

Linguistic indicators of patient, couple, and family adjustment following breast cancer

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Abstract

Background: This study examined how language reflective of emotional and social processes during a cancer-related discussion relates to patient, couple, and family adjustment after breast cancer. It investigated whether emotional expression or relational focus, manifested in language use, indicates healthy family coping following breast cancer.

Methods: Family members each completed measures of adjustment (Family Environment Scale, Dyadic Adjustment Scale, and patient Profile of Mood States) and engaged in a 15-min family discussion about how they have coped with breast cancer. Transcripts from the discussion were submitted to a text-analysis software program to obtain frequency of positive and negative emotion words, and personal pronouns spoken by each family member. The relationship between self-reports of adjustment and frequency of language use during the family discussion was analyzed with regression models.

Results: Partners' positive emotion words were indicative of better family adjustment, patients' negative emotion words indicated greater family conflict, and sons' and daughters' anger words indicated poorer adjustment, whereas their anxiety words indicated better family adjustment. Partner we-talk was related to better dyadic adjustment, and couples' 'you' was somewhat related to worse adjustment at all levels.

Conclusions: Important information about how a family copes with breast cancer can be obtained by attending to families' emotional and relational language. This study suggests that clinicians and members of families' support networks can gauge how well a family has adapted after the breast cancer experience by attending to the type of words that each family member uses to describe how they coped with breast cancer.

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Introduction

Clinically significant symptoms of depression occur in approximately 40% of breast cancer patients over the course of their illness [1], which renders them one of the most common and distressing side-effects of having breast cancer [2]. However, focusing only on the patient leaves a major portion of the coping picture overlooked, in light of evidence that approximately 25% of breast cancer patients' partners also experience depression [3]. Breast cancer patients and their partners may both frequently become depressed, in part, because of the close link between their quality of life, such that as a patient becomes more distressed over time, her partner's distress tends to increase concurrently [4]. However, patients and partners can also influence each other positively throughout the process. Experiencing the coping process together, or communal coping [5], can be one such way of mutual positive influence [6].

Including both partners, however, still does not capture the whole picture of coping with breast cancer. When a woman is diagnosed with breast cancer, ultimately, the entire family is affected. Although the majority of families show a resilient response and often report feeling closer after the experience, one-third of families experience significant distress and dysfunction after a breast cancer

diagnosis [7]. This can, for example, occur as the family moves from a 'living-centered' to a 'cancer-centered' way of life, leaving personal and financial resources dedicated to cancer-related goals, rather than other family goals. Breast cancer patients who are mothers sometimes struggle with the necessary switch in focus from caring for others to caring for themselves, which likely affects their family members' psychological adjustment in addition to their own [8].

The challenges to an equilibrated, interdependent family system necessitate a sense of family cohesion and a productive way of managing conflict while dealing with the practical and psychological demands of coping with breast cancer. Patient and couple adjustment to breast cancer have been found to influence parent-child relationships [9,10]. Therefore, conflict among any of the family members can be disruptive to the whole unit. This is consistent with the finding that more cohesion and less conflict predict better coping responses among all family members. In fact, Weihs and Reiss [7] found that family function predicts breast cancer patients' mental health better than does physical impairment. Some research even suggests that more family cohesion than what is normally healthy is, in the breast cancer context, related to better patient adjustment [11]. In sum, to develop a comprehensive understanding of

coping with breast cancer, it is essential to study how the patient, couple, and whole family are coping.

Methodological challenges to studying coping with and adjustment following breast cancer

Most studies investigating coping with breast cancer and its relationship to psychological adjustment measure both coping (as the independent variable) and adjustment (as the dependent variable), using self-report methods [12–14]. Self-reports can yield important and unique information on participants' perceptions of coping and adjustment. Yet, when both the predictor and the outcome constructs are measured via questionnaires, the two share important method variance and study findings can be susceptible to internal validity threats [15]. On both sides of the equation, the constructs are operationalized via participants' construal of their behaviors and adjustment, which renders them both susceptible to potential biases inherent in self-reports (e.g., social desirability, demand characteristics, lack of self-knowledge, mood effects, cultural and contextual relativity). A recent study of the differential impact of loneliness and social isolation on health highlighted the need for independent measures of subjective (loneliness) and objective (social isolation) aspects of the social environment [16]. Some health risk behaviors were independently predicted by both loneliness and social isolation, and others, such as smoking, were only related to social isolation. The authors concluded that the complexity of the pertinent constructs necessitates a multimethod approach to studying the ways in which social relationships influence health.

In addition, some psychosocial factors directly influence the *reporting* of adjustment outcomes, which further renders self-reports as measures of both predictors and the outcomes problematic. For example, self-focus and rumination are characteristic depressive symptoms that significantly impact symptom reporting [17]. In this instance, using a behavioral observation approach to replace self-reports of either depressive or illness symptoms could eliminate critical shared method variance [18]. Therefore, a multimethod approach is warranted for a more robust understanding of the relationship between subjective and objective aspects of the coping process [15,16].

Language use as an observational indicator of emotional and social processes

A host of recent research supports the notion that idiosyncrasies in patterns of natural language use provide an 'observational' window to understanding people's psychological and social worlds [19–21]. Thus, assessing social and emotional aspects of word use, along with self-reports of psychological adjustment after breast cancer, can be one way to study psychosocial coping processes and adjustment, while bypassing the issue of shared method variance.

For example, emotional language has been consistently found to track important aspects of the coping process. One study found changes in the emotional language of bloggers following the September 11 attacks [22]. Specifically, they found an increase in negative and a decrease in positive emotion words in the blogs. In addition to gauging coping

responses, emotional words can also facilitate coping with stressful experiences. In expressive writing studies, participants tend to benefit from frequently using positive emotion words and using a moderate amount of negative emotion words [23]. Among breast cancer patients, use of negative emotion words [24] and high use of positive emotion words [25] in an expressive writing task predicted fewer physical symptoms 3 months later. Taken together, past literature on emotional language suggests that the frequency of positive and negative emotion words within families' cancer conversations may capture emotional aspects of their coping process and predict psychological adjustment.

In addition to emotional processes, aspects of natural language use have also been found to track health-relevant social processes. Specifically, the way people spontaneously use first-person plural pronouns, or 'we-talk' has been of focal interest because of its conceptual connection to communal coping [5] or—more broadly—interdependence in relationships [26]. For example, two recent studies found that more partner we-talk predicted improved health for heart failure patients [27] and facilitated smoking cessation among health-compromised smokers [28]. In both studies, couples were asked to engage in a health-related discussion. Couples coping with heart failure discussed how they had coped, and those coping with health-compromised smoking discussed a disagreement. We-talk in these cases may reflect the feeling that patients' experiences are shared in general, as in interdependence, or in the specific context of their illness, as in communal coping. The feeling that one's experience is shared can reduce the emotional and practical burdens of illness. Furthermore, the importance of pronoun use in relationships may extend to the breast cancer population, in light of a qualitative study reporting that patients felt supported when their partners referred to cancer using we-talk [29].

In contrast to we-talk, use of 'you' in couples' conversations with each other typically reflects negative relationship processes. According to Pennebaker [21], it is 'the equivalent of pointing your finger at the other person while talking' (p. 175). Indeed, 'you' in marital interactions has been indicative of blaming [30], more negativity [31], and less marital satisfaction [32,33].

The present study: design and research questions

The present study examined how emotional and social aspects of natural word use during an in-lab, cancer-related discussion relates to patient, couple, and family adjustment following breast cancer. Family members from a larger study [34,35] each completed self-reported measures of adjustment and engaged in a 15-min discussion about how they have coped with breast cancer.

First, we investigated whether emotional expression or relational focus, manifested in language use, indicates healthy family coping with breast cancer. Furthermore, we examined whether language use differentially indicated patient, couple, and family adjustment according to family role. We predicted that more use of positive and negative emotion words would reflect better adjustment for all family members, on the basis of evidence that emotional expression is beneficial for breast cancer patients [24,36] and that patient emotional expression is indicative of positive family

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coping [7]. The links between the emotional expression of other members of families coping with breast cancer and adjustment are unknown to date, therefore, these analyses were exploratory.

Next, we investigated whether a more relational focus, manifested in first-person pronoun use, indicates better patient, couple, and family adjustment following breast cancer. With the asymmetrical finding that partner we-talk in the context of an illness-related conversation predicted better patient adjustment [27,28], we expect that partner, but not patient, we-talk would be related to better patient adjustment presumably because partner we-talk might reflect patients' reduced burden of the cancer experience by experiencing it as a shared one. We made no specific predictions for sons' and daughters' we-talk because the psychological implications of pronoun use in patients' children has not been studied in prior research. Thus, our analyses for children's relational language use were exploratory.

Further, we expected that use of 'you' would indicate a more individualistic focus, possibly the opposite of communal coping. Because 'you' typically creates a barrier, rather than bonds people, we expected our results to be consistent with past research finding that 'you' is related to negative relationship outcomes [30–33]. This may, in turn, lead to more conflict and perhaps less cohesion within the family as a whole.

Methods

Participants

The data used in this study are derived from a larger study of families coping with breast cancer [34,35], for which patients were recruited through surveys administered at four medical centers in the metropolitan Washington, DC area between September 1992 and February 1994. Enrollment criteria for the larger study included families with at least three people including a patient with a new diagnosis or first recurrence of breast cancer within the previous 12 months. Family eligibility included participation of at least one son or daughter aged 10 years or more, and one additional family member. The sub-study reported here includes only those families in which the spouse participated, along with a son or daughter of the patient. Two hundred thirty-six families meeting the enrollment criteria were identified, and 127 (54%) participated in the larger study. Eighty-three of these 127 families (65%) included a spouse, and 75 of the 83 families (90%) had usable data for this sub-study. Of the eight families not included in analyses, four were excluded for missing or insufficient quality of the video recording, two lacked all self-reported adjustment data, and two did not have their spouse present for the discussion. Subjects were enrolled in the study and completed initial assessments at a mean of 9.87 months (SD = 3.92) post-diagnosis or first recurrence of breast cancer. Medical characteristics of the 75 patients and demographic information for patients and their families whose data were used in the analyses are reported in Table 1.

Procedure

The patient and family members were assessed at the Center for Family Research laboratory. After consent for

Table 1. Demographics and disease characteristics (N = 75 families)

	Mean	SD	Range
Patient age	49.51	9.88	33.20–80.26
Partner age	51.85	10.52	30.00–82.00
Child age	23.50	9.83	10.00–50.00
Years married/partnered	22.81	11.46	0.33–53.00
Months since diagnosis/recurrence	9.87	3.92	3.00–21.00
	<i>n</i>	<i>%</i>	
Race			
Caucasian	55	73.3	
African American	15	20.0	
Latina	2	2.7	
Other/unknown	3	4.0	
Education			
≤12 Years	13	17.3	
>12 Years	62	82.7	
Stage of disease			
II	50	66.7	
III	4	5.3	
IV	20	26.7	
Unknown	1	1.3	

participation was obtained, family members completed questionnaires in separate rooms. While in their separate rooms, the family members were interviewed regarding the stresses, adjustments, and changes that had occurred since the patient's breast cancer diagnosis, how they coped with the diagnosis, and what they would like to be different in the family. All family members were then brought together. They were informed that each one had been interviewed as described earlier and were instructed to share what they had told the interviewer, as well as to discuss any plans for changes they wanted to make in the family, for the following 15 min. The interviewer then left the room, and the session was videotape recorded.

Language use measures

Research assistants transcribed each family member's utterances from the videotaped discussion to analyze each member's language use using Linguistic Inquiry and Word Count (LIWC) [37]. LIWC is currently one of the most extensively validated text-analysis programs. It processes text word-by-word and yields a percentage of all words in the transcript that fell into a set of different linguistic and psychological categories. The present study focused on the percentage of positive emotion words (e.g., excited, glad) and negative emotion words (e.g., mad, scared) as well as the percentage of first-person singular (I, me, my), plural (we, us, our) and second person (you, your) pronouns. Average number of words uttered (word count) and frequency of use for these word categories by family members is in Table 2. A we-ratio identical to the one used in past studies [27,28] was also computed to assess the relative amount of first-person pronouns that were plural rather than singular:

$$(\text{We-ratio} = \text{we-talk}/(\text{I-talk} + \text{we-talk}))$$

The we-ratio is used instead of 'we' and 'I' separately because it tends to be most predictive of health and coping outcomes [27,28]. This is likely due to more 'we' and less

Table 2. Descriptive statistics for linguistic variables

Linguistic variable	Mean (SD) # of words spoken		
	Patient	Partner	Child
Total word count	924 (417) ^a	748 (421) ^b	625 (470) ^b
	Mean (SD) % of total words		
	Patient	Partner	Child
<i>Emotional processes</i>			
Positive emotion words	2.48 (0.88)	2.45 (1.16)	2.26 (0.99)
Negative emotion words	1.69 (0.64)	1.70 (0.74)	1.82 (0.96)
Anger words	0.23 (0.25) ^a	0.26 (0.28)	0.30 (0.35) ^b
Anxiety words	0.80 (0.47)	0.77 (0.52)	0.80 (0.72)
Sadness words	0.20 (0.22)	0.14 (0.19) ^a	0.26 (0.38) ^b
<i>Social processes</i>			
Use of 'I'	7.07 (2.15) ^a	4.79 (1.94) ^b	6.73 (2.56) ^a
Use of 'we'	1.31 (0.83) ^a	1.87 (1.36) ^b	1.40 (0.94) ^a
Use of 'you'	4.05 (1.93) ^a	4.71 (1.89) ^b	4.37 (1.56)
We-talk ratio	0.17 (0.14) ^a	0.28 (0.17) ^b	0.18 (0.12) ^a

Total word count is the total number of words spoken by each family member. Positive and negative emotion words, and use of 'I', 'we', and 'you' are the percentages of all words uttered from those categories. The we-talk ratio is the percentage of first-person plural to all first-person pronouns. Different letter superscripts denote significant ($p < 0.05$) differences between family members' means.

'I' use signifying affiliation rather than isolation, which is generally related to better health [21]. Furthermore, 'we' and 'I' were negatively correlated among patients ($r = -0.47$, $p < 0.001$), partners ($r = -0.42$, $p < 0.001$), and sons and daughters ($r = -0.33$, $p = 0.004$).

In a validation study, LIWC emotion word categories have shown 'good convergent and discriminant validity with rated positive and negative emotional expression' in an online support group intervention [38]. In addition, several studies have shown the psychological utility of assessing use of personal pronouns [19,21,39]. Examples of each type of word use from the families' discussions are in Table 3.

Self-reported adjustment measures

Patient depression was assessed using the Profile of Mood States (POMS) depression subscale [40]. The depression subscale contained 15 items rated on a five-point scale ranging from 'not at all' to 'extremely.' Respondents were instructed to answer each item on the basis of how they felt during the previous week. The POMS has been repeatedly found to be a valid measure of mood states among cancer patients [41–43].

Couple adjustment and relationship satisfaction was assessed using the Dyadic Adjustment Scale (DAS) [44]. The DAS is a 32-item scale with four subscales: consensus, tension, cohesion, and overall dyadic adjustment. DAS scores were obtained from both members of each couple. This instrument is a reliable and valid measure of marital satisfaction [45]. Higher scores on the DAS indicate more satisfying relationships. DAS scores of less than 100 have been used to indicate marriages that are clearly discordant [46]. In this sample, 24.3% of couples reported an average DAS score below 100.

Family climate was assessed using the cohesion and conflict subscales of the Family Environment Scale (FES) [47]. Each of these subscales consists of nine items for which each family member indicated 'true' or 'false'.

The cohesion subscale contains items such as, 'We really get along with each other.' The conflict subscale contains items such as, 'Family members often criticize each other.' Both subscales have been reliably used in studies of families coping with breast cancer [48,49]. Cronbach's alpha values for each self-reported measure are in Table 4.

Finally, a composite adjustment measure, encompassing the average of patient, couple, and family adjustment was computed to reveal overall patterns of the association between language use and family adjustment. All four scales were standardized, and the POMS-depression and conflict subscale of the FES were reverse-scored before averaging. Cronbach's alpha for this measure was 0.74.

Data analytic strategy

To predict each level of family adjustment, that is, our measures of patient depression, couple satisfaction and family cohesion and conflict, separate multiple regressions were run for each type of word use (e.g., positive emotion words, we-talk) with each one simultaneously including the word use variables of all three types of family member. For example, the first row in Table 5 displays the standardized beta weights for the multiple regression predicting patients' depression simultaneously from the patients', partners', and children's positive emotion words.

Results

First, we addressed the question of whether verbal positive and negative emotional expression indicates how well a family is coping. Our data indicate that it does, sometimes (Table 5). Partners' positive emotion word use was indicative of better average family cohesion ($\beta = 0.27$, $p = 0.02$). Patient negative emotion word use was indicative of more family conflict ($\beta = 0.25$, $p = 0.04$).

Interesting patterns also emerged for the subcategories of negative emotion words. First, sons' and daughters' anger words were related to greater patient depression ($\beta = 0.30$, $p = 0.02$) and more family conflict ($\beta = 0.33$, $p = 0.01$). However, their use of anxiety words yielded contrasting results. Sons' and daughters' anxiety words were marginally related to patients' lower depression ($\beta = -0.23$, $p = 0.06$) and less family conflict ($\beta = -0.23$, $p = 0.06$). Further, partners' use of anxiety words was significantly related to patients' higher depression ($\beta = 0.36$, $p = 0.01$). The final subcategory, sadness words, yielded only one significant association with adjustment. Patients' use of sadness words was related to higher levels of family conflict ($\beta = 0.30$, $p = 0.03$).

Next, we examined whether a more relational focus, as manifested in pronoun use, reflected better family adjustment following breast cancer. Specifically, we examined whether the we-ratio, and use of 'you' indicated patient, couple, and family adjustment. Results revealed that patients' and partners', but not sons' and daughters', pronoun use was related to adjustment (Table 5). First, we replicated the previous pattern of findings that more partner we-talk is related to better patient adjustment [27,28]. A higher partner, but not patient, we-ratio was related to better dyadic adjustment ($\beta = 0.35$, $p = 0.003$).

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Table 3. Examples of language use

Word category	Example
Partner's positive emotion	I found out the prospects looked good , so I was much more relaxed and... the sickness somehow brought us even closer to each other because we appreciate each other more.
Patient's negative emotion	I think the biggest stress for me was being worried about the cancer coming back.
Son/daughter's anger	I mean, I'm sure we like each other but it's not like we're not got to stop fighting or we're not got to stop yelling at each other.
Son/daughter's anxiety	My biggest one would be the fear of losing you... and another stress associated with that is the miscellaneous family problems that we have and how they impact your health.
Patient's sadness	Ok, I mean basically for me to be able to cry and express my feelings without you getting upset... or for me to have on my days, when I had a lot of bad days, depressed days, really really down days.
Partner's high we-ratio (low use of 'I')	So we just had to figure out how to wash the clothes, cook the meals, get everyone to school, tuba lessons... As we are getting organized and saying ok, we've gotten through this, and do what we need to do.
Partner's low we-ratio (high use of 'I')	It was a new experience. Something that I had never gone through before. And I think, in my mind I had set up some criteria for how I was going to handle myself and situations no matter what happened. Stress was really there until you completed your treatment.
Patient's you	When did you start talking to me about that? You don't talk to me... And it's time for supper and cleaning up, you take a bath and you go to bed, and you don't make time to talk to me.

Word categories were defined and frequencies counted by Linguistic Inquiry and Word Count.

and marginally related to lower patient depression ($\beta = -0.20$, $p = 0.10$).

Patients' and partners' use of 'you' indicated somewhat poorer adjustment. Patients' use of 'you' was indicative of their own higher depression ($\beta = 0.25$, $p = 0.04$), and partner use of 'you' was marginally related to more family conflict ($\beta = 0.23$, $p = 0.06$).

Lastly, analysis of the average adjustment measure, encompassing patient, couple, and family adjustment, revealed that sons' and daughters' anger words ($\beta = -0.34$, $p = 0.01$) and patients' ($\beta = -0.24$, $p = 0.04$) and partners' ($\beta = -0.20$, $p = 0.08$) use of 'you' were most indicative of overall poorer family adjustment. Sons' and daughters' anxiety words ($\beta = 0.24$, $p = 0.04$) and partners' we-talk ($\beta = 0.20$, $p = 0.09$) were indicative of better family adjustment. Taken together, the results suggest that the emotional language of all family members—particularly sons and daughters—and the relational language of patients and their partners indicate adjustment after breast cancer at the patient, couple, and family levels.

Discussion

The results of this study suggest that important information about how families cope with breast cancer can be obtained by attending to all members' emotional language and couples' personal pronoun use. The emotional language most indicative of adjustment was children's and patients' negative emotion words, and partners' positive emotion words. Furthermore, we replicated past we-talk and use of 'you' findings, such that partner we-talk was related to better couple and patient adjustment, and both partners' use of 'you' was related to poorer family adjustment.

We did not find that patients' emotional word use was a more important indicator of family adjustment than other family members' emotional word use. In fact, the relationship between emotional word use and adjustment varied by type and family member role. Specifically, patients' negative emotion words was indicative of more reported family conflict, which appeared to be due to their use of sadness words. Partners' positive emotion words indicated better reported family cohesion, and their use of anxiety words was related to higher patient depression, replicating past findings that partners' anxiety predicts

patients' depression [50]. Perhaps most interestingly, however, was sons' and daughters' use of two subsets of negative emotion words, anger and anxiety, and its relationship to adjustment. Their anger words were related to higher patient depression and family conflict, as well as poorer overall adjustment. However, their anxiety words were marginally related to better adjustment at all family levels and significantly related to better overall adjustment. Although these results seem to conflict, the anxiety findings may be representative of the benefits of negative emotional expression during coping [23,24,36], or that children in well-adjusted families feel free to express their anxiety [8], whereas expression of anger specifically can repel people, which may reflect a tendency toward more hostile and conflictual interactions in the family [51].

Furthermore, we replicated the pattern of findings that partners' use of we-talk is related to better patient and couple outcomes for coping in a health context [27,28]. To our knowledge, this is the third study to find that partner use of 'we', relative to use of 'I', in the context of a coping discussion is related to better patient adjustment. This shows some consistency across three types of life-threatening illnesses (breast cancer, heart failure, and heart and lung problems due to smoking). Although partner we-talk just failed to reach significance in relation to patient depression, the magnitude of our effect (0.20) was similar to that of past we-talk findings from at least one study (0.23–0.29) [27]. Additionally, our results for we-talk and dyadic adjustment were statistically significant and also consistent with past findings. The marginally significant relationship between partner we-talk and average family adjustment further supports the notion that this process occurs within couples, rather than families. Taken together, it appears that partner we-talk may be beneficial, or symptomatic of a beneficial process, for patients coping with illness. It is possibly a reflection of communal coping, during which patients reap the benefits of a shared, rather than solitary, burden [5], or a reflection of a broader sense of interdependence in the couple or family [26]. Future research should clarify whether the association between we-talk and better adjustment is specific to the coping context or reflective of interdependence in general.

Our finding that patient use of 'you' was significantly related to greater patient depression and that patient and

Table 4. Descriptive statistics for patient, couple, and family adjustment

	Alpha	Mean	SD	Inter-scale correlations			
				Patient depression	Couple adjustment	Family cohesion	Family conflict
Patient adjustment							
POMS depressed mood	0.95	9.54	10.85	—	−0.33**	−0.34**	0.28*
Couple adjustment							
Dyadic adjustment scale	0.94			—	—	0.52**	−0.40**
Patient		107.89	20.12				
Partner		112.23	16.77				
Couple average		110.06	16.59				
Family adjustment (FES)							
Cohesion	0.69			—	—	—	−0.59**
Patient		7.25	1.90				
Partner		7.20	1.70				
Children		6.91	2.09				
Family average		7.11	1.47				
Conflict	0.73						
Patient		2.79	2.11				
Partner		2.66	2.28				
Children		3.01	2.20				
Family average		2.83	1.80				

POMS, Profile of Mood States; FES, Family Environment Scale.

POMS depressed mood was a 15-item, five-point subscale. Higher scores indicate more depressed mood. Scores lower than 100 for Dyadic Adjustment Scale indicate discordant marriages. Both FES subscales comprised nine true/false items. Higher scores indicate higher levels of each construct. All alphas were computed across items for all family members who completed each measure.

* $p \leq 0.05$;

** $p \leq 0.01$.

Table 5. Regression coefficients for each family member's language use predicting patient, couple, and family adjustment

Linguistic Inquiry and Word Count word category	Patient depression	Couple adjustment	Family cohesion	Family conflict	Average adjustment
	(N = 71)	(N = 74)	(N = 75)	(N = 75)	(N = 75)
Emotional processes					
Positive emotion words					
Patient	−0.13	−0.07	−0.06	−0.10	0.04
Partner	−0.07	0.18	0.27*	0.06	0.15
Child	0.13	0.01	0.05	0.00	−0.02
Negative emotion words					
Patient	0.03	−0.08	−0.02	0.25*	−0.14
Partner	0.21	0.00	0.02	−0.09	−0.01
Child	−0.05	0.12	−0.07	0.12	−0.01
Anger words					
Patient	−0.04	0.12	0.03	0.17	0.00
Partner	0.04	0.04	−0.17	−0.07	−0.08
Child	0.30*	−0.17	−0.20	0.33**	−0.34**
Anxiety words					
Patient	−0.10	−0.14	0.01	0.15	−0.09
Partner	0.36**	0.06	−0.06	0.06	−0.11
Child	−0.23***	0.21***	0.08	−0.23***	0.24*
Sadness words					
Patient	0.05	−0.03	−0.17	0.30*	−0.18
Partner	0.05	−0.05	0.10	−0.10	0.03
Child	−0.04	0.06	−0.07	−0.09	0.04
Social processes					
We-talk					
Patient	0.11	−0.16	−0.17	0.04	−0.16
Partner	−0.20***	0.35**	0.11	−0.02	0.20***
Child	−0.08	0.13	0.11	0.00	0.11
'You'					
Patient	0.25*	−0.19	−0.15	0.13	−0.24*
Partner	0.11	−0.10	−0.15	0.23***	−0.20***
Child	0.13	−0.05	−0.05	−0.01	−0.07

Numbers are standardized regression coefficients. Predictor variables are percentages of all words uttered by each family member that fall into each word category (except we-talk, which is the ratio of first-person plural to all first-person pronouns). Language use and outcomes for families with multiple children represent the average across all sons and daughters. Anger, anxiety, and sadness are subcategories of LIWC negative emotion words. All outcome measures were self-reported on the same day that the language use was observed in the laboratory. Patient depression is from the Profile of Mood States depression scale, couple adjustment was from the Dyadic Adjustment Scale, and Family cohesion and conflict were from the Family Environment Scale. Couple adjustment is the average of the patient's and partner's scores. The Family variables are averages across all family members. Total adjustment is a composite measure including couple adjustment, family cohesion, and reverse-scored patient depression and family conflict.

* $p \leq 0.05$.

** $p \leq 0.01$.

*** $p \leq 0.10$.

partner 'you' was related to worse family adjustment, is also consistent with past findings that more distressed couples use more 'you' language than non-distressed couples [52] and that 'you' reflects less healthy relationships between psychiatric patients and their relatives [53]. 'You' may reflect a blaming tone in conversation [30], which could promote conflict and undermine cohesion among families.

This study also had a few limitations. First, the patients in these families had already completed treatment, so these results may not generalize to family adjustment immediately after diagnosis and during treatment. Future studies should test the association between family language use and adjustment sooner after diagnosis of breast cancer. These results also may not generalize to families that fare worse over the course of coping with breast cancer. At minimum, all of the patients in our study had families willing to participate in a study that included a discussion of coping with breast cancer. Therefore, our results may only apply to families that are willing to discuss breast cancer in the first place. Future analyses should also determine whether emotional and social language is indicative of adjustment to breast cancer in other contexts of families' daily life, such as when they are not discussing breast cancer.

Finally, our concurrent measures of language use and adjustment, and observational nature of the study, render us unable to speculate about causality. We believe, though, that language use likely reflects existing family adjustment. Several studies have manipulated participants to use 'healthier' language but failed to find improvements in pertinent outcomes [21]. Nevertheless, it is possible that the language family members naturally use helps to create or perpetuate the family dynamic. Therefore, further research should examine patterns of language use and family adjustment over time to examine potential causal pathways. Overall, this study suggests that clinicians and members of families' support networks may gauge how well a family has adapted following the breast cancer experience by attending to the emotional and relational words that family members use.

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Notes

1. The magnitude of the correlations between the language use variables and adjustment measures were highly similar to that of the regression coefficients presented in Table 5, with two exceptions. Patients' ($r=0.30, p=0.01$) and partners' ($r=0.26, p=0.03$) anger words were significantly correlated with average conflict, but the effects were reduced to non-significant and marginally significant (respectively) in the multiple regression, leaving children's anger words the only significant predictor. Patients' and children's anger words were positively correlated ($r=0.43, p<0.001$), whereas partners' and children's anger words were not significantly correlated ($r=0.14, p=0.25$), which explains the greater change for patients relative to partners.
2. Sons' and daughters' average age was unrelated to their own reports of cohesion ($r=0.08, p=0.56$) and conflict ($r=-0.03, p=0.84$). However, their age was related to their parents' reports of conflict ($r=-0.33, p=0.02$), and controlling for child age in the regressions of language use on conflict yielded a few changes to the results in Table 5. Patients' negative emotion word use was no longer significantly related to conflict ($\beta=0.15, p=0.33$), and partners' ($\beta=-0.25, p=0.12$) and children's ($\beta=0.21, p=0.17$) use was more related, although still not significantly, to conflict. Lastly, partners' use of 'you' was no longer marginally related to conflict ($\beta=0.16, p=0.30$).

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