of a *Notice* word.

Reliability estimates conducted on a subset of 200 discussion posts between human and computer coding produced an estimate of 91% agreement across these different categories. This was a conservative test, as an entry was coded as a disagreement if any aspect of it was misidentified by the computer. On this basis, Scott's pi was calculated by comparing the percent expected agreement by chance across the seven coded categories with the actual agreement. It was determined to be 87.5% greater than by chances, indicating a highly reliable coding.

**Action log data.** These codings of individual posts, while interesting in their own right, could not reveal much

about the nature of message expression and reception unless combined with action log data gathered in the MySQL relational database management system. The coding of individual messages resulting from the computer-aided content analysis was first stored in a MySQL database that could be readily merged with another MySQL database generated from action log data. Action log data files contain the unique identifier for each action, individual participants' online "handle" (name) and numerical ID, the URL visited within CHESS, the message-relevant behavior (i.e., post, read), and the message ID related to posting or reading. The action log data collection system was developed by CHESS programmers to automatically track usage data on an individual keystroke or click level. This enabled us to monitor which participant wrote and/or read each message. Finally, message IDs were used to merge the MySQL database containing these log files with the MySQL database containing the content coding.

From this we could generate measures of the number of empathy categories written and read by each participant within the CHESS system. These measures of empathy expression and reception are our primary independent variables. Empathy expression is operationalized by the total counts of empathy categories produced divided by total number of messages posted. Likewise, empathy reception is operationalized as the total counts of empathic expressions consumed divided by total number of messages read. Note that this study uses a measure of proportion rather than a raw number of the total counts. This approach makes more sense than simply using raw scores because of the significant variance among participants in the volume of messages that was written or read. It also rules out the potential confounding effect of writing/reading other types of supportive content in the message. Thus, the measures reflect writing/reading more or less within specific content category (i.e., empathy) versus what one's overall number of messages written/read would predict by itself (Han et al., 2008). These message expression and reception scores were calculated at the individual participant level and then integrated with the survey data that were collected from study participants.

## Survey Data

**Patient characteristics.** Social and demographic characteristics (age, ethnicity [a dummy variable with African American coded 0 and Caucasian coded 1], education, insurance status, and living with others or alone) were assessed at baseline. Surveys also included the disease-related clinical measure denoting the stage of cancer. For analyses we classified breast cancer patients at stages 0, I, and II as early (coded 0) and those at stages III and IV as late stage (coded 1) (Gustafson et al., 2005), since this roughly defines a medical boundary at which treatment choices and prognosis differ considerably. Factors such as whether patients went through surgery (e.g., lumpectomy/mastectomy) or treatment (e.g.,

radiation/chemotherapy) after joining the study are also considered in order to assess the level of an individual's direct experience with the disease.

**Breast cancer-related concerns.** This study employed breast cancer-related concerns as a primary health outcome measure. Breast cancer-related concerns is one of the most widely used scales for cancer patients' quality of life, as it addresses breast cancer patients' emotional, physical, and body image concerns and distress related to treatments and side effects (Brady et al., 1997). Validity and responsiveness to clinical change of this scale have been extensively demonstrated (Brady et al., 1997) and it was also used in other CHESS studies (e.g., Han et al., 2008). An 11-item question bank considering breast cancer-related concerns (pretest  $M = 1.82$ ,  $SD = .75$ ; posttest  $M = 1.67$ ,  $SD = .70$ ,  $|t| = 2.74$ ,  $p < .01$ ) asked participants, on a 5-point scale ranging from 0 = *not at all* to 4 = *extremely*, whether (1) they were self-conscious about the way they dress, (2) they are worried about the risk of cancer in their family, (3) they worried about the effect of stress on their illness, (4) their skin bothered them as a result of radiation treatment, (5) their change in weight bothered them, (6) their hair loss bothered them, (7) they have been short of breath, (8) they are bothered by swollen or tender arms, (9) they are able to feel like a woman (reverse coded), (10) they feel sexually attractive (reverse coded), and (11) they are fatigued. Those scores were averaged to construct an index for breast cancer-related concerns (pretest  $\alpha = .70$ , posttest  $\alpha = .72$ ). The relatively lower internal consistency for this scale may be explained because this scale taps into a range of physical, emotional, and body image issues that may not occur all at the same time or among all breast cancer patients (Gustafson et al., 2005).

## Analytic Framework

To test our research hypotheses, we used an analysis of conditional change model (Finkel, 1995), which enables us to analyze the effect of independent variable on change in the dependent variable while holding the initial level of the dependent variable constant. Here our dependent variable was measured in the 4-month posttest, whereas the baseline measure of the dependent variable was measured in the pretest. To examine how empathy expression and reception within CMSS was associated with changes in breast cancer-related concerns, we employed hierarchical ordinary least squares (OLS) regression models. The pretest score of the dependent variable was initially entered in the first block of the regression model, along with five sociodemographics (i.e., age, ethnicity, education, living situation, and insurance status), two disease-related variables (i.e., cancer stage and whether or not patients went through surgery or treatment after joining study), the total time spent in CHESS, two dummy codings for group participation (whether or not

patients participated in general discussion group, whether or not patients participated in prayer and meditation group), and finally two content coding variables representing total counts of remaining content category(ies) for expression and reception. Those control variables were followed by the two main effects of expression and reception, and finally by the three interaction terms. To address the issue of multicollinearity between the product term and its components, the main effect variables were standardized by translating them into *z*-scores prior to creating the interaction terms (Cohen & Cohen, 1983).

## RESULTS

In total, 177 subjects who participated in CMSS groups were used for subsequent analyses. The racial characteristics of the sample were 77.6% Caucasian and 22.4% African American. In addition, about 90% of the women did not have any insurance and about 27% of women lived alone. In terms of clinical characteristics, almost 69% of women were in the early stage of cancer (stages 0, I, II). About 40% of women went through surgery or treatment after they joined the intervention.

We then conducted a principal component analysis of the six content categories covering emotional support to examine the factor structure of these variables to consider the possibility that the other emotional support categories were closely associated with our definition of empathy. All six emotional support categories loaded into one factor (77.5% of the variance in expression categories; 93.7% of variance in reception categories) with all factor loadings .78 or greater. The fact that the empathy category clusters with the other coded categories may indicate that they are part of the same supertype since all of these categories were originally coded as expressions of emotional support and their subdimensions (Braithwaite et al., 1999; Cutrona & Suhr, 1994). Thus, we created a broader measure by combining these six coded categories to create measures of emotional support expression and reception.

However, in the context of cancer support groups, it is not unusual for a discrete message post (our unit of

analysis) to include more than one type of the emotional support. Our coding system captures just this sort of dynamic, which likely increases correlations among content categories. Based on this and the conceptual boundary of empathy suggested by previous work (Braithwaite et al., 1999; Cutrona & Suhr, 1994), we also maintained our original operationalization of the empathy category. Table 1 presents the descriptive statistics for the message relevant behaviors, including both overall emotional support expression and reception and empathy expression and reception.

Applying the same analytic scheme using each measure (i.e., emotional support expression and reception and empathy expression and reception), hierarchical regression analysis was conducted. The results of these analyses are presented side-by-side in model I and model II in Table 2. Both measures produce largely consistent findings, suggesting that the effects observed for the broader emotional support measures are concentrated within the original operationalization of empathy described in method section. This conclusion is further supported by an additional analysis (model III in Table 2) that we conducted based on a “five-category” measure of emotional support that omitted the empathy category. When expression and reception measures of this variable were tested in the same manner as described earlier, the result did not yield any significant predictors of breast cancer concerns for either main or interaction effects. This provides some support for our hypothesis, with the results from the emotional support measures (model I in Table 2) paralleling the findings for the empathy measures (model II in Table 2).

The results of these hierarchical regression models predict the 4-month breast cancer-related concerns. As expected, the pretest score of the outcome measure was a strong predictor of corresponding 4-month outcome in both models ( $\beta = .70, p < .001$  in model I;  $\beta = .69, p < .001$  in model II), but most of the other control variables failed to reach significance. The one exception to this was the surgery or treatment variables, which achieved significance in model I ( $\beta = .14, p < .05$ ) but merely approached significance in model II ( $\beta = .12, p = n.s.$ ).

Turning to our focal variables, hypothesis 1, that empathy expression would be associated with fewer breast cancer-related concerns, received support in our testing of model

TABLE 1  
Descriptive Statistics for Discussion Group Activities ( $n = 177$ )

	<i>M</i>	<i>SD</i>	<i>Minimum</i>	<i>Maximum</i>
Total number of messages posted	15.08	43.10	0	470.00
Total number of messages viewed	269.60	548.95	0	3905.00
Emotional support expression	0.54	0.79	0	4.64
Emotional support reception	0.84	0.48	0	3.00
Empathy expression	0.06	0.10	0	0.67
Empathy reception	0.16	0.14	0	1.00

*Note.* The statistics shown in the table represent values per participant over the entire 4 months.

TABLE 2  
Hierarchical Regression Analysis Predicting Breast Cancer Concerns (Posttest)<sup>a</sup>

	<i>Model I<sup>b</sup></i>	<i>Model II<sup>c</sup></i>	<i>Model III<sup>d</sup></i>
Block 1: Control variables			
Breast cancer concerns (pretest)	.70***	.69***	.70***
Age	-.10	-.09	-.10
Ethnicity	-.01	-.01	-.01
Education	.08	.06	.08
Stage of cancer (late = 1)	.03	.02	.03
Surgery or Treatment (Yes = 1)	.14*	.12	.14*
Live alone (Yes = 1)	.11	.12	.10
No insurance (Yes = 1)	.01	.01	.01
Total time spent in CHES	.01	.01	.01
Participated in general discussion group (Yes = 1)	-.01	-.02	-.01
Participated in prayer and meditation group (Yes = 1)	-.01	-.01	-.01
Total counts of other category(ies) posted	-.11	-.03	-.11
Total counts of other category(ies) viewed	.17	.12	.18*
Incremental <i>R</i> <sup>2</sup> (%)	53.7	53.0	53.8
Block 2: Main effect			
Emotional support (E.S.)/empathy expression	-.14*	-.13*	.01
Emotional support/empathy reception	-.01	-.08	-.02
Incremental <i>R</i> <sup>2</sup> (%)	1.6	2.0	0.0
Block 3: Interactive effect <sup>e</sup>			
E.S./Empathy expression × E.S./empathy reception	-.16*	-.16*	.05
E.S./Empathy expression × cancer concerns (pretest)	-.14*	-.13*	.04
E.S./Empathy reception × cancer concerns (pretest)	.01	.12	.01
Incremental <i>R</i> <sup>2</sup> (%)	2.8	2.9	0.1
Total <i>R</i> <sup>2</sup> (%)	58.1	57.9	54.0

<sup>a</sup>Cell entries refer to the standardized regression coefficient.

<sup>b</sup>Model based on operationalization of emotional support combining six categories.

<sup>c</sup>Model based on operationalization of empathy as originally operationalized.

<sup>d</sup>Model based on operationalization of emotional support combining five categories that omitted the empathy category.

<sup>e</sup>Interaction term was entered in the final block of the hierarchical regression model following control variables and main effect variables.

\**p* < .05, \*\*\**p* < .001; *n* = 146.

II, even after controlling for the baseline outcome and control variables ( $\beta = -.13, p < .05$ ). The findings were nearly identical for emotional support expression tested in model I. Hypothesis 2, which predicted that empathy reception would be associated with fewer breast cancer-related concerns, did not receive support, as empathy reception was not significantly associated with a decrease in breast cancer-related concerns. This was also true of the parallel analysis in model I.

In addition to these main effects, three interaction terms were included to test (1) whether the effect of emotional support/empathy reception on the hypothesized outcome is contingent on the amount of emotional support/empathy expression and (2) whether emotional support/empathy expression and reception buffer the magnitude of positive relationship between the baseline and follow-up breast cancer-related concerns, respectively. Given the consistent findings of models I and II, the significant interactions observed in model II, our original specification, were plotted and post hoc testing was conducted to examine pairwise comparison of the slopes (Aiken & West, 1991). As shown

in Table 2, the interaction between empathy expression and reception was found to be significant ( $\beta = -.16, p < .05$ ) and in the direction predicted. This was identical for the interaction term comprised of the broader measures of emotional support. Post hoc probing of the interaction suggested that there was a significant difference between two regression slopes representing low or high level of empathy expression ( $p < .05$ ). Figure 1 indicates that there was a weak effect of empathy reception among those who expressed empathy less, but a stronger negative and tempering effect between empathy reception and breast cancer concerns among those who expressed empathy more. This provides support for hypothesis 3, that the reduction in breast cancer-related concerns resulting from empathy reception is more pronounced among those who receive empathic messages.

Applying the same analytic framework, the interaction between empathy expression and baseline breast cancer-related concerns on the follow-up outcome was also found to be significant ( $\beta = -.13, p < .05$ ), consistent with hypothesis 4. This was also true for the interaction of the broader

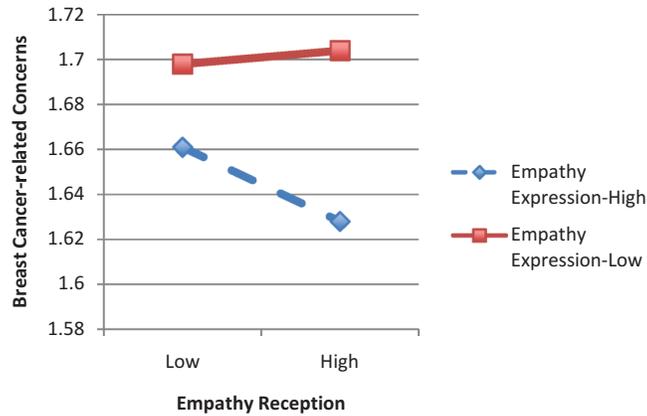


FIGURE 1 Interaction between empathy expression and reception in predicting 4-month breast cancer-related concerns.

Note. For illustration purpose, we plotted this using the means of the four subgroups: (a) low empathy expression/low empathy reception; (b) low empathy expression/high empathy reception; (c) high empathy expression/low empathy reception; and (d) high empathy expression/high empathy reception. To illustrate the significant interaction effect, mean values were assigned to the control variables.

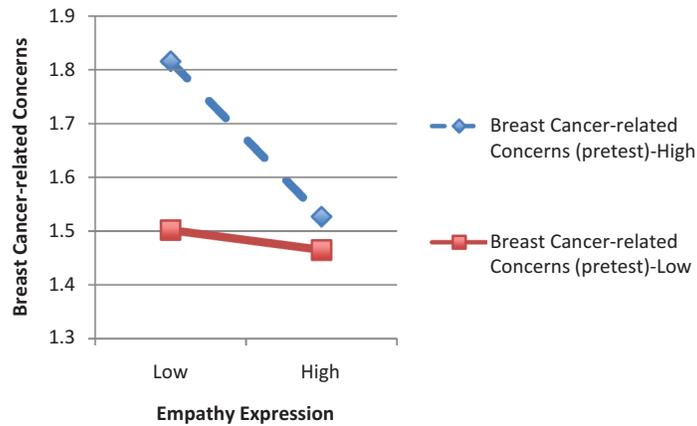


FIGURE 2 Interaction between empathy expression and pretest level of breast cancer-related concerns in predicting 4-month breast cancer-related concerns.

Note. For illustration purpose, we plotted this using the means of the four subgroups: (a) low empathy expression/low breast cancer concern (pretest); (b) low empathy expression/high breast cancer concern (pretest); (c) high empathy expression/low breast cancer concern (pretest); and (d) high empathy expression/high breast cancer concern (pretest). To illustrate the significant interaction effect, mean values were assigned to the control variables.

emotional support measure with baseline breast cancer-related concerns ( $\beta = -.14, p < .05$ ). Post hoc probing of the interaction revealed a significant difference between the regression slopes representing low or high level of breast cancer concerns at pretest ( $p < .05$ ). As shown in Figure 2, there was a weak negative effect of empathy expression among those who had a lower level of baseline breast cancer concerns, but a stronger negative and buffering effect between empathy expression and follow-up breast cancer concerns among those who had a higher level of baseline concerns. This provides support for hypothesis 4. In contrast, hypothesis 5, which predicted an interaction with message reception, did not receive support.

Next, to determine the power for the sample size, a post hoc power analysis was conducted using G\*Power 3 (Faul,

Erdfelder, Lang, & Buchner, 2007). The power of the regression model was 1, further confirming the described results (effect size  $f^2 = 1.33, \alpha = .05$ ). This strong power can be attributed primarily to the presence of the pretest score of dependent variable in the model and provides greater confidence in our findings.

## DISCUSSION

This study explored whether the effects of producing and posting emotional support/empathic messages within CMSS groups are discernable from receiving and reading these types of messages, and whether the effects of message production are amplified among those who also

consume empathically supportive messages from others. We also considered whether emotional support/empathic communication provides beneficial effects among women with higher levels of distress and concern associated with a cancer diagnosis and treatment. To test our idea, we advanced a novel methodology that combined content coding of individual message posts with action log data regarding the discrete behaviors of each breast cancer patient involved in the DDPP. This allowed us to create measures of the amount of emotional support/empathic expression produced and the amount of emotional support/empathic messages consumed. This was related to individual differences in an indicator of quality of life—*breast cancer-related concerns*—assessed in the survey instruments. By synthesizing data from multiple sources, this study was able to provide a clearer picture of the dynamic interactions within online cancer support groups and to examine how both quantity and quality of interactions contribute to emotional and psychological benefits for them.

Based on the result of factor analysis and the conceptual boundary suggested by previous work (e.g., Cutrona & Suhr, 1994), this study tested two parallel models and they produced very consistent findings. However, when the same analytic procedure was employed with alternative emotional support expression and reception measures that omitted the empathy category, it did not yield statistically significant main effects or interactions against our outcome of interest. This suggests that empathic exchanges are the core mechanism in reducing breast cancer concerns among our study population of CMSS group users.

Although past studies found that empathic communication appears frequently in online support communities (Preece & Ghazati, 2001), little effort has been devoted to examine these phenomenon among breast cancer populations. Previous research documented that gathering disease-specific data is valuable since different patient populations demonstrate unique patterns in how they use the online community for needed information and support (Owen, Klapow, Roth, & Tucker, 2004). As shown in Table 1, our data indicate that the breast cancer patients we studied are more likely to receive rather than express emotional support/empathic messages. This is not surprising, for as past research suggests, patients often have concerns about the social consequences of such expression. Although patients wish to express feelings related to their shared disease experiences, they may perceive social constraints of being misunderstood or unsupported by other group members (Lepore, Silver, Wortman, & Wayment, 1996).

Yet, in terms of effects, it is message expression that appears to have greater effects than message reception, at least in the context of emotional support/empathy. Our findings provide strong support for the hypotheses that expressing emotional support/empathy generates a salutary effect for women facing a life-threatening illness (Dunkel-Schetter & Wortman, 1982). This is consistent with past

research that has found that confronting a traumatic experience and translating the event into language can help cancer patients gain better understanding and cope more effectively with their distress (Pennebaker, 1997). Equally interesting is the finding that the interplay of expression and reception plays a crucial role in attaining optimal benefits for these women. Although reading empathically supportive messages on their own was not significantly associated with change in breast cancer concerns, when reception of emotional support/empathic messages was combined with the same kind of expression within computer-mediated networks, this was found to produce beneficial outcomes in terms of a reduction in cancer concerns. This result supports the common perception that bidirectional help is an essential factor in the success of patient support groups, thus contributing to an empirically grounded understanding of the coping process associated with a cancer diagnosis and suffering.

Our findings also lend support to the applicability of the buffering hypothesis to the psychological process of emotional support/empathy expression among the clinical population of breast cancer patients. Specifically, among women who had high levels of breast cancer concerns when assessed at baseline, those who more frequently expressed emotional support/empathy experienced fewer concerns at follow-up than women who did not. But we did not observe a buffering effect of reception. Evidence suggested that emotional support allays psychological distress more effectively if it is from significant others (i.e., family, spouse), and this deficit of support cannot be made up for by support from nonsignificant others (Lieberman, 1982). Because we examined reception with little regard to its *source*, attention to that factor would be a valuable feature of inquiry for future study.

There are several reasons that may explain why we found modest effects of reception. First, our measure of emotional support/empathy reception is assessed by behavioral observation rather than recipients' self-reports of perceived emotional support/empathy, which have been found to be a stronger predictor than the actual behavior exchanged (Roberts et al., 1999). Although our behavioral measures capture each patient's exposure to these sorts of thought and feelings in the messages she encountered, the relevant issue here is the strength of linkage between the actual behavior of receiving messages and the effect of that reception on the reader's mind. Future study should examine whether observational measures are actually perceived as emotionally supportive/empathic by the recipient.

Related to this measurement issue, our study was conducted in the online interaction context where the patterns of expressing and receiving emotional support/empathy may differ from face-to-face support group. For example, the target recipient of a message is rather obvious in face-to-face interaction, but in our study context it is less so since our observation includes the cases where women consume

emotional support/empathic messaging directed not only to themselves but to other people as well. Thus, if person A consumes the message directed to person B and/or others, that person is less likely to perceive this message as relevant, which in turn may reduce effects of message reception. Future research should also differentiate between the effects of receiving messages directed to the reader versus others, as it seems quite likely that different mental health outcomes may result from these divergent reception processes and related judgments of relevance.

There are, of course, other limitations in this study. Most notably, due to the nature of correlational analysis, we must acknowledge that this study cannot isolate whether the expression and reception examined here actually caused the change in breast cancer-related concerns, whether another factor can explain away the observed relationships, or whether it is the reduction in breast cancer concern that encourages those exchanges. It is also possible, for example, that as patients' worry and distress about their situations decrease, they express more emotional support/empathy to provide help to others. One might attempt to employ an experimental design to solve this issue but it might not be always easy for researchers to manipulate those activities across significant periods of time and especially for subjects facing life-threatening illness. We controlled not only the pretest scores but also a number of background variables to rule out potential confounding effects from differences in baseline scores.

Along these same lines, reception of messages was measured solely by the total counts of expression encountered divided by total number of messages opened. Although the computer tracking data allow us to examine much more detailed, accurate, and richer information about users' message reception behaviors, it can only track whether participants opened a message. Of course, opening a message does not necessarily translate into a person reading the message and fully processing its content. Future study should validate our measure by collecting additional data on web page viewing behavior, potentially using interruptive "pop-up" questions that query the users on their processing of the materials they just encountered.

Even with these limitations, this study provides several important implications for future research on CMSS groups among clinical population. While there is a growing recognition that patient concerns may be analyzed using computerized content analysis program (Krippendorff, 2004), past research has relied upon on simple word-counting programs to map out the interaction among participants, which may be rightly criticized as reducing the richness of communication occurring in CMSS groups. In contrast, the method applied here allows for more nuance in the computer's application of the content analysis because the syntactical coding rules are created and refined by human coders through a series of iterations testing their performance against content messages. This approach allows ideas and pairs of ideas in the

text to be combined to give more complex meaning and thus to judge context more effectively.

Besides the methodological implications, this study will provide clear insights into the underlying mechanism of what makes CMSS groups effective and how patients facing life-threatening illnesses obtain benefits out of such systems. Overall, the findings of this study suggest that the way a person translates her or his emotions and situations via language within CMSS groups might play a significant role in how that person perceive her or his cancer experience. From a practical standpoint, results from the current study may validate the value of CMSS groups for the breast cancer patient population and may help further identify the conditions under which CMSS groups may serve as a viable place for communicating about illness experiences.

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