



Naturalistically Observing Non-Cancer Conversations among Couples Coping with Breast
Cancer

BREAST CANCER COUPLES' NATURALISTIC CONVERSATION

Megan L. Robbins

Alexander Karan

Psychology Department

University of California, Riverside

Ana Maria Lopez

Internal Medicine

University of Utah

Karen Weihs

Arizona Cancer Center

and Department of Psychiatry

University of Arizona

Accepted Article

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1002/pon.4797

Abstract

Objective: This study revealed the landscape of non-cancer conversations, identifying topics and types of everyday conversation, and examined links to psychological adjustment among couples coping with breast cancer. **Methods:** Fifty-two couples wore the Electronically Activated Recorder (EAR) over one weekend and self-reported psychological adjustment while patients were on treatment. The EAR sampled 50 s of ambient sound every 9 min to estimate the frequency of non-cancer conversation and reveal topics and types of conversation. **Results:** Analyses revealed non-cancer conversations comprised over 93% of conversations. The most common topic discussed was people. Substantive conversation was associated with better, while emotional disclosure was associated with worse, well-being for patients, but not spouses. **Conclusions:** Results revealed that ordinary conversations are frequent among couples who face breast cancer, and they are associated with patients' psychological adjustment, providing a foundation for potential interventions for coping with cancer that do not focus on illness.

Keywords: Electronically Activated Recorder (EAR), substantive conversation, emotional disclosure, close relationships, **cancer, oncology**

Background

Many people and their loved ones experience distress when faced with breast cancer¹⁻³. Though discussing cancer is important for processing the experience⁴⁻⁶, recent evidence revealed that cancer does not frequently come up in everyday conversations of couples coping with breast cancer⁶. Thus, cancer conversations may not be the only interpersonal factors that can dampen the negative effects of the cancer experience. Non-cancer conversations are a virtually unstudied potential source for finding new areas to target for psychosocial interventions. This study reveals the landscape of non-cancer conversations, identifying topics and types of conversation in daily life, and examining links to psychological adjustment among couples coping with breast cancer.

Social interactions contribute to cancer adjustment. In-lab observational studies have revealed insights such as links between partners' responsiveness to cancer-related emotional disclosures and spousal intimacy⁷, and families' word use in cancer discussions and family adjustment⁸. Recently, one study used the Electronically Activated Recorder (EAR)^{9,10} to naturalistically observe the cancer conversations of 52 couples coping with breast cancer outside the lab⁶. The EAR recorded brief audio samples of couples' social interactions and revealed that cancer comes up in approximately 6.2% of conversations sampled from patients' and 2.5% of conversations sampled from spouses' daily lives. The study also revealed that spouses' engagement in substantive (non-trivial, non-emotional) or emotional cancer conversations was associated with patients' better adjustment. The authors concluded that discussing cancer in everyday life is important, and past research's exclusive focus on cancer conversations has left the vast majority of conversations unexamined.

Why might non-cancer conversations be important for adjustment to cancer? Relational Regulation Theory (RRT) posits that perceived support is linked to mental health via ordinary interactions within social networks, rather than through socially supportive

interactions while enduring a particular stressor. Evidence in support of RRT has demonstrated that the effects of social support on adjustment are largely accounted for by mundane social interactions and the resources that develop as a result of the interactions¹¹. Further, a naturalistic observation study revealed that substantive conversations—those that discussed a substantive, rather than superficial, topic— were related to greater well-being among healthy participants¹². Taken together, psychological adjustment may importantly depend on mundane social behaviors that do not focus on cancer¹³. Thus, we apply RRT, predicting that everyday, meaningful social interactions might facilitate maintenance of well-being while coping with cancer.

We know little about the characteristics of ordinary social interactions, such as non-cancer conversations, among couples coping with breast cancer. One study revealed word use within EAR-observed non-cancer conversations was associated with dyadic adjustment among couples coping with breast cancer¹⁴. Results indicated romantic relationships may thrive in the face of cancer if couples' non-cancer conversations are a place where spouses find some balance and positivity, rather than focusing on one partner's "patient" status.

Examining the landscape of everyday non-cancer conversations requires a naturalistic observation approach. The EAR is a useful tool for unobtrusively sampling participants' everyday social interactions. Past studies have established its reliability and unobtrusive nature^{15,16}, convergent validity with theoretically-related psychological measures^{17,18}, and ethical practices for its use^{16,19}.

This study used the EAR to 1) identify common, non-cancer-related topics among everyday conversations of couples coping with breast cancer. Research has not previously examined this among people coping with serious illness, so this aim was exploratory. 2) Identify the prevalence of different types of non-cancer conversation. Past research has focused on substantive and emotional conversation for their psychological relevance^{6,12}. Past

estimates from this study's sample of cancer conversations revealed that substantive conversations were far more frequent than emotional conversations⁶, and an estimate of substantive conversation from a healthy college student sample was 35.5% of total conversations¹². Therefore, we expect substantive non-cancer conversations to comprise roughly one-third of conversations, and that they will be far more common than emotional non-cancer conversations. 3) Examine the links between substantive and emotional non-cancer conversations and psychological adjustment. Based on RRT¹¹ and past research on a healthy college student sample¹², we expect substantive conversations to be positively associated with psychological adjustment (fewer depressive symptoms; greater satisfaction with life). Emotional disclosure predictions are less straightforward. Induced emotional disclosure—as in therapy or expressive writing—tends to benefit people²⁰. However, there is mixed evidence that naturally-occurring emotional disclosure is associated with better well-being²¹. The Fever Model of Disclosure posits that emotional disclosure is a symptom of a problem and a potential remedy²²; thus, emotional disclosure and psychological adjustment could be positively or negatively associated with psychological adjustment. We will also examine whether these associations differ for patients and spouses; however, lack of past research on links between non-cancer conversations and adjustment renders this exploratory.

Methods

Participants

This study was approved by the University of Arizona Institutional Review Board (BSC B06.207). A detailed overview of the ethical principles for this study, including the EAR method, can be found in papers by Robbins and colleagues^{6,19}.

Patients were recruited from the Arizona Cancer Center during their regular oncology visits. Breast cancer patients were eligible if they had a primary diagnosis of Stage I, II, or III breast cancer, had definitive surgery, and were receiving adjuvant treatment. Couples were

eligible if they were primarily English-speaking, at least 21 years of age, and living together in a (self-defined) marriage-like relationship. Two-hundred and ten of the 647 approached couples (32.5%) were eligible for this study. Fifty-six (26.7% of eligible couples) agreed to participate. Informed consent was provided to eligible couples willing to participate.

Of the 56 consented couples, 53 had data usable for analyses. Two couples withdrew from the study: one because the external microphone wire was bothersome, and one for an unknown reason. One couple had not completed all outcome measures. Medical and demographic information are in Table 1. Two patients with Stage 0 and four with Stage 4 disease were allowed to participate to maximize sample size.

Procedure

The first session (T1) was typically on a Friday and participants completed psychological adjustment questionnaires. Afterward, they were instructed to wear the EAR as much as possible over the weekend during their waking hours. They were told it would yield a 10% sample of their day, excluding the 6-hour blackout period during participants' sleeping hours. They were also told the EAR would record 50 seconds of ambient sound at a time, though they would be unaware of when the EAR was recording. Participants were informed they would have the opportunity to delete any sound files before anyone listened to them. After the weekend, typically on a Monday (T2), the researcher collected the EARs and administered demographic and medical questionnaires. After two months, participants completed the same baseline questionnaires to assess changes in psychological adjustment (T3). Participants were then debriefed and given a CD of their recordings to review them. Only one participant, a patient, deleted one sound file. Each couple was paid \$150 for their participation.

Measures

EAR Device. The EAR device was an HP ipaq 100 handheld computer. The EAR software was programmed to record 50 seconds every 9 minutes. This sampling rate has yielded highly stable estimates of daily social behaviors and highly robust criterion validity¹⁰. Patients and spouses wore their EAR device clipped to their waistline, with an Olympus ME-15 external microphone clipped to their lapels. The EAR yielded an average of 176 (SD = 57) valid (i.e. participant was wearing the device; there were no technical problems), waking (i.e. participant was not sleeping) sound files per participant—18,453 sound files in total.

EAR-Derived Measures. Research assistants coded sound files for presence (“1”) or absence (“0”) of talking, talking about cancer, and conversation type. Sound files were coded as “talking” if the participant spoke any words, and “talking about cancer” if the participant or their conversation partner mentioned anything related to cancer (e.g., treatment, scheduling, difficulties). Non-cancer conversations were all conversations that did not contain any topics related to cancer.

Conversation type was either substantive or emotionally-disclosing, and did not comprise all conversations (e.g., a conversation could be practical or superficial). Both substantive and emotional disclosure were distinguished from superficial and practical topics as non-trivial (superficial) and not solely for instrumental purposes (practical). Substantive conversations were coded if the participant exchanged thoughts, information, values or ideas about anything in a non-emotional way. These were conversations in which meaningful information was exchanged, that did not contain emotion¹². Substantive conversations included news, political issues, philosophical topics, ideas, or information about a non-emotional topic. Emotional disclosure was coded if the participant shared his or her personal feelings or emotions about any topic⁶. This included positive and negative topics, such as revealing fears, concerns, or hopes for the future. Conversation type examples are in Table 2.

All sound files were coded by two research assistants. Inter-coder reliability was calculated using one-way random effects intraclass correlations. Intraclass correlations (ICC[1;k]) for all coding categories ranged from .76 to .92. Sound files were aggregated across each participant to yield the mean frequency of sound files containing non-cancer-related conversations.

Research assistants also transcribed all of participants' utterances. The transcripts were analyzed using Linguistic Inquiry and Word Count (LIWC), a software program that calculates the percentage of words that belong in various linguistic and psychological categories²³. LIWC has been extensively validated and used in hundreds of psychological studies^{24,25}, including those of people coping with breast cancer^{8,14}. The categories used in this study were those that indicate the topic of the transcribed conversation: people ("social" in LIWC; e.g., friend, person), work (e.g., goal, hire), leisure (e.g., play, sing), food ("ingest" in LIWC; e.g., tea, breakfast), body (e.g., eye, throat), home (e.g., backyard, microwave), money (e.g., bills, pay), religion (e.g., blessing, church), and death (e.g., dying, kill).

LIWC was used to code for presence or absence of a topic of conversation in each sound file. If a participant uttered at least one word from a topic category, the conversation was coded as about that topic and assigned a value of "1". Absence was indicated with a "0." All values were aggregated to estimate frequency of topics in participants' conversations.

Psychological Adjustment. Outcome measures were completed by patients and their spouses at T1 and T3. They completed the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item self-report measure of depressive symptoms²⁶. The CES-D is highly reliable and extensively used in cancer research²⁷. The scale was 0-3, and items were summed, with higher scores indicating more depressive symptoms. On average, patients' ($M_{T1} = 11.82, SD = 8.84; M_{T3} = 10.10, SD = 9.67$) and spouses' ($M_{T1} = 10.93, SD = 8.12; M_{T3} = 9.36, SD = 9.57$) scores were below the clinical cut-off (score of 16), and the standard

deviations indicate substantial variability, with one standard deviation above all means exceeding the clinical cut-off. At T1, 28 participants (27.2%) and at T3, 21 participants (20.4%) had a score ≥ 16 .

Participants also completed the Satisfaction With Life Scale (SWLS), a 5-item measure of the evaluation of the quality of and satisfaction with one's life²⁸. The scale was 1-7, items were averaged, and patients' ($M_{t1} = 5.70$, $SD = 1.21$; $M_{t3} = 5.69$, $SD = 1.16$) and spouses' ($M_{t1} = 5.53$, $SD = 1.24$; $M_{t3} = 5.76$, $SD = 1.06$) scores indicated fairly high average satisfaction with life.

Demographic and medical information. Patients and spouses completed a 10-item demographics questionnaire, and patients also completed a 16-item breast cancer questionnaire about medical characteristics (Table 1)²⁹.

Data Analytic Strategy

We first used descriptive statistics to answer questions regarding the non-cancer topics participants discussed. Second, we used correlations to reveal the bivariate associations among patients' and spouses' conversation types with psychological adjustment.

Then, correlations between the outcome variables and typically relevant medical and demographic variables were conducted to determine which variables should be controlled before conducting regression models in SPSS³⁰. Eight regressions were conducted: one per outcome, per timepoint, for patients and spouses separately to account for the non-independence between partners. Regressions addressed questions about how different types of couples' conversations were related to patients' and spouses' psychological adjustment, while controlling for covariates. Models predicting depressive symptoms included age and patients' use of antidepressants, and models predicting satisfaction with life included age as covariates. Models predicting T3 outcomes controlled for T1 outcome scores. To obtain

confidence intervals for the standardized regression coefficients, we used the following equation³¹:

$$\beta \pm 2 * SE_{\beta}, \text{ where } SE_{\beta} = \left(\frac{SD_x}{SD_y} \right) * SE_b$$

Three participants had an insufficient number of sound files for analysis (< 30); however, patients' and spouses' EAR variables were averaged and used as predictors in the regressions. Therefore, missing EAR data for these three participants was replaced with their partners' scores and used in the regressions, as the best estimate of the values.

Results

Topics and Types of Non-Cancer Conversation

Patients ($M = 47.85\%$, $SD = 15.20$) and spouses ($M = 44.99\%$, $SD = 15.48$) spoke nearly half of their waking hours. Among all conversations, patients uttered an average of 2800 ($SD = 1834$) and spouses uttered an average of 2090 ($SD = 1228$) sampled words. Based on a 17-hour waking day, this yields an estimate of patients speaking an average of 19,473 words, and spouses speaking 14,535 words per day, following a past study's calculation³².

Non-cancer conversations comprised, on average, 93.90% ($SD = 6.99$) of patients' and 97.57% ($SD = 2.83$) of spouses' conversations. Table 2 displays the means and standard deviations of topics of non-cancer conversations. The most common topic by far was people, followed by work, leisure, money, food, and home. Death was the least frequent topic.

Nearly one-third of non-cancer conversations were substantive, which was 18.58 and 27.03 times more frequent than emotional disclosure for patients and spouses, respectively (Table 2). Fewer than 2% of conversations were emotional disclosure. The remaining non-cancer conversations were superficial (46%) or practical (21%).

Bivariate Links Between Conversation and Adjustment

For patients, not spouses, emotional disclosure was related to more depressive symptoms at T1 and T3, as well as lower satisfaction with life at both timepoints (Table 3).

Conversely, substantive conversation was associated with lower depressive symptoms for patients at both timepoints and not significantly associated with satisfaction with life.

Patient-Spouse Non-Independence

Correlations of patients' and spouses' conversation type and outcome scores revealed substantial non-independence within couples. Table 3 shows the correlations between partners' conversation variables. Due to the medium-to-large sized correlations, couples' conversation variables were averaged for subsequent analyses.

Table 3 also reveals patients' and spouses' T1 ($M_{patients} = 11.82, SD = 8.84; M_{spouses} = 10.93, SD = 8.12$) and T3 ($M_{patients} = 10.10, SD = 9.07; M_{spouses} = 9.36, SD = 9.57$) scores for the CES-D were positively correlated, as well as patients' and spouses' scores for T1 ($M_{patients} = 5.70, SD = 1.21; M_{spouses} = 5.52, SD = 1.24$) and T3 ($M_{patients} = 5.69, SD = 1.16; M_{spouses} = 5.76, SD = 1.06$) SWLS. This non-independence indicates that separate regression models for patients and spouses are an appropriate approach for further analysis of links between conversation type and adjustment.

Regression Models

Correlations between the outcome variables and potentially relevant medical and demographic variables revealed that only patient age ($r = -.01-.24, p = .10-.93$) and whether the patient was taking antidepressants ($r = .33-.54, p's < .01$) significantly or marginally related to patients' and spouses' depressive symptoms. Only patient use of antidepressants was associated with satisfaction with life ($r = -.39 - .52, p's < .005$). Patients' stage of cancer ($p's > .12$), time since last treatment ($p's > .15$), and spouses' gender ($p's > .21$) were not significantly related to psychological adjustment, and therefore were not included in the models.

Table 4 displays the models examining the associations between conversation types (emotional disclosure and substantive conversation) and adjustment (depressive symptoms

and satisfaction with life) at T1 and T3 controlling for T1. Analyses revealed that emotional disclosure was generally indicative of poorer adjustment for patients but not spouses at T1. Emotional disclosure was generally not associated with T3 adjustment when controlling for T1 outcome scores, except for a marginal, positive association with spouses' depressive symptoms. Substantive conversation was associated with patients' fewer depressive symptoms at T1, and marginally associated with their greater satisfaction with life at T3.

Conclusions

This naturalistic observation study revealed that ordinary conversations are frequent among couples who face breast cancer, and they are associated with patients' psychological adjustment. These findings support RRT¹¹, as its basic premise is that ordinary social interactions are associated with mental health. Psychological adjustment to cancer may importantly depend, in part, on maintenance of meaningful social interactions that do not focus on cancer.

The topics discussed in non-cancer conversations were mundane (e.g., people, work). Participants rarely talked about health and religion, and even less frequently mentioned death, reflecting the apparent "normalcy" of their everyday interactions, despite cancer.

Findings were fairly consistent with a healthy sample's frequency of substantive conversation—nearly one-third of non-cancer conversations were substantive¹². Likewise, the positive relationship observed between substantive conversation and psychological adjustment was also consistent with the past study¹², further indicating similarity to non-clinical samples. Although substantive conversation only marginally predicted patients' greater satisfaction with life at follow-up when controlling for baseline, this finding is remarkable in light of how strongly baseline satisfaction with life predicted follow-up. Considered with the cancer conversation findings from this dataset,⁶ this suggests that substantive conversations, whether about cancer or not, are associated with better well-being.

If replicated in a higher-powered study, this would indicate that having more substantive conversations about cancer or non-cancer topics could be fruitful to test as a psychosocial intervention for women coping with breast cancer.

Emotional disclosure was associated with poorer psychological adjustment, particularly among patients. These bivariate associations existed at baseline and follow-up, not controlling for baseline. In the regressions, emotional disclosure indicated patients' poorer baseline adjustment and (marginally) spouses' greater depressive symptoms at follow-up. These findings support the Fever Model of Disclosure²², which posits that emotional disclosure tends to occur when it is needed, and thus is a symptom of distress. This contrasts with induced emotional disclosure, as in therapy or expressive writing²⁰, that tends to have a therapeutic effect. Because we did not manipulate emotional disclosure, there is not a strong reason to expect changes in follow-up psychological adjustment, predicted by emotional disclosure at one point in the breast cancer experience.

Study Limitations

This study revealed that emotional disclosure and substantive conversations were more consistently related to patients', or women's, psychological adjustment than spouses', or men's adjustment. Because all patients in this study were women, it is unclear whether this is due to patient status or sex. Therefore, differences between patients and spouses could be interpreted as differences between women and men. For 7 couples, however, patients and spouses were women, and sex and role status were not confounded for them. Literature has largely supported sex differences, rather than patient/spouse role differences, revealing that women tend to be more distressed and disclose more than men^{1,33}. This study is first evidence for a possible sex difference in associations between disclosure and psychological adjustment, though future studies with female and male patients are needed.

This sample size was too small to detect small effects; nonetheless, there were several effects large enough for this study to detect. Despite the sample size, this study provided data from over 18,000 sound files from couples' real lives (not a contrived setting) and bypassed problems with self-reports. Thus, these data contribute a highly unique perspective to the picture of what life is like while couples cope with breast cancer.

Clinical Implications

This study provides a foundation for developing and testing future interventions for coping with cancer that do not focus on illness. For example, our findings suggest it may be fruitful to develop and test interventions that encourage couples to engage in substantive conversations about topics that interest them. If effective, the interventions could circumvent potential negative side effects, such as distress from discussing cancer, and may have the added positive side effect of strengthening couples' relationships as they cope with cancer.

References

1. Hagedoorn, M., Sanderman, R., Bolks, H. N., Tuinstra, J. & Coyne, J. C. Distress in couples coping with cancer: A meta-analysis and critical review of role and gender effects. *Psychol. Bull.* **134**, 1–30 (2008).
2. Henselmans, I. *et al.* Identification and prediction of distress trajectories in the first year after a breast cancer diagnosis. *Health Psychol.* **29**, 160 (2010).
3. Stanton, A. L. *et al.* Depressive episodes, symptoms, and trajectories in women recently diagnosed with breast cancer. *Breast Cancer Res. Treat.* **154**, 105–115 (2015).
4. Manne, S. *et al.* Couples' Support-Related Communication, Psychological Distress, and Relationship Satisfaction Among Women With Early Stage Breast Cancer. *J. Consult. Clin. Psychol.* **72**, 660–670 (2004).
5. Manne, S. L. *et al.* Cancer-related relationship communication in couples coping with early stage breast cancer. *Psychooncology.* **15**, 234–247 (2006).
6. Robbins, M. L., López, A. M., Weihs, K. L. & Mehl, M. R. Cancer conversations in context: Naturalistic observation of couples coping with breast cancer. *J. Fam. Psychol.* **28**, 380–390 (2014).
7. Manne, S. *et al.* The interpersonal process model of intimacy: the role of self-disclosure, partner disclosure, and partner responsiveness in interactions between breast cancer patients and their partners. *J. Fam. Psychol.* **18**, 589 (2004).
8. Robbins, M. L., Mehl, M. R., Smith, H. L. & Weihs, K. L. Linguistic indicators of patient, couple, and family adjustment following breast cancer. *Psychooncology.* **22**, 1501–1508 (2013).
9. Mehl, M. R., Pennebaker, J. W., Crow, D. M., Dabbs, J. & Price, J. H. The Electronically Activated Recorder (EAR): A device for sampling naturalistic daily activities and conversations. *Behav. Res. Methods Instrum. Comput.* **33**, 517–523 (2001).

10. Mehl, M. R., Robbins, M. L. & Deters, F. große. Naturalistic observation of health-relevant social processes: The Electronically Activated Recorder (EAR) methodology in psychosomatics. *Psychosom. Med.* **74**, 410–417 (2012).
11. Lakey, B. & Orehek, E. Relational regulation theory: a new approach to explain the link between perceived social support and mental health. *Psychol. Rev.* **118**, 482–495 (2011).
12. Mehl, M. R., Vazire, S., Holleran, S. E. & Clark, C. S. Eavesdropping on happiness: Well-being is related to having less small talk and more substantive conversations. *Psychol. Sci.* **21**, 539–541 (2010).
13. Robbins, M. L., Wright, R. C. & Karan, A. Everyday coping behaviors. in *Wiley Encyclopedia of Health Psychology* (eds. Sweeny, K. & Robbins, M. L.) **2**, (Wiley, in press).
14. Karan, A., Wright, R. C. & Robbins, M. L. Everyday emotion word and personal pronoun use reflects dyadic adjustment among couples coping with breast cancer. *Pers. Relatsh.* (in press).
15. Mehl, M. R. & Holleran, S. E. An empirical analysis of the obtrusiveness of and participants' compliance with the electronically activated recorder (EAR). *Eur. J. Psychol. Assess.* **23**, 248–257 (2007).
16. Manson, J. H. & Robbins, M. L. New evaluation of the Electronically Activated Recorder (EAR): Obtrusiveness, compliance, and participant self-selection effects. *Front. Psychol.* **8**, 1–9 (2017).
17. Holtzman, N. S., Vazire, S. & Mehl, M. R. Sounds like a narcissist: Behavioral manifestations of narcissism in everyday life. *J. Res. Personal.* **44**, 478–484 (2010).
18. Mehl, M. R., Gosling, S. D. & Pennebaker, J. W. Personality in its natural habitat: manifestations and implicit folk theories of personality in daily life. *J. Pers. Soc. Psychol.* **90**, 862–877 (2006).

19. Robbins, M. L. Practical suggestions for legal and ethical concerns with social environment sampling methods. *Soc. Psychol. Personal. Sci.* **8**, 573–580 (2017).
20. Pennebaker, J. W. Theories, therapies, and taxpayers: On the complexities of the expressive writing paradigm. *Clin. Psychol. Sci. Pract.* **11**, 138–142 (2004).
21. Zech, E. & Rimé, B. Is talking about an emotional experience helpful? effects on emotional recovery and perceived benefits. *Clin. Psychol. Psychother.* **12**, 270–287 (2005).
22. Stiles, W. B., Shuster, P. L. & Harrigan, J. A. Disclosure and anxiety: A test of the fever model. *J. Pers. Soc. Psychol.* **63**, 980–988 (1992).
23. Pennebaker, J. W., Boyd, R. L., Jordan, K. & Blackburn, K. The Development and Psychometric Properties of LIWC2015. (2015).
24. Tausczik, Y. R. & Pennebaker, J. W. The psychological meaning of words: LIWC and computerized text analysis methods. *J. Lang. Soc. Psychol.* **29**, 24–54 (2010).
25. Bantum, E. O. & Owen, J. E. Evaluating the validity of computerized content analysis programs for identification of emotional expression in cancer narratives. *Psychol. Assess.* **21**, 79–88 (2009).
26. Radloff, L. S. The CES-D scale a self-report depression scale for research in the general population. *Appl. Psychol. Meas.* **1**, 385–401 (1977).
27. Segrin, C., Badger, T., Sieger, A., Meek, P. & Lopez, A. M. Interpersonal well-being and mental health among male partners of women with breast cancer. *Issues Ment. Health Nurs.* **27**, 371–389 (2006).
28. Diener, E. D., Emmons, R. A., Larsen, R. J. & Griffin, S. The satisfaction with life scale. *J. Pers. Assess.* **49**, 71–75 (1985).
29. Badger, T. *et al.* Telephone interpersonal counseling with women with breast cancer: Symptom management and quality of life. *Oncol. Nurs. Forum* **32**, 273–279 (2005).

30. Kenny, D. A., Kashy, D. A. & Cook, W. L. *Dyadic data analysis*. (Guilford Press, 2006).
31. Allison, P. D. *Multiple regression: A primer*. (Pine Forge Press, 1999).
32. Mehl, M. R., Vazire, S., Ramírez-Esparza, N., Slatcher, R. B. & Pennebaker, J. W. Are women really more talkative than men? *Science* **317**, 82–82 (2007).
33. Zakowski, S. G. *et al.* Social barriers to emotional expression and their relations to distress in male and female cancer patients. *Br. J. Health Psychol.* **8**, 271–286 (2003).

Acknowledgements

This project was supported by NIH Grant R03CA137975 and ACS IRG-74-001-28.

Conflict of Interest Statement

The authors have no conflicts of interest.

Table 1. Demographic and medical descriptive statistics

	Mean	SD	Range
Patient Age	56	14	24 – 82
Spouse Age	59	14	26 – 94
Years Married/Partnered	23	16	0.4 – 62
Months Since Diagnosis	11	14	1 – 56
	n	%	
Patient Sex:			
Female	52	100	
Partner Sex:			
Male	44	86.3	
Female	7	13.7	
Legally Married Couples:			
	38	73.1	
Patient Race:			
Caucasian	42	80.8	
Latina	6	11.5	
African American	2	3.8	
Other/Unknown	2	3.8	
Partner Race:			
Caucasian	42	82.4	
Latino	8	15.7	
Asian	1	2.0	
Patient Education:			
≤ Some College/Vocational	18	34.6	
Bachelor's Degree	18	34.6	
Post-graduate Degree	16	30.8	
Partner Education:			
≤ Some College/Vocational	21	40.5	
Bachelor's Degree	10	19.6	
Post-graduate Degree	20	39.2	
Stage of Disease:			
0	2	3.8	
I	16	30.8	
II	14	26.9	
III	12	23.1	
IV	4	7.7	
Unknown	4	7.7	
Patients on Medication for Depression			
	16	30.8	

Note. *N* = 52 patients and 51 spouses. Adapted from Robbins et al. (2014).

Table 2. Types and topics of non-cancer conversations

Conversation Type	Mean (SD) 95% CI	Example	Topic(s)	Mean Convos. (SD) 95% CI	
				Patients	Spouses
Emotional Disclosure	1.71 (2.91) 1.03, 2.61	Patient: Thanks for playing and having so much fun... It uh, definitely brightened my day.	Leisure	14.48 (7.73) 12.44, 16.59	12.30 (5.82) 10.75, 13.91
	1.15 (3.10) 0.46, 2.14	Spouse: He had poor circulation, and circulation is one of the biggest things about diabetes. That's when he and I got closer... He didn't accept me like your mother.	Health	6.78 (4.72) 5.58, 8.07	5.23 (3.31) 4.34, 6.13
			People	73.55 (12.09) 70.24, 76.75	69.95(11.67) 66.86, 72.94
		Patient: I never received a message for that, but I received when I walked inside the glory of God.	Religion	4.61 (4.97) 3.39, 6.05	3.66 (3.61) 2.74, 4.71
Substantive Conversation	31.78 (14.81) 27.70, 35.62	Patient: Well I mean their final check that they received... at some point that makes them the responsibility of First Magnus, not the employee.	Money	8.63 (5.97) 7.11, 10.23	9.94 (6.50) 8.28, 11.76
			Work	15.71 (7.91) 13.67, 17.86	15.43 (7.97) 13.36, 17.61
	31.09 (13.69) 27.37, 34.77	Spouse: There is pasta in the fridge... it's good for you.	Food	13.43 (6.16) 11.77, 15.09	10.84 (3.88) 9.79, 11.90
			Home	11.40 (5.94) 9.79, 13.03	7.75 (4.02) 6.70, 8.86
			Death	1.47 (1.99) 0.97, 2.03	1.19 (1.54) 0.80, 1.62
	Spouse: You're getting a nice foot rub. I hope, you like? I'm not putting you to sleep though?	Body	10.76 (5.04) 9.41, 12.09	9.01 (5.24) 7.65, 10.50	

Note. "Mean convos." is the percentage of all conversations that contained at least one word belonging to that topic dictionary. $N = 52$ patients and 51 spouses.

Table 3. Correlations of Patients' and Spouses' Non-Cancer Conversations and Adjustment

	1.	2.	3.	4.	5.	6.	7.
1. Depressive symptoms T1	.32*	.55***	-.58***	-.54***	.03	.01	-.01
2. Depressive symptoms T3	.71***	.43***	-.49***	-.56***	.18	.18	-.09
3. Satisfaction with life T1	-.52***	-.69***	.47***	.80***	-.12	-.17	.04
4. Satisfaction with life T3	-.45***	-.58***	.75***	.48***	-.12	-.20	.11
5. Non-cancer conversation	-.01	-.01	.01	-.05	.50***	.07	.46***
6. Emotional disclosure	.37**	.33*	-.36**	-.28*	-.12	.72***	-.09
7. Substantive conversations	-.43***	-.36**	.06	.19	.18	-.21	.63***

Note. All conversation variables are percentages of all conversations, and all are non-cancer. Patients' correlations are below the diagonal, spouses' correlations are above the diagonal, patients' and spouses' intercorrelations are bolded on the diagonal. $N = 50 - 52$, depending on missing data for each analysis. $^{\dagger}p \leq .10$; $*p \leq .05$; $**p \leq .01$; $***p \leq .001$

Table 4. Regressions of Couples' Non-Cancer Conversations and Adjustment

	Depressive Symptoms				Satisfaction with Life				Note.
	T1		T3		T1		T3		
	Patient	Spouse	Patient	Spouse	Patient	Spouse	Patient	Spouse	
Emotional Disclosure	.34** [.11, .56]	.13 [-.16, .41]	-.001 [-.19, .19]	.22 [†] [-.03, .47]	-.40*** [-.63, -.17]	-.09 [-.34, .17]	-.02 [-.22, .18]	-.09 [-.26, .09]	
Substantive Conversation	-.33** [-.56, -.11]	-.01 [-.28, .26]	-.12 [-.31, .08]	.000 [-.24, .24]	.04 [-.19, .27]	.10 [-.17, .36]	.17 [†] [-.02, .35]	.07 [-.11, .26]	
T1 Depressive Symptoms	-	-	.63*** [.40, .85]	.54*** [.27, .81]	-	-	-	-	
T1 Satisfaction with Life	-	-	-	-	-	-	.72*** [.50, .95]	.72*** [.52, .92]	

Emotional disclosure and substantive conversation are couple-level variables. Numbers are standardized regression coefficients from 8 separate regression models, with 95% confidence intervals. $N = 53$ for Depressive Symptoms; $N = 52$ for Satisfaction with Life. [†] $p \leq .10$; * $p \leq .05$; ** $p \leq .01$.