



Published in final edited form as:

J Psychosoc Oncol. 2011 January ; 29(1): 35–50. doi:10.1080/07347332.2011.534024.

Clinical, Demographic, and Situational Factors Linked to Distress Associated with Benign Breast Biopsy

Rachel F. Steffens, M.S., Heather R. Wright, M.D., Molly Y. Hester, M.D., and Michael A. Andrykowski, Ph.D.

University of Kentucky College of Medicine Department of Behavioral Science Lexington, KY

Abstract

Few studies have examined the magnitude of distress associated with specific aspects of the benign breast biopsy (BBB) or distress risk factors. Women (n=51) completed questionnaires regarding distress associated with a recent BBB experience. Clinical and demographic risk factors for distress were also examined. All women reported distress associated with BBB; one-third reported it as “very stressful.” Biopsy-specific events were rated most distressing. Younger age, less education, non-surgical biopsy, and absence of family history of breast cancer were identified as risk factors for distress. The identified factors provide an efficient and potentially cost-effective means of stratifying risk for BBB-related distress.

Introduction

Among US women, breast cancer (BC) is the second most common cancer diagnosis and second leading cause of cancer related mortality (American Cancer Society, 2008). Crucial to prevention and reduction of BC morbidity and mortality is early detection. Multiple studies have demonstrated a significant reduction in BC-related deaths due to earlier detection resulting from mammography screening (Anderson, Jatoi, & Devesa, 2006; Duffy, Tabár, Chen, Holmqvist, Yen, Abdsalah., et al., 2002; Freedman, Petitti, & Robins, 2004; Reddy, & Given-Wilson, 2006; Tabar, Yen, Vitak, Chene, Smith, & Duffy, 2003). Considered cornerstones of BC early detection efforts, mammography and clinical breast examination identify suspicious breast lesions which may require follow-up in the form of a breast biopsy. Fortunately, most breast biopsies yield benign results. It is estimated one million US women undergo a breast biopsy annually and approximately 80% receive a benign, or nonmalignant, test result (Chappy, 2004; Weaver, Vacek, Skelly, & Geller, 2005; Winchester, Sener, Immerman, & Blum, 1983).

While benign from a histological standpoint, a benign breast biopsy (BBB) may not be benign from a psychological or behavioral perspective. BC screening procedures generate a certain proportion of abnormal or suspicious results requiring additional follow-up. Although follow-up often indicates no malignancy is present, a “false positive” screening test result can be distressing. It is well-documented that false-positive results associated with mammography are associated with a broad range of negative responses including heightened risk perception, cancer-specific worry, depressive symptoms, anxiety, and general distress (Absetz, Aro, & Sutton, 2003; Brett & Austoker, 2001; Brett, Austoker, & Ong, 1998; Gilbert, Cordiner, Affleck, Hood, Mathieson, & Walker, 1998; Gram, Lund, & Slenker, 1990; Heckman, Fisher, Monsees, Merbaum, Ristvedt, & Bishop, 2004; Jatoi, Zhu, Shah, & Lawrence, 2006; Lipkus, Halabi, Strigo, & Rimer, 2000; MacFarlane & Sony, 1992; Sandin,

Chorot, Valiente, Lostao, & Santed, 2002). A much smaller body of research has examined the psychological and behavioral impact of BBB. However, the literature clearly indicates the BBB experience can be distressing for many women with distress likely exceeding that associated with only false positive mammography results (Cunningham, Andrykowski, Wilson, McGrath, Sloan, & Kenady, 1998; Deane, & Degner, 1998; Lebel, Jakubovits, Rosberger, Loiselle, Seguin, Cornaz, et al., 2003; Pineault, 2007; Seckel, & Birney, 1996). In addition to the distress associated with BBB, evidence also suggests BBB may detrimentally impact future breast cancer screening practices (Andrykowski, Carpenter, Studts, Cordova, Cunningham, Beacham, et al., 2002; Beacham, Carpenter, & Andrykowski, 2004; Brewer, Salz, & Lillie, 2007).

While the literature indicates BBB is a distressing experience for many women, little is known about specific aspects of the BBB experience evoking more or less distress. Receipt of a BBB result is the culmination of a chain of events often beginning with notification that a follow-up mammogram is needed, continuing through notification that a biopsy procedure is needed, undergoing the biopsy procedure itself, and culminating in a wait for biopsy results. Identification of which aspects of this sequence of events associated with the BBB are more or less distressing can inform clinical efforts to better manage distress and other potential negative consequences. Furthermore, little is known about clinical or demographic variables which might be associated with risk for BBB-related distress. If linked to risk for BBB-related distress, easily identifiable variables such as age, education, family history (FH) of BC, prior history of BBB, or type of biopsy procedure performed could be used to prospectively identify women most at risk for distress in biopsy settings. Clinical intervention efforts to manage BBB-related distress could then be targeted toward these women.

In response to these gaps in the present literature regarding the impact of BBB, the present study was designed to identify: (1) the magnitude of distress associated with specific aspects of the BBB experience; (2) clinical and demographic variables associated with the magnitude of distress associated with the BBB experience.

Methods

Participants & Accrual Procedures

Eligibility criteria for study participation included: ≥ 18 years of age and having undergone a BBB procedure 3 to 12 months prior to study participation. Potential participants were identified from clinic records at the University of Kentucky and were sent a letter of invitation. All women were asked to complete a questionnaire. Some women were also offered the opportunity to participate in a focus group or telephone interview designed to collect qualitative information about the BBB. This data will not be reported here. Focus group participants ($n = 13$) provided written informed consent and completed the study questionnaire on site, at the time of the focus group. All remaining participants ($n = 38$) were mailed the study consent form and questionnaire, which were completed and returned in the pre-addressed, stamped envelope provided.

Among 147 women invited to participate in our study, 20% ($n = 30$) declined and 43% ($n = 63$) did not respond. A total of 37% ($n = 54$) indicated interest in study participation of which 51 women were deemed study eligible, provided informed consent, and completed the study questionnaire. The final accrual rate was 35% (51/146).

Measures

The study questionnaire consisted of 17 items; data from 14 items are reported here. Six items collected demographic information including: age, education, date of breast biopsy,

type of breast biopsy procedure ('surgical' vs. 'non-surgical'), history of previous breast biopsy ('yes' vs. 'no'), and FH of BC in first degree female relatives (mother, sister, daughter; "yes" vs. "no").

Seven additional items assessed distress associated with the two main components of the breast biopsy experience: follow-up mammography and the biopsy procedure itself. Three of these items assessed mammography-related distress including being informed of needing additional mammography, waiting to undergo additional mammography, and waiting for the results of the additional mammography. Four of the seven items assessed biopsy-related distress including being informed of needing a breast biopsy, waiting to undergo the breast biopsy, undergoing the breast biopsy procedure, and waiting for the results of the biopsy. For these seven items, responses were recorded using a four point Likert scale with one end point labeled 'not stressful at all,' and the other endpoint labeled 'very stressful.' For mammography-related items, "does not apply to me" was an additional response option.

A final item assessed global distress associated with the BBB. Women were instructed to recall their entire BBB experience and rate their overall distress associated with their BBB. Responses were recorded using the four point Likert scale described above.

Additionally, two composite scores were calculated representing distress associated with the two major components of the BBB experience: follow-up mammography and the biopsy procedure. A mammography distress composite score was calculated as the sum of the three items assessing distress associated with a second mammogram (see above). A biopsy distress composite score was calculated as the sum of the four items assessing distress associated with the biopsy procedure (see above). If items were missing in the calculation of the mammography and biopsy composite scores, the mean of the remaining items was imputed provided a minimum of two items were present. Internal consistency (i.e., coefficient α) for the mammography distress and biopsy distress composite scores was .87 and .76, respectively.

Results

Women in the final study sample ($n = 51$) were a mean of 48.2 years of age ($SD = 14.5$; range = 18.6 – 82.5) and a mean of 263.43 days post-biopsy ($SD = 88.05$; range = 41 – 431) at the time of study participation. Educational level was as follows: less than high school (8%), high school degree (12%), some college or technical school (32%), and college degree or more (48%). Most women had no FH of BC in a first degree female relative ($n = 37$; 73%) and had no prior history of breast biopsy ($n = 31$; 61%). Slightly more than half the sample reported undergoing a non-surgical breast biopsy ($n = 28$; 55%).

Distress Associated with the BBB Experience

Descriptive data for items assessing global distress and distress associated with the seven specific aspects of the BBB experience are presented in Table 1. Distress scores could range from 0 to 3. The most distressing specific aspects of the biopsy experience were waiting for the results of the breast biopsy ($M = 2.28$, $SD = .73$), being informed of needing a breast biopsy ($M = 2.25$, $SD = .65$), and waiting to undergo the breast biopsy ($M = 2.22$, $SD = .65$). Nearly half of the sample reported the most extreme response possible, 'very stressful', when informed of needing a breast biopsy ($n = 24$; 47%) and waiting for the results of the breast biopsy ($n = 22$; 44%). With regard to global biopsy distress ratings, no woman (0%) rated her biopsy experience as "not stressful." In contrast, one in three women ($n = 17$; 33%) endorsed the most extreme rating possible (i.e., 'very stressful') in rating global distress associated with their BBB experience.

Clinical Variables Associated with BBB Distress

To examine differences in distress with regard to our clinical variables, we conducted a series of two-tailed, independent samples t-tests. The independent variables included history of BBB (yes vs. no), type of biopsy procedure (surgical vs. non-surgical), and FH of BC in first degree relatives (yes vs. no). A set of 10 dependent variables included: global distress, distress associated with the seven aspects of the BBB experience, and the mammography distress and biopsy distress composite scores. Results are shown in Table 2. With regard to prior history of BBB, women with a prior history reported more distress only when informed of needing follow-up mammography ($t(42) = 2.45, p = .02$). With regard to type of biopsy procedure, there were no significant group differences for individual distress items. However, the overall pattern of results suggested greater distress associated with non-surgical biopsies. Women who had undergone non-surgical breast biopsies reported greater distress on seven of the eight individual measures of distress ($p = .07$ by binomial test, 2-tailed) and 9 of the 10 distress ratings overall ($p = .022$ by binomial test, 2-tailed). With regard to FH of BC, women without a FH of BC reported more global distress associated with their BBB than did women with a FH of BC ($t(48) = 2.33, p < .05$). Additionally, the overall pattern of results suggested more distress was experienced by women without a FH of BC since these women reported more distress on all eight of the individual measures of distress ($p < .01$, by binomial test, 2-tailed) and all 10 of the distress ratings overall ($p < .01$, by binomial test, 2-tailed).

Demographic Variables Associated With BBB Distress

To examine differences in distress associated with age and education, Pearson Product Moment correlations were calculated. Dependent variables again included global distress associated with the breast biopsy, distress associated with the seven aspects of the BBB experience, and mammography and biopsy distress composite scores. Results are shown in Table 3. Age was inversely correlated with distress while waiting to undergo the second mammogram ($r = -.33, p = .03$), waiting for the results of the second mammogram ($r = -.34, p = .02$), and undergoing the breast biopsy ($r = -.39, p < .01$). Age was also inversely correlated with the biopsy distress composite index. ($r = -.29, p < .05$). (The inverse association between age and global distress approached statistical significance ($r = -.27, p = .06$). Data generally suggested an inverse association between age and biopsy-related distress as all 10 correlation coefficients were negative ($p = .002$ by binomial test, 2-tailed) with a mean $r = -.25$. Similarly, education was inversely correlated with distress when waiting to undergo the breast biopsy ($r = -.29, p < .05$) and when waiting for the results of the biopsy ($r = -.35, p < .05$). Again, the overall pattern of results suggested an inverse association between age and biopsy-related distress as all 10 correlation coefficients were negative ($p = .002$ by binomial test; 2-tailed) with a mean r of $-.23$.

Multivariate Prediction of BBB-Related Distress

A multiple regression analysis was used to examine the unique contribution of clinical and demographic variables to ratings of global biopsy-related distress. Age, education, FH of BC, history of biopsy, and type of biopsy were entered as independent variables. The overall five-variable model accounted for 20% of the variance in ratings of global distress ($R = .45, R^2 = .20$). The model as a whole approached statistical significance $F(5, 43) = 2.19, p = .07$. Among the five predictor variables, FH of BC was the most strongly linked to global biopsy-related distress ($\beta = -.34; p = .04$). Specifically, women without a FH of BC rated the overall BBB experience as more distressing than those women with a history.

Discussion

Consistent with prior research regarding the receipt of abnormal cancer screening results, our data clearly suggest a BBB is a distressing experience (Cunningham, et al., 1998; Deane & Degner, 1998; Lebel, et al., 2003; Pineault, 2007; Ryan, Graves, Pavlik, & Andrykowski, 2007; Seckel & Birney, 1996). All women reported some distress associated with their BBB experience and one third reported their experience was “very stressful” - the most extreme rating possible on our measure of global distress. Our data also extend previous research by identifying specific aspects of the BBB, a complex experience involving a series of events ranging from being informed of needing follow-up mammography to awaiting biopsy results, which are more or less distressing. In general, events associated with the biopsy itself were rated as the most distressing aspects of the entire BBB experience: being informed of needing a breast biopsy, waiting to undergo the biopsy, and waiting for biopsy results.

In contrast to events associated with the breast biopsy, events associated with undergoing additional, follow-up mammography after receipt of abnormal mammography results were generally rated as relatively less stressful. So while prior research has documented the recall for follow-up mammography is distressing, our data suggest the breast biopsy itself may be associated with even greater distress (Absetz, et al., 2003; Brett & Austoker, 2001; Brett, et al., 1998; Gilbert, et al., 1998; Gram, et al., 1990; Heckman, et al., 2004; Jatoi, et al., 2006; Lipkus, et al., 2000; MacFarlane & Sony, 1992; Sandin, et al., 2002).

Given the likelihood of significant distress associated with the biopsy experience, special efforts to manage this distress are clearly warranted. Which women might be at greatest risk for distress in the biopsy setting? Extending prior research, our data suggest several demographic and clinical factors associated with risk for distress in the BBB context. While the number of statistically significant findings for our individual distress ratings was small, the general pattern and direction of our findings markedly indicated younger age, less education, a non-surgical breast biopsy, and a FH of BC were all associated with reports of greater distress.

The inverse relationship between age and distress in the BBB setting is consistent with research in the cancer setting suggesting older women are less likely to experience and report distress (Carlson, Angen, Cullum, Goodey, Koopmans, Lamont, et al., 2004; Mosher & Danoff-Burg, 2006; Politi, Enright, & Weihs, 2007). Furthermore, from a developmental perspective, younger women may be less likely to have achieved life goals associated with marriage, family, and/or a career (Avis, Crawford, & Manuel, 2005). Thus, there is greater perceived potential for loss and psychosocial disruption posed by a potential diagnosis of BC in younger women (Kroenke, Rosner, Chen, Kawachi, Colditz, & Holmes, 2004). This may lead to younger women experiencing more distress due to the greater threat posed by a breast biopsy. Younger women might also utilize less effective coping skills than older women or have less informational support provided to them by medical staff, prompting greater distress when confronted with the threat posed by a breast biopsy (Brady & Helgeson, 2000; Drageset & Lindstrøm, 2005).

The inverse relationship between education and distress in the BBB setting is also consistent with previous research. Our finding that less educated women tended to report greater distress is consistent with prior research across mental health and medical settings indicating individuals with less education fare worse both with regard to physical and psychological health (Andrykowski & Cordova, 1998; Drossman, Leserman, Li, Keefe, Hu, & Toomey, 2000; Simoni & Ng, 2000; Ransom, Jacobsen, Schmidt, & Andrykowski, 2005; Widows, Jacobsen, & Fields, 2000). Educational status has been found to be positively associated

with effective coping strategies, independent information seeking, and competent use of informational resources (Bloom, Stewart, Johnston, Banks, & Fobair, 2001; Cordova, Cunningham, Carlson, & Andrykowski, 2001; Epping-Jordan, Compas, Osowiecki, Oppedisano, Gerhardt, & Gerhardt, et al., 1999; Rutten, Squiers, & Hesse, 2006; Seeman & Syme, 1987; Wiley & Sillman, 1990). Women with less education may feel more reticent to ask questions of medical staff or seek out supportive care. Consequently they may be less effective in eliciting informational and emotional support from medical staff, friends, and family (Gray, Goel, Fitch, Franssen, & Labrecque, 2002).

While our findings for the demographic variables of age and education were consistent with prior research, our findings for our clinical variables of FH of BC and type of breast biopsy were surprising. Relative to women without a FH of BC, prior research suggests women with a FH of BC tend to report inaccurately high perceptions of personal BC risk and greater anxiety and distress, particularly in BC screening settings (Brain, Norman, Gray, & Mansel, 1999; Erblich, Bovbjerg, & Valdimarsdottir, 2000; Hailey, Carter, & Burnett, 2000). However, in our study, BBB-related distress ratings for women without a FH of BC consistently exceeded the distress ratings for women with a FH, suggesting no FH of BC may be a risk factor for distress in the BBB setting. Why this seeming inconsistency with prior research? Women without a FH of BC likely have lower personal perceptions of BC risk and thus may consider their BC risk less frequently than women without an FH of BC. Consequently, women without a FH of BC may be more surprised and less prepared to cope with the potential threat posed by the need to undergo a breast biopsy (Absetz, Aro, Rehnberg, & Sutton, 2000). Alternatively, or in addition, distress differences between women with and without a FH of BC could be a result of differential treatment by medical staff. Medical staff understands a FH of BC represents greater objective risk for BC and may intentionally or unintentionally furnish more information and support to women with a family history of BC during the biopsy experience. If true, the recommendation would not be to decrease support furnished to women with FH's of BC but to ensure the provision of adequate informational and emotional support to all women undergoing breast biopsy.

Our findings for risk of distress associated with type of biopsy procedure were also surprising. Surgical biopsy is a more invasive procedure and generally associated with a greater index of suspicion, yet non-surgical biopsies were associated with greater distress. Why? As a non-surgical biopsy is performed under local anesthesia, women may experience greater distress due to their being fully conscious throughout the biopsy procedure (Denton, Ryan, Beaconfield, & Michell, 1999). Additionally, as surgical biopsies are generally associated with a higher index of suspicion, medical staff may intentionally or unintentionally furnish more information and support to women undergoing surgical breast biopsies (Hamming, Goslings, van Steenis, van Ravenswaay Claasen, Hermans, & van de Velde, 1990; Kerlikowske, Smith-Bindman, Ljung, & Grady, 2003; Reynolds, 2000). Again, if true, the recommendation would be to ensure that all women, irrespective of type of biopsy, are provided with appropriate information and adequate support.

Some limitations of our study should be noted. Our sample size was relatively small, limiting the statistical power of our analyses. Thus, caution should be exercised when interpreting null results. Additionally, we collected retrospective ratings of distress associated with the BBB experience which may have resulted in some biased or inaccurate recall of distress. Finally, our 35% accrual rate is fairly low, and may limit the generalizability of our results.

In conclusion, our data have clear clinical importance. While confirming the generally distressing nature of the BBB experience and its potential for triggering significant distress in a sizeable proportion of women, our data suggest some avenues for clinical efforts to

manage distress in the biopsy setting. Given limited clinical resources, our data suggest building distress management efforts around events associated with the biopsy procedure, beginning with notification of the need for a biopsy and continuing through the wait for biopsy results, might yield the most benefit. Specifically, waiting periods associated with the BBB were rated as particularly stressful; therefore, we suggest wait time reduction leading up to the biopsy and the receipt of results may be a relatively simple means of reducing BBB related distress. Furthermore, our data suggest several demographic and clinical risk factors for distress, suggesting distress management efforts be especially targeted toward women possessing a greater risk profile: younger, less educated women without a FH of BC undergoing a non-surgical biopsy procedure. As these risk factors are all readily identifiable, they furnish a simple, efficient, and potentially cost-effective means of stratifying risk for distress in the breast biopsy setting.

Acknowledgments

This research was supported by grant 5 K05 CA096558 from the National Institutes of Health

References

- Absetz P, Aro AR, Rehnberg G, Sutton SR. Comparative optimism in breast cancer risk perception: Effects of experience and risk factor knowledge. *Psychol Health Med*. 2000; 5(4):367–376.
- Absetz P, Aro AR, Sutton SR. Experience with breast cancer, pre- screening perceived susceptibility and the psychological impact of screening. *Psychooncology*. 2003; 12(4):305–318. [PubMed: 12748969]
- American Cancer Society. *Cancer Facts and Figures 2008*. American Cancer Society; Atlanta, GA: 2008.
- Anderson W, Jatoi I, Devesa S. Assessing the impact of screening mammography: breast cancer incidence and mortality rates in Connecticut (1943–2002). *Breast Cancer Res and Treat*. 2006; 99(3):333–340. [PubMed: 16703451]
- Andrykowski MA, Cordova MJ. Factors associated with PTSD symptoms following treatment for breast cancer: Test of the Andersen Model. *J Trauma Stress*. 1998; 11(2):189–203. [PubMed: 9565911]
- Andrykowski MA, Carpenter JS, Studts JL, Cordova MJ, Cunningham LLC, Beacham A, et al. Psychological impact of benign breast biopsy: A longitudinal, comparative study. *Health Psychol*. 2002; 21(5):485–494. [PubMed: 12211516]
- Avis NE, Crawford S, Manuel J. Quality of life among younger women with breast cancer. *J Clin Oncol*. 2005; 23(15):3322–3330. [PubMed: 15908646]
- Beacham AO, Carpenter JS, Andrykowski MA. Impact of benign breast biopsy upon breast self-examination. *Prev Medicine*. 2004; 38(6):723–731.
- Bloom JR, Stewart SL, Johnston M, Banks P, Fobair P. Sources of support and the physical and mental well-being of young women with breast cancer. *Social Science & Medicine*. 2001; 53(11):1513–1524. [PubMed: 11710426]
- Brady SS, Helgeson VS. Social support and adjustment to recurrence of breast cancer. *J Psychosoc Oncol*. 2000; 17(2):37–55.
- Brain K, Norman P, Gray J, Mansel R. Anxiety and adherence to breast self-examination in women with a family history of breast cancer. *Psychosom Med*. 1999; 61(2):181–187. [PubMed: 10204971]
- Brett J, Austoker J, Ong G. Do women who undergo further investigation for breast screening suffer adverse psychological consequences? A multi-centre follow-up study comparing different breast screening result groups five months after their last breast screening appointment. *J Public Health Med*. 1998; 20(4):396–403. [PubMed: 9923945]
- Brett J, Austoker J. Women who are recalled for further investigation for breast screening: psychological consequences 3 years after recall and factors affecting re-attendance. *J Public Health Med*. 2001; 23(4):292–300. [PubMed: 11873891]

- Brewer NT, Salz T, Lillie SE. Systematic review: The long-term effects of false-positive mammograms. *Ann Intern Med.* 2007; 146(7):502–510.
- Carlson L, Angen M, Cullum J, Goodey E, Koopmans J, Lamont L, et al. High levels of untreated distress and fatigue in cancer patients. *Br J Cancer.* 2004; 90(12):2297–2304. [PubMed: 15162149]
- Chappy SL. Women's experience with breast biopsy. *AORN Journal.* 2004; 80(5):885–901. [PubMed: 15566213]
- Cordova MJ, Cunningham LLC, Carlson CR, Andrykowski MA. Social constraints, cognitive processing, and adjustment to breast cancer. *J Consult Clin Psychol.* 2001; 69(4):706–711. [PubMed: 11550737]
- Cunningham L, Andrykowski M, Wilson J, McGrath P, Sloan D, Kenady D. Physical symptoms, distress, and breast cancer risk perceptions in women with benign breast problems. *Health Psychol.* 1998; 17(4):371–375. [PubMed: 9697947]
- Deane KA, Degner LF. Information needs, uncertainty, and anxiety in women who had a breast biopsy with benign outcome. *Cancer Nurs.* 1998; 21(2):117–126. [PubMed: 9556938]
- Denton ER, Ryan S, Beaconfield T, Michell MJ. Image-guided breast biopsy: Analysis of pain and discomfort related to technique. *Breast.* 1999; 8(5):257–260. [PubMed: 14965740]
- Drageset S, Lindstrøm TC. Coping with a possible breast cancer diagnosis: Demographic factors and social support. *J Adv Nurs.* 2005; 51(3):217–226. [PubMed: 16033589]
- Drossman DA, Leserman J, Li Z, Keefe F, Hu YJB, Toomey TC. Effects of coping on health outcome among women with gastrointestinal disorders. *Psychosom Med.* 2000; 62(3):309–317. [PubMed: 10845344]
- Duffy SW, Tabár L, Chen H-H, Holmqvist M, Yen M-F, Abdsalah S, et al. The impact of organized mammography service screening on breast carcinoma mortality in seven Swedish counties. *Cancer.* 2002; 95(3):458–469. [PubMed: 12209737]
- Epping-Jordan JE, Compas BE, Osowiecki DM, Oppedisano G, Gerhardt C, Primo K, et al. Psychological adjustment to breast cancer: Processes of emotional distress. *Health Psychol.* 1999; 18(4):315–326. [PubMed: 10431932]
- Erblich J, Bovbjerg D, Valdinarsdottir H. Looking forward and back: Distress among women at familial risk for breast cancer. *Ann Behav Med.* 2000; 22(1):53–59. [PubMed: 10892528]
- Freedman DA, Petitti DB, Robins JM. On the efficacy of screening for breast cancer. *Int J of Epidemiol.* 2004; 33(1):43–55. [PubMed: 15075144]
- Gilbert FJ, Cordiner CM, Affleck IR, Hood DB, Mathieson D, Walker LG. Breast screening: the psychological sequelae of false-positive recall in women with and without a family history of breast cancer. *Eur J Cancer.* 1998; 34(13):2010–2014. [PubMed: 10070302]
- Gram IT, Lund E, Slenker SE. Quality of life following a false positive mammogram. *Br J Cancer.* 1990; 62(6):1018–1022. [PubMed: 2257206]
- Gray R, Goel V, Fitch M, Franssen E, Labrecque M. Supportive care provided by physicians and nurses to women with breast cancer. *Supportive Care Cancer.* 2002; 10(8):647–652.
- Heckman BD, Fisher EB, Monsees B, Merbaum M, Ristvedt S, Bishop C. Coping and anxiety in women recalled for additional diagnostic procedures following an abnormal screening mammogram. *Health Psychol.* 2004; 23(1):42–48. [PubMed: 14756602]
- Hailey BJ, Carter CL, Burnett DR. Breast cancer attitudes, knowledge, and screening behavior in women with and without a family history of breast cancer. *Health Care Women Int.* 2000; 21(8):701–715. [PubMed: 11813762]
- Hamming J, Goslings B, van Steenis G, van Ravenswaay Claasen H, Hermans J, van de Velde C. The value of fine-needle aspiration biopsy in patients with nodular thyroid disease divided into groups of suspicion of malignant neoplasms on clinical grounds. *Arch Intern Med.* 1990; 150(1):113–116. [PubMed: 2297281]
- Jatoi I, Zhu K, Shah M, Lawrence W. Psychological distress in U.S. women who have experienced false-positive mammograms. *Breast Cancer Res and Treat.* 2006; 100(2):191–200. [PubMed: 16773439]

- Kerlikowske K, Smith-Bindman R, Ljung B-M, Grady D. Evaluation of abnormal mammography results and palpable breast abnormalities. *Ann Intern Med.* 2003; 139(4):274–284. [PubMed: 12965983]
- Kroenke CH, Rosner B, Chen WY, Kawachi I, Colditz GA, Holmes MD. Functional impact of breast cancer by age at diagnosis. *J Clin Oncol.* 2004; 22(10):1849–1856. [PubMed: 15143077]
- Lebel S, Jakobovits G, Rosberger Z, Loiselle C, Seguin C, Cornaz C, et al. Waiting for a breast biopsy: Psychosocial consequences and coping strategies. *J Psychosom Res.* 2003; 55(5):437–443. [PubMed: 14581098]
- Lipkus IM, Halabi S, Strigo TS, Rimer BK. The impact of abnormal mammograms on psychosocial outcomes and subsequent screening. *Psychooncology.* 2000; 9(5):402–410. [PubMed: 11038478]
- MacFarlane M, Sony S. Women, breast lump discovery, and associated stress. *Health Care Women Int.* 1992; 13(1):23–32. [PubMed: 1556029]
- Mosher CE, Danoff-Burg S. A review of age differences in psychological adjustment to breast cancer. *J Psychosoc Oncol.* 2006; 23(2-3):101–114. [PubMed: 16492654]
- Pineault P. Breast cancer screening: Women's experiences of waiting for further testing. *Oncol Nurs Forum.* 2007; 34(4):847–853. [PubMed: 17723985]
- Politi M, Enright T, Weihs K. The effects of age and emotional acceptance on distress among breast cancer patients. *Supportive Care Cancer.* 2007; 15(1):73–79.
- Ransom S, Jacobsen PB, Schmidt JE, Andrykowski MA. Relationship of problem-focused coping strategies to changes in quality of life following treatment for early stage breast cancer. *J Pain Symptom Manage.* 2005; 30(3):243–253. [PubMed: 16183008]
- Reddy M, Given-Wilson R. Screening for breast cancer. *Women's Health Medicine.* 2006; 3(1):22–27.
- Reynolds HE. Core needle biopsy of challenging benign breast conditions: A comprehensive literature review. *Am. J. Roentgenol.* 2000; 174(5):1245–1250. [PubMed: 10789770]
- Rutten LJF, Squiers L, Hesse B. Cancer-related information seeking: Hints from the 2003 Health Information National Trends Survey (HINTS). *J Health Commun.* 2006; 11(1):147–156. [PubMed: 16641080]
- Ryan PY, Graves KD, Pavlik EJ, Andrykowski MA. Abnormal ovarian cancer screening test result: Women's informational, psychological and practical needs. *J Psychosoc Oncol.* 2007; 25(4):1–18. [PubMed: 18032262]
- Sandin B, Chorot P, Valiente R, Lostao L, Santed M. Adverse psychological effects in women attending a second-stage breast cancer screening. *J Psychosom Res.* 2002; 52(5):303–309. [PubMed: 12023127]
- Seckel MM, Birney MH. Social support, stress, and age in women undergoing breast biopsies. *Clin Nurse Spec.* 1996; 10(3):137–143. [PubMed: 8846455]
- Seeman TE, Syme SL. Social networks and coronary artery disease: A comparison of the structure and function of social relations as predictors of disease. *Psychosom Med.* 1987; 49(4):341–354. [PubMed: 3615763]
- Simoni JM, Ng MT. Trauma, coping, and depression among women with HIV/AIDS in New York City. *AIDS Care.* 2000; 12(5):567–580. [PubMed: 11218543]
- Tabar L, Yen M-F, Vitak B, Chene H-HT, Smith RA, Duffy SW. Mammography service screening and mortality in breast cancer patients: 20-year follow-up before and after introduction of screening. *Lancet.* 2003; 361(9367):1405–1410. [PubMed: 12727392]
- Weaver DL, Vacek PM, Skelly JM, Geller BM. Predicting biopsy outcome after mammography: What is the likelihood the patient has invasive or in situ breast cancer? *Ann Surg Oncol.* 2005; 12(8):660–673. [PubMed: 15968496]
- Widows MR, Jacobsen PB, Fields KK. Relation of psychological vulnerability factors to posttraumatic stress disorder symptomatology in bone marrow transplant recipients. *Psychosom Med.* 2000; 62(6):873–882. [PubMed: 11139008]
- Wiley C, Sillman R. The impact of disease on the social-support experiences of cancer patients. *J Psychosoc Oncol.* 1990; 8(1):79–96.
- Winchester DP, Sener S, Immerman S, Blum M. A systematic approach to the evaluation and management of breast masses. *Cancer.* 1983; 51(S12):2535–2539. [PubMed: 6850531]

Table 1

Means, Standard Deviations, and Proportion of Women Reporting Extreme Responses for Distress Associated with Various Aspects of the BBB Experience

Aspect of BBB Experience	N	M ^a	SD	Not stressful ^b	Very stressful ^c
Informed of needing a second mammogram	44	1.77	.94	11%	23%
Waiting to undergo the second mammogram	43	1.60	1.03	19%	21%
Waiting for the results of the second mammogram	44	2.02	.93	7%	36%
Being informed of needing a breast biopsy	51	2.25	.82	2%	47%
Waiting to undergo the breast biopsy	49	2.22	.65	0%	35%
Undergoing the breast biopsy	50	1.88	1.00	12%	32%
Waiting for the results of the breast biopsy	50	2.28	.73	0%	44%
Distress associated with entire BBB experience	51	2.08	.77	0%	33%

^a Responses rated on four point Likert scale with "0" corresponding to "not stressful at all" and "3" corresponding to "very stressful."

^b Proportion of respondents reporting that aspect of the BBB was "not stressful at all."

^c Proportion of respondents reporting that aspect of the BBB was "very stressful."

Table 2
Means and Standard Deviations for BBB Distress Items for Women by Presence and Absence of Clinical Variables

Source	No History of BBB (N = 31)		History of BBB (N = 20)		p-value ^a		Non-Surgical Biopsy (N = 28)		Surgical Biopsy (N = 23)		p-value ^a		No Family History of BC (N = 36)		Family History of BC (N = 14)		p-value ^a
	M ^b	SD	M ^b	SD	p-value ^a	M ^b	SD	M ^b	SD	M ^b	SD	p-value ^a	M ^b	SD	M ^b	SD	
Being told of needing a second mammogram	1.50	.99	2.17	1.93	.02	1.93	.92	1.93	.94	1.53	.94	.17	1.87	.94	1.54	.97	.30
Waiting to undergo a second mammogram	1.56	1.00	1.67	1.63	.74	1.63	1.04	1.56	1.03	1.56	1.03	.84	1.71	.90	1.50	1.22	.52
Waiting for results of the second mammogram	1.96	1.02	2.11	2.07	.61	2.07	.94	1.94	.93	1.94	.93	.65	2.17	.93	1.79	.89	.20
Being informed of needing a breast biopsy	2.26	.89	2.25	2.39	.97	2.39	.74	2.09	.90	2.09	.90	.19	2.31	.82	2.14	.86	.54
Waiting to undergo the breast biopsy	2.27	.64	2.16	2.15	.58	2.15	.72	2.32	.57	2.32	.57	.37	2.29	.52	2.07	.92	.29
Undergoing the breast biopsy	1.97	.98	1.74	2.04	.44	2.04	1.02	1.70	.97	1.70	.97	.23	1.94	1.01	1.77	1.01	.60
Waiting for the results of the breast biopsy	2.30	.75	2.25	2.39	.82	2.39	.74	2.14	.71	2.14	.71	.22	2.34	.73	2.14	.77	.40
Distress associated with entire BBB experience	2.13	.85	2.00	2.11	.57	2.11	.79	2.04	.77	2.04	.77	.77	2.25	.73	1.71	.73	.02
Composite distress of follow-up mammography ^c	6.02	1.95	6.41	6.38	.55	6.38	2.00	5.89	1.92	5.89	1.92	.47	6.38	1.94	5.91	2.07	.51
Composite distress of the breast biopsy procedure ^d	8.68	3.02	8.50	9.04	.83	9.04	2.77	8.09	2.89	8.09	2.89	.24	8.81	2.72	8.21	3.26	.52

^a p-value associated with t-test for independent samples.

^b Mean responses rated on four point Likert scale ranging from 0-3.

^c Composite of three distress items associated with follow-up mammography – possible range from 0 to 9.

^d Composite of four distress items associated with the breast biopsy procedure – possible range from 0 to 12.

Table 3

Pearson Product Moment Correlations between Ratings of Distress Associated with the BBB Experience and Age and Education

Variable	Age	Education
Being informed of needing a second mammogram	-.12	-.23
Waiting to undergo the second mammogram	-.33*	-.15
Waiting for the results of the second mammogram	-.34*	-.23
Being informed one needed a breast biopsy	-.15	-.26
Waiting to undergo the breast biopsy	-.23	-.29*
Undergoing the breast biopsy	-.39**	-.11
Waiting for the results of the breast biopsy	-.08	-.35*
Distress associated with entire BBB experience	-.27	-.20
Composite distress of follow-up mammography ^a	-.28	-.29
Composite distress of the breast biopsy procedure ^b	-.29*	-.23

*
p < .05,

**
p < .01

^aComposite of three distress items associated with follow-up mammography – possible range from 0 to 9.

^bComposite of four distress items associated with the breast biopsy procedure – possible range from 0 to 12.