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# DISTRESS AND HEALTH INFORMATION INTERESTS OF WOMEN FOLLOWING A BENIGN BREAST BIOPSY

Rachel Fancher Steffens  
*University of Kentucky*

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## ABSTRACT OF THESIS

### DISTRESS AND HEALTH INFORMATION INTERESTS OF WOMEN FOLLOWING A BENIGN BREAST BIOPSY

Benign breast biopsy (BBB) can be a stressful experience for many women. Few studies have examined the specific aspects of the BBB more and less distressing. However, no research studies have examined demographic and clinical variables as they relate to distress associated with specific aspects of the BBB or the informational interests of women following a BBB. This study evaluated the magnitude of distress associated with each aspect of the BBB (additional mammography, waiting for the results of the mammography, being informed of needing a biopsy, etc.) as well as the clinical (family history of BC in first degree relative, history of BBB, and type of biopsy) and demographic (age and education) variables as correlates of distress associated with each aspect of a BBB. Additionally, we examined health information interests in women following a BBB and the manner in which women preferred to have this health information communicated.

**KEYWORDS:** Benign Breast Biopsy, False-positive Breast Biopsy, False-positive Mammogram, Breast Cancer Screening, Distress.

Rachel Fancher Steffens

January 27, 2009

DISTRESS AND HEALTH INFORMATION INTERESTS OF WOMEN  
FOLLOWING A BENIGN BREAST BIOPSY

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THESIS

Rachel Fancher Steffens

The Graduate School

University of Kentucky

2009

DISTRESS AND HEALTH INFORMATION INTERESTS OF WOMEN  
FOLLOWING A BENIGN BREAST BIOPSY

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THESIS

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A thesis submitted in partial fulfillment of the  
requirements for the degree of Master of Science in the  
Department of Psychology  
at the University of Kentucky

By

Rachel Fancher Steffens

Lexington, Kentucky

Director: Dr. Michael A. Andrykowski, Professor of Behavioral Science

Lexington, Kentucky

2009

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## DEDICATION

This thesis is dedicated to my mother, Mary Eva Thicksten, who has consistently challenged and motivated me to be the best individual for whom I am capable throughout the course of my life. It is because of her example that each detail is significant, every life is of highest value, and I am able to pursue with confidence, a life driven by the pursuit of helping others through my writing and research efforts.

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Furthermore and of tantamount significance, I was also privileged to receive a tremendous level of social support and love from my family members and friends. My husband, Neil C. Steffens, was a consistent pillar of emotional strength and unfaltering love; Neil never wavered in providing moral support and encouragement at every step of the process. A dear and loyal friend, Jennifer Kilkus Poe, often provided reassurance, support, and hope during the entirety of completing this thesis. Jen was the person to whom I could turn to for a 'boost' of motivation and optimism. Lastly, my sisters, both of whom are uniquely brilliant, have often exemplified the character, tenacity, and integrity for which I was often forced to draw upon during this process. Finally, I thank the brave women of my study who gave of their time and selves. It was their honesty and vulnerability which allowed me to develop an informative and empirically relevant project with many implications for future research and clinical intervention.



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## Introduction

### *Background and Significance*

It is estimated over 182,000 women will be diagnosed with invasive breast cancer (BC) in 2008 (American Cancer Society, 2008). The American Cancer Society (ACS) reports BC is the second most prevalent form of cancer and the second leading cause of cancer-related deaths in women. Since BC is not fully preventable, both the ACS and Center for Disease Control advocate the use of BC screening behaviors such as breast self exam, clinical breast exam, and mammography to assist in earlier detection. Early detection in BC is essential as it is key to successful treatment and reduction in BC mortality (Anderson, Jatoi, & Devesa, 2006; Tabar, Yen, Vitak, Chene, Smith, & Duffy, 2003) and morbidity (Reddy & Given-Wilson, 2004).

Multiple studies have demonstrated a significant reduction in BC-related deaths due to earlier detection as resulting from mammographic screening practices (Duffy, Tabár, Chen, Holmqvist, Yen, Abdsalah, et al., 2002; Freedman, Petitti, & Robins, 2004). However, with increased mammography screening, there is a positive linear increase in the number of abnormalities detected and breast biopsies performed (Weaver, Vacek, Skelly, & Geller, 2005). This directly translates into a higher percentage of women who will experience a false-positive screening result. Nonetheless, of the estimated one million US women who will undergo a breast biopsy in 2008 (Chappy, 2004; Ghosh, Melton, Suman, Grant, Sterioff, Brandt, et al., 2005; Weaver, Vacek, Skelly, Geller, 2005), approximately 80% will receive “an all” clear or benign test result (American Cancer Society, 2007).

An abnormal mammography result typically requires clinical follow-up in the form of additional mammography, a clinical breast exam, breast biopsy, or some combination of these (Barton, et al., 2004). This need for additional clinical follow-up is likely associated with distress. Among women recalled for further clinical follow-up after an abnormal mammogram, distress tends to be more severe and prevalent than for women with normal, initial mammography results (Brett & Austoker, 2001; Brett, Austoker, & Ong, 1998). The scientific literature suggests a range of negative responses associated with abnormal mammography test results including heightened sense of risk, cancer-specific worry, and general distress (Gilbert, Cordiner, Affleck, Hood, Mathieson, & Walker, 1998; Lipkus, Halabi, Strigo, & Rimer, 2000). More specifically, abnormal or ambiguous mammogram results have been associated with general increases in distress, anxiety (Pineault, 2007) depressive symptomatology (Jatoi, Zhu, Shah, & Lawrence, 2006), and anxiety (Heckman, Fisher, Monsees, Merbaum, Ristvedt, & Bishop, 2004; Barton, Morley, Moore, Allen, Kleinman, Emmons, et al. 2004; Gram, Lund, & Slenker, 1990).

While follow-up testing after an abnormal mammogram is stressful for most women, those experiencing an abnormal test result specifically leading to a breast biopsy may actually fare worse in regard to negative psychological consequences (Brett, Austoker, & Ong, 1998; Pineault, 2007). Thus, women who experience a benign breast biopsy (BBB) comprise a sub-set of particularly vulnerable individuals. Women who experience a BBB not only report more distress than women with normal screening results (Absetz, Aro, & Sutton, 2003), but report distress in multiple forms. This includes distress manifested as longer-term breast cancer specific worry (Sandin, Chorot, Valiente,

Lostao, & Santed, 2002), heightened risk perception (Brewer, Weinstein, Cuite, Herrington, 2004), depression (Lebel, Jakubovits, Rosberger, Loiselle, Seguin, Cornaz, et al., 2003), anxiety (Benedict, Williams, & Baron, 1994) and other forms of distress (Cunningham, Andrykowski, Wilson, McGrath, Sloan, & Kenady, 1998). In addition to the negative psychosocial outcomes of BBB, some findings suggest a BBB could potentially negatively impact future screening practices (Brett & Austoker, 2001). An alarming percentage of women, following a BBB, were less compliant with advised breast self exam than women who had received normal test results (Beacham, Carpenter, & Andrykowski, 2004).

#### Factors associated with BBB Distress

While the scientific literature suggests a BBB is distressing (Andrykowski, Carpenter, Studts, Cordova, Cunningham, Beacham, et al., 2002; Brewer, Salz, & Lillie, 2007; Deane & Degner, 1998) little is known about which specific aspects of the entire BBB experience are more or less distressing. Additionally, little is known about the specific factors associated with risk for BBB related distress. For example, distress could be associated with clinical variables such as the type of biopsy, family history of BC and previous history of biopsy as well as the demographic variables of age and education. These are questions that need to be answered since the identification of individuals at greatest risk for distress following a BBB and the specific time points most distressing during the BBB can inform and impact tailored intervention efforts. Thus, the purpose of this study was to address these gaps in the literature and provide answers as to what characteristics of women in the BBB setting may increase risk for distress and what specific aspects of the BBB are most and least distressing.

*Type of biopsy:*

Breast biopsies can be categorized generally as either non-surgical or surgical. Non-surgical biopsies are the most common form of breast biopsy. Non-surgical biopsy procedures (ie: core needle, fine needle aspiration, etc.) were specifically designed and developed as a less invasive means to detect cancer since the vast majority of abnormalities tested by biopsy are found to be benign (Singletary, 2001). Non-surgical biopsies are more time efficient, more cost effective (Schmidt, 1994), and can be considered less invasive than surgical biopsies. As a result, they have been associated with fewer negative consequences, such as scarring (Heywang-Köbrunner, Schaumlöffel, Viehweg, Höfer, Buchmann, & Lampe, 1998) and surgery-related complications, compared to surgical biopsies (Dershaw, 2000).

Surgical, often excisional, biopsies differ from non-surgical biopsies since they were designed to allow for the full removal of an abnormal mass as well as tissue around the mass. Surgical biopsy commonly requires use of general anesthetic (ACS, 2008). Some research suggests surgical biopsy has a slightly greater sensitivity (White, Halperin, Olson, Soo, Bentley, Seigler, 2001) but refuting evidence exists that in cases of identified mammographic lesions (Bauer, Sung, Eckhert, Koul, Castillo, & Nemoto, 1997) and lower suspicion masses, non-surgical biopsy is comparably sensitive and specific (Gisvold, Goellner, Grant, Donohue, Sykes, Karsell, et al., 1994; Schmidt, 1994). Thus, surgical biopsy is much less commonly utilized due to its invasive nature and reported morbidity (Cross, Evans, Peters, Cheek, Jones, & Krakos, 1994).

Even with various measures in place to decrease pain and discomfort, such as the use of sedatives (van Vlymen, Sa Rego, & White, 1999) and hypnosis-based

interventions (Montgomery, Bovbjerg, Schnur, David, Goldfarb, Wertz, et al., 2007), the literature includes a number of studies suggesting women still experience pain at varying intensities when undergoing breast biopsy procedures (Satchithananda, Fernando, Ralleigh, Evans, Wasan, Bose, et al, 2005; Zagouri, Sergentanisa, Gounarisb, Koulocheria, Nonnic, Domeyera, et al. 2008). In general, while both non-surgical and surgical breast biopsies are both invasive procedures, surgical biopsy is considered to be more invasive because of the use of general anesthetic and the various risks and complications associated with surgery. Therefore, it might be expected that women required to undergo a surgical breast biopsy would report more distress than those who underwent a non-surgical breast biopsy.

#### *History of Previous BBB*

Some women experience multiple BBBs over their lifetime. While the experience of one BBB is likely to be distressing, a prior history of BBB may exacerbate the negative impact of a subsequent BBB. Results of a study examining the specific impact of previous BBB history on distress following an abnormal mammogram, indicated a history of BBB was associated with greater distress (Haas, Kaplan, McMillan, & Esserman, 2001). Specifically, prior history of BBB was significantly associated with anxiety at both short-term (4-6 weeks) and longer-term assessments (~ 8 months). However, it should be noted that this particular sample was comprised of nearly 30% BC survivors. Nonetheless, these results suggest that previous experience of a BBB may magnify the negative psychological impact of undergoing an additional breast biopsy. Lebel et al. (2003) found a previous history of BBB was significantly associated with intrusive

and avoidant thoughts and anxiety among women following an abnormal mammogram and awaiting a breast biopsy. Having to undergo a breast biopsy is likely to heighten risk perception and cancer-specific anxiety (Absetz, Aro, & Sutton, 2003) and a prior “scare” with regard to having a malignancy may serve to augment negative emotion.

### *Family History of BC*

Currently, no research has specifically addressed whether a family history of BC influences distress associated with various aspects of a BBB. However, we extrapolated from related literature that among women who perceive their risk for BC as higher, a BBB is likely a distressing event. It is widely accepted women with first degree relatives (FDRs) with BC comprise a group at higher risk to experience more distress in general. This may be due to the fact that the lifetime, objective risk for BC is elevated for these women. Potentially, due to this knowledge, FDRs may often experience more distress than women without a family history of BC (Rothmund, Paepke, & Flor, 2001).

Beyond objective risk, it appears that women generally overestimate their personal risk for BC. The literature confirms that many women incorrectly estimate their risk for BC (Hopwood, 2000) and women who have family histories of BC more often incorrectly overestimate risk and experience more negative emotionality than women without a family history of BC (Rothmund, Paepke, & Flor, 2001). Women with a family history of BC consistently report higher subjective (perceived) risk for BC than women without a family history of breast cancer (Kash, Holland, Halper, & Miller, 1992; Meiser, Butow, Schnieden, Gattas, Gaff, Harrop, et al., 2000). Subsequently, this heightened, subjective perceived risk, when paired with a BBB, might escalate the



perceived threat of a breast biopsy, thus intensifying the distress associated with the BBB.

### *Demographic Variables*

While a limited number of research studies have examined age as a potential risk factor for distress following a false-positive cancer screening test, there is a growing body of literature within the general cancer literature providing support that age is likely an important predictor of psychological adjustment (Epping-Jordan, Compas, Osowiecki, Oppedisano, Gerhardt, Primo, et al., 1999; Compas, Stoll, Thomsen, Oppedisano, Epping-Jordan, & Krag, 1999) and coping (Baider, Andritsch, Uziely, Goldzweig, Ever-Hadani, Hofman, et al., 2003). Increasing evidence within the cancer literature also suggests women who are younger are more likely to report distress than older women (Carlson, Angen, Cullum, Goodey, Koopmans, Lamont, et al., 2004; Mosher & Danoff-Burg, 2006; Politi, Enright, & Weihs, 2007). Specifically within the context of a breast biopsy, older women (> 40 years) reported less distress compared to younger women ( $\leq$  40 years) who were scheduled to undergo a breast biopsy (Seckel & Birney, 1996).

Various explanations exist with regard to understanding why age would influence distress associated with a potential BC diagnosis. Perhaps it is the threat posed by a BBB and a potential diagnosis of BC which is perceived greater for younger women? Some literature suggests younger women experience BC as more distressing because it poses greater threat to unachieved life goals, such as a career, raising small children, or family planning (Avis, Crawford, & Manuel, 2005). From a purely social perspective, a BC diagnosis in a younger woman is much less normative than a diagnosis in an older woman; thus a BC diagnosis in a younger woman is more emotionally and

psychologically ‘shocking.’ While it is unclear precisely why younger women experience more distress in response to BC, it is likely that differences in resources, social support, and coping behaviors are potentially influential.

Education may also be a powerful predictor of distress following a BBB. Within the specific context of women scheduled to undergo a breast biopsy, data revealed education was inversely associated with reported distress (Northouse, Jeffs, Cracchiolo-Caraway, Lampman, & Dorris, 1995; Novy, Price, Huynh, Schuetz, 2001). In a related study, less educated women were significantly less likely to feel reassured following a benign breast diagnosis (Meechan, Collins, Moss-Morris, & Petrie, 2005). Lastly, among women who had actually experienced a BBB, distress was inversely associated with education (Andrykowski, et al., 2002). Two potential explanations as to why this relationship exists may be due to less-educated women being perceived by medical staff as less capable of understanding pertinent health-related information in a breast biopsy setting. Additionally, women who have less education may be less experienced in asking the type of questions leading to informational support. Both of these explanations could lead to systematic biases on the part of the medical staff which could result in less-educated women receiving inadequate information-based support. Consequently, less-educated women understand less about the BBB and are more likely to experience greater distress. While the explanation of why education may associate negatively with distress in a breast biopsy setting is not definitive, limited experience with how to ask for as well as how to seek out information is likely influential.

## BBB and Interest in Additional Health-Related Information

Following a distressing, medically-related event, some individuals may begin adhering to healthier lifestyle choices (Andrykowski, Beacham, Schmidt, & Harper, 2006; Gorin, Phelan, Hill, & Wing, 2004; McBride, Puleo, Pollak, Clipp, Woolford, & Emmons, 2008; McGovern, Gross, Krueger, Engelhard, Cordes, & Church, 2004). Specifically within the cancer screening literature, data suggests receipt of abnormal screening test results may motivate interest in health behavior change (Ostroff, Buckshee, Mancuso, Yankelevitz, & Henschke, 2001; Taylor, Cox, Zincke, Mehta, McGuire, & Gelmann, 2007). Additional literature suggests that simply undergoing a cancer screening may be distressing enough to stimulate positive health behavior change (Cox, Clark, Jett, Patten, Schroeder, et al., 2003; Lerman, Schwartz, Lin, & Hughes, 1997). Why is this? One explanation might be that the period of time subsequent to a distressing health-related event, such as a false-positive cancer screening test result, is a “Teachable Moment” (TM).

McBride et al. (2003) defined TM’s as “naturally occurring life transitions or health events thought to motivate individuals to spontaneously adopt risk-reducing health behaviors.” According to McBride and colleagues, a TM is characterized by the following: a subsequent increase in risk perception, change in self-concept or societal role, and affective or emotional response following a cuing event (ie: a BBB). Assuming a BBB is a TM, enhanced motivation to engage in healthier behaviors could be reflected in an enhanced interest in learning about new health topics or learning additional cancer-specific health information. Therefore, it is suggested that experience of a BBB may well serve as a TM to amplify the health information interest (i.e., ‘teachability’) of women

following a BBB. If so, this might support the development, design, and implementation of tailored health information interventions following a BBB.

### *Summary*

The literature clearly indicates BBB can be a stressful experience for many women (Lang, Berbaum, Faintuch, Hatsiopoulou, Halsey, Li, et al., 2006; Lindfors, O'Connor, Acredolo, & Liston, 1998; Witek-Januseka, Gabramb, & Mathews, 2007). However, little research has examined the specific aspects of the BBB experience that are more or less distressing for women. Additionally, little is known about the clinical or demographic factors that are associated with more or less distress in the BBB context. Furthermore, while the BBB experience is most likely distressing, it could potentially serve as a TM to motivate and enhance interest in changing critical health behavior or learning important health-related information. This is why it is so important to identify which women might be most receptive to receiving additional health-related information, the specific information in which they are interested, and the modes of receiving this information they might prefer.

### *Study Aims*

In response to these gaps in the present literature, the present study was designed to examine the magnitude of distress associated with particular aspects of the BBB experience. The specific aims of the study include identification of: (1) the magnitude of distress associated with various aspects of the BBB experience; (2) clinical and demographic variables associated with the magnitude of distress and relief associated with the BBB experience; (3) women's health information interests and preferred modes of communicating this information following a BBB, and (4) clinical, demographic, and

psychosocial variables associated with health information interests in women following a BBB.

### *Study Hypotheses*

It is hypothesized that: (a) Women who have a prior history of BBB will report greater global distress and greater distress at each of seven specific time points (distress when informed one needed additional mammography, distress when waiting to undergo the mammography, distress when waiting for the results of the mammography, distress when informed one needed a breast biopsy, distress when waiting to undergo the breast biopsy, distress while undergoing the breast biopsy, and distress waiting for results of the breast biopsy) than women who do not have a prior history of BBB; (b) Women who have undergone a surgical biopsy will experience greater global distress and distress at each of these seven specific time points; (c) Women who have a family history of BC in a first degree relative (FDR) will report greater global distress and distress at each of these seven specific time points; (d) Age and education will be inversely associated with distress experienced in relation to a BBB. Women with less education and younger women will experience greater distress than women with more education and women who are older. Finally, considering that a BBB may serve as a TM, global distress will be positively associated with greater health information interests. Women reporting more global distress will be interested in more health information.

## Methods

### *Participants*

Women met eligibility criteria for participation if they were  $\geq 18$  years of age and had undergone a BBB procedure 3 to 12 months prior to study participation. A total of

146 eligible women were identified and sent a letter of invitation to participate in the study. Of the 146 women initially contacted, 21% ( $n = 30$ ) declined participation and 43% ( $n = 63$ ) did not respond. A total of 37% ( $n = 54$ ) indicated interest in study participation. Of these, 52 women provided informed consent and participated in the study. One participant's data was excluded since it was later discovered eligibility criteria had not been met. The final completion rate was 35% (51/146).

#### *Accrual Procedures*

Eligible study participants were identified from clinic records at the University of Kentucky Comprehensive Breast Care Center. Eligible women were contacted by letter and invited to participate in a study that would include completion of a questionnaire. Some women were also offered the opportunity to participate in a focus group or telephone interview designed to collect additional qualitative information about the BBB experience. This data will not be reported here. All participants, with the exception of those who participated in a focus group ( $n = 13$ ), were provided two consent forms, the study questionnaire, an address confirmation form, and a pre-addressed stamped envelope by mail. Women who elected to participate in a focus group completed the questionnaire in person at the time of the focus group participation and were compensated \$50.00 for their time and cost associated with travel. All other women completed the questionnaire at home returning it by mail and were compensated \$20.00 for their time.

#### *Measures*

The study questionnaire consisted of seventeen items. (For a complete copy of the study questionnaire, see Appendix A.) Items 1 through 6 of the questionnaire collected general demographic information including: age, education level, time since the breast

biopsy, type of breast biopsy ('surgical' vs. 'non-surgical'), history of previous breast biopsy ('yes' vs. 'no'), and family history of breast cancer in first degree female relatives (mother, sister, daughter).

Items 7 through 13 of the study questionnaire assessed the distress associated with the two main, potential components of the breast biopsy experience: follow-up mammography and the biopsy procedure itself. The three specific items that assessed mammography-related distress included being informed of needing a second mammogram, waiting for the second mammogram, and waiting for the test results of the second mammogram. The four specific items that assessed breast biopsy specific distress included being informed of needing a breast biopsy, waiting to undergo the breast biopsy, undergoing the breast biopsy, and waiting for the test results of the breast biopsy. 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'. Women were also given the option to indicate 'Does not apply to me' if appropriate.

Two indexes were also designed to assess distress associated with the follow-up mammography portion of the BBB and the distress associated with the breast biopsy portion of the BBB. To assess the composite distress associated with follow-up mammography, the following three items were summed: distress when informed of needing a second mammography, distress when waiting to undergo the mammography, and distress when waiting for the results of the mammography. If data was missing for one of the three items, the average score of the remaining two items was imputed to enable calculation of a follow-up mammography composite distress score. If data was missing for two or more of the three items, no composite score was calculated. The

internal consistency coefficient for the composite distress associated with follow-up mammography was adequate ( $\alpha = .87$ ).

To assess the composite distress associated with the breast biopsy procedure itself, the following four items were summed: distress when informed one needed a breast biopsy, distress when waiting to undergo the breast biopsy, distress when undergoing the biopsy procedure, and distress when waiting for the test results of the breast biopsy. If data was missing for two or less of the four items, the average score of the remaining items was imputed to enable calculation of a follow-up mammography composite distress score. If data was missing for three or more of the four items, no composite score was calculated. The internal consistency coefficient for the composite distress associated with the breast biopsy procedure was adequate ( $\alpha = .76$ ).

Two additional items assessed global relief and global distress. To assess global relief, women were asked to rate how much relief they experienced in learning of a benign biopsy test result. Responses were recorded using a four point Likert scale with one end point labeled 'not relieved at all', and the other endpoint labeled 'completely relieved.' To assess global distress, women were asked to recall the BBB experience in its entirety and rate how much distress has been experienced. 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.'

The two final items of the questionnaire assessed potential health information interests and the modes by which women preferred this information communicated. To assess women's informational interests, women were provided a checklist of 12 cancer-specific (ie: risk for colon and rectal cancers) and more general types of health



information (ie: how to live a healthier lifestyle) which they might have been interested in receiving following their BBB. Women were instructed to endorse as many types of information as they would like. To assess preferred modes of communication among women following a BBB, women were given a checklist of eight different communication options (ie: brochure or pamphlet). Women were instructed to endorse as many modes of communication as they would like.

To assess total health information interest associated with a BBB, a composite index of health information interest was developed. First, each type of health information was considered independent of the other types of health information and each positively endorsed item was considered a '1'. Second, the total number of positively endorsed items was summed for each participant resulting in a total health information interest index. Each composite score of total health information interest could range from 0 to 12.

## Results

A total of 51 women provided informed consent and completed the study questionnaire. The mean time since their BBB was 263.43 days ( $SD = 88.05$ ; range = 41 – 431). Women were a mean of 48.2 years of age ( $SD = 14.5$ ; range = 18.6 – 82.5) at the time of study participation. The breakdown of 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%). The majority of women reported no family history 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 biopsy ( $n = 28$ ; 55%) while 23 women reported undergoing a surgical biopsy (45%).

### *Distress Associated with the BBB Experience*

Descriptive data for items assessing distress associated with the seven specific aspects of the BBB experience and global distress associated with the BBB experience are presented in Table 1. Distress scores could range from 0 to 3. The most distressing aspects of the biopsy 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, ‘very stressful’, in regard to being informed of needing a breast biopsy ( $n = 24$ ; 47%) and waiting for the results of the breast biopsy ( $n = 22$ ; 44%). When women were asked to assess the global distress associated with the entire BBB experience, no women (0%) indicated the BBB experience was ‘not stressful’; however, one in three women (33%) endorsed the most extreme distress rating possible in rating their global distress, rating their overall BBB experience as ‘very stressful.’

Table 1

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

<i>Aspect of BBB Experience</i>	<i>N</i>	<i>M<sup>a</sup></i>	<i>SD</i>	<i>Not stressful<sup>b</sup></i>	<i>Very stressful<sup>c</sup></i>
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%

<sup>a</sup>Responses rated on four point Likert scale with “0” corresponding to “not stressful at all” and “3” corresponding to “very stressful.”

<sup>b</sup>Proportion of of respondents reporting that aspect of the BBB was “not stressful at all.”

<sup>c</sup>Proportion of respondents reporting that aspect of the BBB was “very stressful.”

### *Clinical Variables*

To test our hypothesis linking history of BBB to distress associated with a BBB, a set of 2-sample, independent t-tests was performed. The independent variable was history of BBB (yes vs. no) while the dependent variables included ratings of distress associated with the seven specific aspects of the BBB experience, the composite measure of distress associated with follow-up mammography only, the composite measure of distress associated with breast biopsy only, and global distress associated with the entire BBB experience. Results are shown in Table 2. Results indicated women with a history of BBB were significantly more distressed at being informed of needing follow-up mammography ( $t(42) = 2.45, p = .02$ ). No significant differences were found between groups of women who had a previous history of BBB compared to those women without a previous history of BBB on any of the other specific BBB distress items. Additionally, no significant differences were found between groups of women with or without a history of BBB on either of the composite measures of distress. Finally, no significant group differences were found for ratings of global distress. While the two groups differed significantly on only the one specific item noted above, it is interesting to note that mean distress scores on all three items related to a second mammogram were higher in women with a history of BBB while mean distress scores on all four items related to the BBB were higher in women without a history of BBB.

Table 2

*Means and Standard Deviations for BBB Distress Items for Women with and without a History of BBB*

<i>Source</i>	No History of BBB (N = 31 )		History of BBB (N = 20)		p-value <sup>a</sup>
	<i>M<sup>b</sup></i>	<i>SD</i>	<i>M<sup>b</sup></i>	<i>SD</i>	
Being told of needing a second mammogram	1.50	.99	2.17	.71	.02
Waiting to undergo a second mammogram	1.56	1.00	1.67	1.08	.74
Waiting for results of the second mammogram	1.96	1.02	2.11	.81	.61
Being informed of needing a breast biopsy	2.26	.89	2.25	.72	.97
Waiting to undergo the breast biopsy	2.27	.64	2.16	.69	.58
Undergoing the breast biopsy	1.97	.98	1.74	1.05	.44
Waiting for the results of the breast biopsy	2.30	.75	2.25	.72	.82
Distress associated with entire BBB experience	2.13	.85	2.00	.65	.57
Composite distress of follow-up mammography <sup>c</sup>	6.02	1.95	6.41	2.00	.55
Composite distress of the breast biopsy procedure <sup>d</sup>	8.68	3.02	8.50	2.63	.83

<sup>a</sup>p-value associated with t-test for independent samples.

<sup>b</sup>Mean responses rated on four point Likert scale ranging from 0-3.

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

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

To test our hypothesis linking type of breast biopsy to distress associated with a BBB, a set of 2-sample, independent t-tests was performed. The independent variable was type of breast biopsy (non-surgical vs. surgical) while the dependent variables included the seven measures of distress associated with the specific aspects of the BBB experience, the composite measure of distress associated with the follow-up mammography only, the composite measure of distress associated with the specific aspects of the breast biopsy only, and global distress associated with the entire BBB experience. Results are shown in Table 3. No significant group differences were found for any of the 10 items ( $p$ 's  $> .20$ ). However, while narrowly missing our .05 criterion for statistical significance, the general pattern of results suggested more distress in women who underwent a non-surgical biopsy. Contrary to our hypothesis, women who underwent a non-surgical breast biopsy reported greater distress on seven of the eight independent measures of distress ( $p = .07$  by binomial test, 2-tailed).

Table 3

*Means and Standard Deviations for BBB Distress Items for Women Undergoing Surgical and Non-surgical Biopsy Procedures*

<i>Source</i>	Non-Surgical Biopsy (N = 28 )		Surgical Biopsy (N = 23)		p-value <sup>a</sup>
	<i>M<sup>b</sup></i>	<i>SD</i>	<i>M<sup>b</sup></i>	<i>SD</i>	
Being told of needing a second mammogram	1.93	.92	1.53	.94	.17
Waiting to undergo a second mammogram	1.63	1.04	1.56	1.03	.84
Waiting for results of the second mammogram	2.07	.94	1.94	.93	.65
Being informed of needing a breast biopsy	2.39	.74	2.09	.90	.19
Waiting to undergo the breast biopsy	2.15	.72	2.32	.57	.37
Undergoing the breast biopsy	2.04	1.02	1.70	.97	.23
Waiting for the results of the breast biopsy	2.39	.74	2.14	.71	.22
Distress associated with entire BBB experience	2.11	.79	2.04	.77	.77
Composite distress of follow-up mammography <sup>c</sup>	6.38	2.00	5.89	1.92	.47
Composite distress of the breast biopsy procedure <sup>d</sup>	9.04	2.77	8.09	2.89	.24

<sup>a</sup>p-value associated with t-test for independent samples.

<sup>b</sup>Mean responses rated on four point Likert scale ranging from 0-3.

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

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

To test our hypothesis linking a family history of BC in a FDR to distress associated with a BBB, a set of 2-sample, independent t-tests was performed. The independent variable was a family history of BC in an FDR (yes vs. no) while the dependent variables included the seven measures of distress associated with the specific aspects of the BBB experience, the composite measure of distress associated with the follow-up mammography only, the composite measure of distress associated with the specific aspects of the breast biopsy only, and global distress associated with the entire BBB experience. Results are shown in Table 4. A significant difference was found for only one of the ten items. Contrary to our hypothesis, women without a family history of BC reported more global distress associated with the BBB than did women with a family history of BC ( $t(48) = 2.33, p < .05$ ). However, while the two groups differed significantly on only one of the ten items, the overall pattern of results suggested more distress in women without a family history of BC. Women without a family history of BC reported more distress on eight out of the eight independent measures of distress ( $p < .01$ , by binomial test, 2-tailed).



Table 4

*Means and Standard Deviations for BBB Distress Items for Women with and without a Family History of BC*

<i>Aspect of the BBB Experience</i>	No Family History of BC (N = 36)		Family History (N = 14)		p-value <sup>a</sup>
	<i>M<sup>b</sup></i>	<i>SD</i>	<i>M<sup>b</sup></i>	<i>SD</i>	
Being told of needing a second mammogram	1.87	.94	1.54	.97	.30
Waiting to undergo a second mammogram	1.71	.90	1.50	1.22	.52
Waiting for results of the second mammogram	2.17	.93	1.79	.89	.20
Being informed of needing a breast biopsy	2.31	.82	2.14	.86	.54
Waiting to undergo the breast biopsy	2.29	.52	2.07	.92	.29
Undergoing the breast biopsy	1.94	1.01	1.77	1.01	.60
Waiting for the results of the breast biopsy	2.34	.73	2.14	.77	.40
Distress associated with entire BBB experience	2.25	.73	1.71	.73	.02
Composite distress of follow-up mammography <sup>c</sup>	6.38	1.94	5.91	2.07	.51
Composite distress of the breast biopsy procedure <sup>d</sup>	8.81	2.72	8.21	3.26	.52

<sup>a</sup>p-value associated with t-test for independent samples.

<sup>b</sup>Mean responses rated on four point Likert scale ranging from 0-3.

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

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

### *Demographic Variables*

Pearson Product Moment correlations were calculated to test the hypotheses that age and education would be inversely associated with distress associated with the biopsy experience. Dependant variables included the seven specific breast biopsy distress items, the two composite measures of distress, and global distress. Results are presented in Table 5. Age was significantly and inversely correlated with waiting to undergo the second mammogram ( $r = -.33, p = .03$ ), waiting for the results of the second mammogram ( $r = -.34, p = .02$ ), undergoing the breast biopsy ( $r = -.39, p < .01$ ) and the composite index of distress associated with the biopsy procedure ( $r = -.29, p < .05$ ). It should also be noted the inverse association between age and global distress approached significance ( $r = -.27, p = .06$ ). Education was significantly and inversely correlated with distress when waiting to undergo the breast biopsy ( $r = -.29, p < .05$ ) and when waiting for the results of the biopsy ( $r = -.35, p < .05$ ). Overall, the general pattern of correlations for both the age and education variables was consistent with our hypotheses. The correlations of age (mean  $r = -.25$ ) with the ten distress items were all negative as were the correlations of education (mean  $r = -.23$ ) with the distress items ( $p$ 's  $< .01$ , by binomial test, 2-tailed).

Table 5

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

<b>Variable</b>	<b>Age</b>	<b>Education</b>
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 <sup>a</sup>	-.28	-.29
Composite distress of the breast biopsy procedure <sup>b</sup>	-.29*	-.23

\*  $p < .05$ , \*\*  $p < .01$

<sup>a</sup>Composite of three distress items associated with follow-up mammography – possible range from 0 to 9.

<sup>b</sup>Composite of four distress items associated with the breast biopsy procedure –possible range from 0 to 12.

### *Exploratory Analyses*

A multiple regression analysis was conducted to assess the unique contribution of clinical and demographic variables to ratings of global distress. The variables of age, education, family history of BC, history of biopsy, and type of biopsy were entered as independent variables. Results are shown in Table 6. The overall five-variable model accounted for 20% of the variance in ratings of global distress ( $R = .45$ ,  $R^2 = .20$ ). However, the model as a whole only approached statistical significance  $F(5, 43) = 2.19$ ,  $p = .07$ ). Among the five independent predictors, only family history of BC was significantly associated with Global Distress ( $B = -.34$ ). Women without a family history of BC reported the experience of the BBB on the whole was more distressing than those women with a family history.

Table 6

*Multiple Regression Analysis for the Clinical and*

*Demographic Variables Predicting Global Distress (N = 51).*

<i>Variable</i>	$\beta^a$	$p^b$
Age	-.25	.25
Education	-.14	.22
Family History <sup>c</sup>	-.34	.04
History of BBB <sup>d</sup>	-.04	.98
Type of Biopsy <sup>e</sup>	-.23	.23
Full Model Statistics		
Multiple R	.45	
Multiple R <sup>2</sup>	.20	
F (5, 43)	2.19	

<sup>a</sup> Standardized beta weight

<sup>b</sup> Test of significance of beta weight

<sup>c</sup> Coded as: 0 = no family history of BC; 1=family history of BC

<sup>d</sup> Coded as: 0 = no history of BBB; 1=family history of BBB

<sup>e</sup> Coded as: 0 = non-surgical biopsy; 1= surgical biopsy

A multiple regression analysis was conducted to assess the unique contribution of clinical and demographic variables to global ratings of relief associated with learning the biopsy yielded a benign result. Age, education, family history of BC, history of biopsy, and type of biopsy were entered as independent variables. See Table 7 for results. The overall model accounted for 9% of the variance ( $R = .31$ ,  $R^2 = .09$ ) and was not statistically significant ( $F(5, 43)$ ,  $p = .48$ ). Among the five independent predictors, only education approached significance ( $t(48) = -1.86$ ,  $p = .06$ ). Less educated women were more likely to experience greater relief.

Table 7

*Multiple Regression Analysis for the Clinical and*

*Demographic Variables Predicting Global Relief (N = 51).*

<i>Variable</i>	$\beta^a$	$p^b$
Age	.08	.57
Education	-.27	.06
Family History <sup>c</sup>	.01	.95
History of BBB <sup>d</sup>	.13	.44
Type of Biopsy <sup>e</sup>	-.05	.75
Full Model Statistics		
Multiple R	.31	
Multiple R <sup>2</sup>	.09	
F (5, 43)	.89	

<sup>a</sup> Standardized beta weight

<sup>b</sup> Test of significance of beta weight

<sup>c</sup> Coded as: 0 = no family history of BC; 1=family history of BC

<sup>d</sup> Coded as: 0 = no history of BBB; 1=family history of BBB

<sup>e</sup> Coded as: 0 = non-surgical biopsy; 1= surgical biopsy

### *Health Information Interests after BBB*

Table eight shows the number and proportion of women indicating interest in each of the 12 health information topics assessed. The mean number of information interests endorsed was 4.70 ( $SD = 2.96$ ; range = 0-10). The total number of health information interests indicated was summed for each woman to create an index of total health information interest. Thus, this index ranged from 0 – 12. The most frequently endorsed items (> 50% of the sample) involved information concerning the following: other sorts of screening tests for cancer (n = 30; 59%), risk for hereditary cancers (n = 30; 59%), and personal risk for breast cancer (n = 29; 57%). The least frequently endorsed information topic was 'why one needed to undergo a biopsy procedure (n = 6; 12%) and five women (9%) indicated they would not be interested in any of the information topics provided. At least one fourth of the sample indicated interest in each of the 12 health information topics.



Table 8

*Frequencies and Percentages of Women Indicating Interest in Health Information Topics after BBB*

<b>Health Information Topic</b>	<b>Frequency</b>	<b>%<sup>a</sup></b>
Personal risk for BC	29	57%
How to better cope with stressful thoughts about cancer	13	26%
How to prevent cancer	23	45%
How to better perform a self- breast exam	14	28%
Other sorts of screening tests for cancer	30	59%
Risk for ovarian cancer	18	35%
Risk for colon or rectal cancer	19	37%
Why I needed to undergo a biopsy procedure	6	12%
How to live a healthier lifestyle	18	35%
How to reduce the amount of stress in my life	17	33%
Cancers that are inherited or run in families	22	43%
Risk for hereditary cancers	30	59%

<sup>a</sup> Percent based upon 51 respondents.

To test our hypothesis that distress associated with the BBB experience would be positively associated with health information interests, a series of Pearson Product Moment correlations was conducted. Pearson Product Moment correlations were calculated between global distress and relief ratings and the total number of health information choices in which a woman expressed interest, as well as interest in each of the 12 specific health information topics. Results are shown in Table 9. Global Distress was significantly associated with interest in only two of the health information topics: how to prevent cancer ( $r = -.30, p = .03$ ) and other sorts of screening tests for cancer ( $r = -.33, p = .02$ ). Contrary to our hypothesis, these correlations suggested greater distress was associated with less information interest in these two health information topics. Global relief was significantly associated only with interest in information concerning personal risk for BC ( $r = -.29, p < .05$ ), where women who were more relieved were less likely to endorse interest in information about their personal risk for BC. The overall pattern of correlations for global distress was inverse (10 out of 13), suggesting women who report more distress are less likely to be interested in health information ( $p < .10$ , by binomial test, 2-tailed). Not surprisingly, two of the three positive correlations pertained to interest in learning how to better cope with stress. The overall pattern of correlations for global relief was also inverse (12 out of 13), suggesting women who report more relief from learning of a benign test result are less likely to be interested in health information ( $p < .01$ , by binomial test, 2-tailed).

Table 9

*Pearson Product Moment Correlations between Global Ratings of Distress and Relief Associated with the BBB experience and Interest in Health Information*

Health Information	Global Distress	Global Relief
Total information interest	-.14	-.16
Personal risk for BC	-.01	-.29*
How to better cope with stressful thoughts about cancer	.18	-.03
How to prevent cancer	-.30*	-.12
How to better perform a self- breast exam	-.12	-.06
Other sorts of screening tests for cancer	-.33*	-.09
Risk for ovarian cancer	-.13	-.06
Risk for colon or rectal cancer	-.13	.23
Why I needed to undergo a biopsy procedure	.12	-.09
How to live a healthier lifestyle	-.08	-.13
How to reduce the amount of stress in my life	.25	-.15
Cancers that are inherited or run in families	-.04	-.02
Risk for hereditary cancers	-.18	-.20

\*  $p < .05$  - \*\*  $p < .001$

To examine the relationship between clinical variables (history of a BBB, family history of BC, and type of biopsy) and total number of health information interests, three independent samples t-tests were conducted. Results are shown in Table 10. No significant group differences in health information interests were found by history of BBB ( $t(49) = .51, p = .62$ ), type of biopsy ( $t(48) = -.10, p = .92$ ), or family history of BC ( $t(49) = -1.32, p = .19$ ).

Table 10

*Means and Standard Deviations for Health Information Interest by Clinical Variables:  
History of BBB, Type of Biopsy, and Family History of BC*

<i>Source</i>	<i>M</i>	<i>SD</i>	<i>p</i>
<i>No Family History of BC</i>	4.35	3.05	.19
<i>Family History of BC</i>	5.57	2.62	
<i>No History of BBB</i>	4.52	3.01	.62
<i>History of BBB</i>	4.95	2.95	
<i>Non-Surgical Biopsy</i>	4.74	3.11	.92
<i>Surgical Biopsy</i>	4.83	2.74	

To examine the relationship between demographic variables and health information interests, Pearson Product Moment correlations were calculated between the demographic variables of age and education and the total health information interest index. Results indicated that neither age ( $r = -.06, p = .68$ ) nor education ( $r = .09, p = .54$ ) were significantly associated with total interest in health information.

Finally, Table 11 shows the number and proportion of women indicating they would prefer to receive health information by each of the eight modes of communicating health information that were assessed. The mean number of modes of communication endorsed was 2.41 (SD = 1.41). The most preferred mode of communication was brochure or pamphlet (n = 29; 57%) and nearly half the women expressed interest in directions to a website with information (n = 23; 45%). The least frequently endorsed mode of communication was an audio file to be downloaded to an IPOD or MP-3 player (n = 3; 6%).

Table 11

*Frequencies and Percentages of Women Indicating Interest in Receiving Health Information by Various Modes of Communication*

Mode of Communication	Frequency	Percent <sup>a</sup>
Brochure or pamphlet	29	57%
Directions to a website with information	23	45%
A CD for home use or use at place of work	19	37%
Individual face-to-face meeting with a health care professional or health educator	16	31%
Group meeting with similar women or health care professional/health educator	8	16%
A telephone call from a health care professional or health educator	8	16%
Video or DVD for home use	17	33%
Audio file to be downloaded on an IPOD or MP-3 player	3	6%

<sup>a</sup> Percent based upon 51 respondents.



## Discussion

### *Summary of Findings*

In general, results provided mixed support for our hypotheses. Specifically, the data tended to support our hypotheses that younger age and less education would both associate with greater distress. Our data indicated age and education were inversely associated with distress throughout the BBB experience. However, the data did not generally support our hypotheses regarding our clinical variables (family history of BC, history of BBB, and type of biopsy). While we hypothesized women with a family history of BC, a history of BBB, as well as women undergoing surgical biopsy vs. non-surgical biopsy would experience greater distress throughout the BBB, the majority of our data actually suggested the opposite. Women who endorsed the presence of our clinical variables actually tended to report less distress. The lone exception was data revealing women with family histories of BC experience significantly more global distress than women without such a history.

Finally, the hypothesis that women who experienced greater distress in the BBB setting would be more “teachable” and thus express more interest in health-related information was also not supported. Again, if anything, the data suggested the opposite might be true; women reporting more BBB-related distress were less interested in receiving additional health-related information. Interestingly, while women with a history of BC, history of BBB, or who underwent a surgical biopsy were not more distressed than women without these clinical characteristics, they did tend to indicate more interest in information.

As noted above, study results supported the hypothesized inverse relationship between age and distress associated with the BBB experience. More specifically, age was significantly and negatively correlated with ratings of distress associated with waiting to undergo a second mammogram, waiting for the results of the second mammogram, and undergoing the biopsy procedure. Age was also significantly and negatively correlated with the composite index of distress associated with the biopsy procedure. In addition to these significant inverse relationships between age and specific distress ratings, the general pattern of results supported the hypothesized inverse relationship between age and distress associated with a BBB: age was negatively correlated with all ten of the specific distress items examined (see Table 5). The correlations between age and the 10 distress items ranged from  $-.08$  to  $-.39$ , with a mean correlation of  $-.25$ , suggesting a moderate to medium effect (Hojat, Mohammadreza & Xu, 2004). This inverse relationship between age and distress in the BBB setting is consistent with the literature in the cancer setting (Compas, Stoll, Thomsen, Oppedisano, Epping-Jordan, & Krag, 1999; Siegel, Gluhoski, & Gorey, 1999) as well the literature across medical populations (Hou, Chui, Eckert, Oldridge, Murray, Bennett, 2004; Lavie, & Milani, 2006; Trief, Wade, Pine, & Weinstock, 2003) suggesting older women are less likely to experience and report distress.

#### *Interpretation of Findings*

In the BBB setting, younger women may experience a breast biopsy as more threatening than older women as breast cancer is less commonly normalized for younger women and may represent greater potential psychosocial disruption in their lives (Kroenke, Rosner, Chen, Kawachi, Colditz, et al., 2004). From a developmental

perspective, younger women have not yet achieved certain life goals, such as marriage, family, or career and may likely feel they are at risk to lose more (Avis, Crawford, Manuel, 2005). Alternatively, or in addition, younger women may utilize lesser developed or effective coping skills than older women (Drageset & Lindstrøm, 2005) and consequently experience more distress when confronted with the threat posed by a breast biopsy. Regardless of the explanation for why distress might be more common in younger women, our results strongly suggest that younger age be considered a risk factor for distress in the biopsy setting and that the reactions of younger women to their biopsy experience be monitored closely and additional psychological support provided when necessary.

With regard to education, study results also supported the hypothesized inverse relationship between education and distress associated with BBB. More importantly, the correlations of education with the ten distress items were all negative. The correlations for education with the 10 distress items ranged from -.11 to -.35, the average correlation coefficient was -.23, suggesting a small to medium effect as suggested by Cohen (Hojat, Mohammadreza & Xu, 2004). Specifically, women who were less educated reported significantly more distress than their educated counterparts when waiting to undergo the breast biopsy and when waiting for the results of the biopsy. This inverse relationship between education and distress in the BBB setting is consistent with the literature in the cancer setting (Andrykowski & Cordova, 1998) as well as literature in the general mental health setting (Sherbourne, Dwight-Johnson, & Klap, 2001) suggesting less-educated women are more likely to experience and report distress.

Women with less education may have less experience seeking out answers to questions and eliciting greater informational and emotional support. Alternatively, or in addition, there may be a systematic bias in treatment by medical staff. Perhaps when women with less education interact with medical staff, they are perceived differently. Potentially less-educated women may be perceived as being less assertive, less capable of understanding, or desirous of informational support. Regardless of the explanation for why distress might be more common in less-educated women, our results strongly suggest that less-education should be considered a risk factor for distress in the biopsy setting and that the reactions of less educated women to their biopsy experience be monitored closely and additional psychological support provided when necessary.

Our hypothesis that women with a family history of BC would report more distress related to their BBB as a whole was not supported. If anything, mean distress scores revealed women with a family history of BC actually reported less distress than their counterparts without such a history (See Table 4). As shown in Table 4, for 10 of the 10 items examined, mean distress ratings for women without a family history of BC exceeded distress ratings from women with a family history of BC. With regard to global distress associated with the BBB, women without a family history of BC reported significantly greater distress. These findings are both surprising and interesting as other related literature has found that women with a family history of BC have incorrect, heightened risk perception and anxiety (Brain, Norman, Gray, & Mansel, 1999; Erblich, Bovbjerg, & Valdimarsdottir, 2000) and at the time of BC screening, report higher levels of distress than women without such a history (Hailey, Carter, & Burnett, 2000). Additionally, among women who were being assessed for distress prior to a breast

biopsy, data suggested a family history of BC was a potential risk factor for distress (Lebel et al., 2003). Our results actually tend to align more so with the data provided by a review of the literature on family history of BC and distress in the screening context, where data indicated women with and without histories of BC report equivalent distress in most screening settings (Watson, Henderson, Brett, Bankhead, & Austoker, 2005).

In light of our findings, the question remains: why might women without a family history of BC report more distress related to their biopsy experience? First, when women without a family history of BC have thought about their risk for developing BC, they have probably rarely considered it more than a remote possibility. Thus, women without a family history of BC think about their risk less often and are less prepared for the shock and stress of a BBB. For instance, Cohen (2006) found women with a family history of BC had higher risk perceptions and more BC worry. Since women without such a history probably rarely consider their risk and therefore worry less about BC, having a BBB actually makes this potentially life threatening diagnosis a salient reality for one of the first times, if not the very first time. Secondly, medical personnel are likely to be aware that women with a family history of BC are at higher risk and may therefore intervene with more support overall compared to women of more average risk without a family history of BC. Our results suggest women without a family history of BC may be at greater risk throughout the BBB experience; therefore, these women should be watched closely and provided additional information and support if necessary.

Again contrary to our hypothesis, the data did not support our expectation that a personal history of a previous BBB would be associated with greater distress in the breast biopsy setting. A history of BBB was not significantly associated with distress ratings for

any of the 10 BBB-related items assessed (see Table 2). However, the pattern of results suggested women without a history of BBB reported greater distress in association with specific aspects of the breast biopsy while women with a history of BBB reported greater distress with regard to the follow-up mammography. Why might this be? First and foremost, women who have never had a breast biopsy have no previous experience upon which to anticipate the pain or even uncertainties of the medical procedure. According to Mishel's Model of Uncertainty and Illness (Mishel, 1981), uncertainty can lead to threat, which is then followed by anxiety and stress. If coping resources are insufficient, then adaptation and recovery from the experience are impacted thus resulting in more distress. Second, women who have a history of BBB may actually be less distressed since their outcome was benign in the past. One would imagine that having undergone a BBB in the past would likely trigger anxiety and distress about the procedure, the pain, the waiting for results. However, in our sample, the opposite was true. It appears that having a history of BBB may actually serve as a protective factor for women in the BBB setting. Perhaps the knowledge of what is happening, what to expect, and historically having been diagnosed as cancer-free is actually comforting or reassuring. Women who do not have this knowledge base may actually be at greater risk for distress since they may be cognitively appraising the threat for the first time.

Also contrary to hypothesis, the data did not support the hypothesis that a surgical biopsy would be associated with more distress than a non-surgical biopsy. Having undergone a surgical biopsy was not significantly associated with distress ratings for any of the 10 BBB-related items assessed (see Table 3). In fact, with the exception of waiting to undergo the breast biopsy, the general pattern of results suggested women who had

undergone a non-surgical biopsy reported greater distress in association with their BBB. As shown in Table 3 for 9 of the 10 items examined, mean distress ratings for women who had experienced a non-surgical biopsy, exceeded distress ratings of women who had experienced a surgical biopsy.

While the mean differences between groups categorized by type of biopsy procedure were not significant, an interesting question is raised. Why do women who undergo a surgical biopsy, hence general anesthesia and an obviously more invasive operation, not report greater distress than women undergoing a non-surgical biopsy? First, non-surgical biopsies are performed without general anesthesia. Women who are fully awake or conscious throughout the breast biopsy procedure may be more likely to experience distress since they are aware of what is being done and said during the breast biopsy. Second, because non-surgical biopsy is likely to use just a local anesthetic, the procedure may be more painful for the patient during the procedure (Denton, Ryan, Beaconfield, & Michell, 1999). Third, since a surgical biopsy is more likely to be used if the abnormality is considered higher risk, medical staff may provide more emotional, psychological, and informational support and resources to the woman undergoing a surgical biopsy. Distress may actually be higher initially for women undergoing a surgical biopsy, but if there is a systematic bias occurring in the way in which their various needs are being met, women undergoing surgical biopsy may fare better psychologically in the end. Clinical implications include the necessity of medical staff being sufficiently trained in providing support and resources to all women undergoing a breast biopsy irrespective of whether it is a surgical or non-surgical procedure. Furthermore, clinicians may be more effective in providing support for their patients if

they provide tailored communication, related specifically to the type of procedure that the patient will be undergoing.

Finally, contrary to hypothesis, there was no evidence to indicate that women who experienced more BBB-related distress would express more interest in receiving additional health-related information following their BBB experience. Not surprisingly, global distress ratings were positively (but not significantly) correlated with interest in topics associated with coping and managing distress and also information about why they needed to undergo a biopsy. However, global distress ratings were negatively correlated with interest in all other health information topics. So, if anything, the general trend appeared to be the experience of less BBB-related distress was associated with greater interest in a spectrum of non-BBB related health information topics.

We believe there are several reasons why our hypothesis was not supported. First, there may have been some difficulties finding an association between health information interest and distress using a checklist approach to measuring health information interest. By using a dichotomous format, women were forced to either endorse or ignore a health topic. Additionally, while a wide range of topics was provided, the list was not exhaustive by any means; therefore, women could have been interested in many topics not provided. A likert scale format may have more sensitively captured interest of women regarding health information. Second, because the time since the biopsy ranged from three months to approximately a year, women may not have been able to clearly recollect what information they would have found useful at the time of their biopsy. Third, McBride's Model of the TM is still relatively new and may not translate well to the BBB setting; quite simply, the BBB experience may not qualify as a TM. Finally, it is possible



there is some optimal time when individuals are most teachable and that a retrospective design is not capable of capturing this time point.

With regard to utilizing McBride's conceptualization of the TM, we did not actually measure an outcome satisfying the component of change in societal role which is part of the tri-fold nature of McBride's Model. Change of societal role is an ambiguous construct which may or may not have made some difference in our results of whether or not the BBB setting served as a TM. The Cognitive Processing Theory may have actually been a more appropriate model as it would support what our results suggested: those less distressed have the cognitive capacity to process information and therefore may be more likely to be interested in informational resources, while those experiencing distress may be challenged by inhibited or impeded processing (Cordova, Cunningham, Carlson, & Andrykowski, 2001). Women who are experiencing too much distress may be incapable of averting their attention to anything but the most salient issue at hand; thus, they are less likely to be interested in learning about other health information and essentially less 'teachable.' Of course, it should be noted women who experienced less global relief were more likely to be interested in health information following a BBB; conversely, women who experienced more relief indicated less interest in all of the health information topics with one exception, information on risk for colon and rectal cancer. This finding would suggest that the absence of relief may actually motivate women's interest in health information. Furthermore, while the absence of relief may not be a high level distress, it may be a construct more closely related to risk perception or worry, which has actually been found to motivate health behaviors such as screening and self-breast exam (McCaul, Schroeder, & Reid, 1996).

### *Limitations*

Some limitations of this study should be noted. First, the sample size here was relatively small, resulting in less than optimal statistical power to test our study hypotheses. Consequently, one must be cautious in interpreting null results. Second, our sample tended to be more educated than the general population of Kentucky since 80% of our sample had at least some college education and nearly half (48%) had at least a college degree compared to the estimated 22% of Kentucky state residents with a Bachelor's degree (Kentucky Council on Postsecondary Education, 2007). Third, additional variables such as socio-economic status and race would also have been helpful in determining the role of demographic variables as would the measurement of social support in distress associated with a BBB. Fourth, this was a cross-sectional, retrospective study so there could be some potential bias associated with recall of distress associated with a BBB at one point in time. Without multiple time points of reference (pre-BBB and during BBB), it is difficult to know how a BBB impacts distress, relative to baseline distress. Finally, the question of how representative our sample is at our particular institution should be noted. Overall, the accrual rate was 35% which was fairly low. We do not know what variables may or may not have been linked to study participation, thus we are potentially limited in the manner in which we can generalize our results.

### *Future Research and Conclusions*

Future research should attempt to clarify additional demographic variables that are easily assessed in a clinical setting and might thus be used to identify woman at high risk for distress related to their BBB. Prospective and longitudinal research designs will

also be helpful in establishing clearer trajectories for distress and relief following baseline. While we asked women to report distress associated with aspects of the BBB, we did not assess whether distress persisted after the BBB experience.

In conclusion, a BBB is a distressing health-related event and our data revealed both demographic and clinical predictors of distress associated within the BBB setting. The implications of younger age and less education being identified as risk factors for distress in a BBB setting are encouraging as age and education are efficiently identified in a clinical setting. Therefore, screening for distress utilizing these factors may not only be cost effective but time effective as well. Furthermore, women who are experiencing a BBB for the first time may be the most promising candidates for a psychosocial intervention as this experience is new and full of uncertainty. Lastly, while distress was not found to be associated with health information interest, our sample did endorse a fair amount of information interest. Thus, a BBB setting may still provide fertile ground for effectively nurturing interest in information about cancer-related topics and other health behavior change in women following a BBB, especially when the information is provided via their preferred modes of communication.

ID # \_\_\_\_\_

Today's Date \_\_\_\_\_

**Participant Information Sheet**

1. **What is your birthdate?** \_\_\_\_\_
2. **How much formal education have you completed? (check one)**  
 Some high school  
 Completed high school  
 Some college or technical/trade school beyond high school  
 Completed college  
 Some graduate or professional school beyond college  
 Completed a graduate or professional degree
3. **When did you undergo your most recent benign breast biopsy? (month and year)**  
\_\_\_\_\_
4. **What kind of biopsy procedure did you have? (check one)**  
 Surgical biopsy  
 Needle biopsy (either fine needle aspiration biopsy or core needle biopsy)  
 Not sure
5. **Was this the first breast biopsy you have ever had?**  
 No, I have had a breast biopsy in the past  
 Yes, this was the first breast biopsy I have ever had
6. **Is there a history of breast cancer in your immediate family? (check all that apply)**  
 Yes, my mother had breast cancer  
 Yes, one or more of my sisters have had breast cancer  
 Yes, one or more of my daughters have had breast cancer

Some women find aspects of their benign breast biopsy experience to be stressful. We would like to know what aspects of your benign breast biopsy experience were stressful for you.

7. **Being told that you needed to return for a second mammogram (check one box).**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>9</b>
Not stressful at all	A little bit stressful	Somewhat stressful	Very stressful	Does not apply to me

8. **Waiting to undergo your second mammogram .....**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>9</b>
Not stressful at all	A little bit stressful	Somewhat stressful	Very stressful	Does not apply to me

9. **Waiting to be told the results of your second mammogram.....**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>9</b>
Not stressful at all	A little bit stressful	Somewhat stressful	Very stressful	Does not apply to me

10. **Being told that you needed to undergo a breast biopsy procedure.....**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
Not stressful at all	A little bit stressful	Somewhat stressful	Very stressful

11. **Waiting to undergo your breast biopsy procedure .....**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>9</b>
Not stressful at all	A little bit stressful	Somewhat stressful	Very stressful	Does not apply to me

12. **Undergoing the biopsy procedure itself.....**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
Not stressful at all	A little bit stressful	Somewhat stressful	Very stressful

13. **Waiting to find out the results of your biopsy procedure..... (check one box)**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>9</b>
Not stressful at all	A little bit stressful	Somewhat stressful	Very stressful	Does not apply to me

14. **Many women are relieved when they are told the results of their breast biopsy are benign (that is, no cancer is present). What was your reaction to being told that your biopsy result was benign?**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>9</b>
Not relieved at all	A little bit relieved	Somewhat relieved	Completely relieved	Does not apply to me

15. **Considering everything that happened before, during, and after your biopsy how stressful has the experience of having a breast biopsy been for you?**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
Not stressful at all	A little bit stressful	Somewhat stressful	Very stressful

16. **Finally, following their benign breast biopsy experience, some women are interested in learning more about certain topics which interest them, which of the following would you have been interested in learning more about after your benign breast biopsy? (check all that apply)**

- Information about my personal risk for breast cancer
- Information about how to better cope with stressful thoughts about cancer
- Information about how I can prevent cancer
- Information about how I can better perform a breast self-examination
- Information about what other sorts of screening tests for cancer I should receive

- Information about my risk for ovarian cancer
- Information about my risk for colon or rectal cancer
- Information about why I needed to undergo a biopsy procedure
- Information about how I can live a healthier lifestyle
- Information about how I could reduce the amount of stress I have in my life
- Information about cancers that are inherited or run in families
- Information about tests I could receive to determine whether I am at risk for developing a cancer that is inherited

**17. Assuming that you were interested in some of the information listed above, how would you prefer to receive that information? (check all that apply)**

- Receive a brochure or pamphlet
- Be directed to a website where I can receive the information
- Be given a CD that I could look myself at on a computer at my home or place of work
- An individual face-to-face meeting with a health care professional or health educator

**17. (continued from previous page) (check all that apply)**

- A meeting in a group with other similar women and with a health care professional or health educator
- Receive a telephone call from a health care professional or health educator
- Be given a video or DVD that I can watch on my television at home
- Be given an audio file that I could download to my IPOD or MP-3 player and listen to at my convenience
- I was not interested in any of the information listed above*

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## VITA

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### Rachel Fancher Steffens

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#### DATE & PLACE OF BIRTH

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May 26, 1979  
Seoul, Korea

#### EDUCATIONAL INSTITUTIONS

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##### **University of Kentucky, 20087- Present**

Clinical Psychology Doctoral Student  
Concentration: Behavioral Oncology

##### **Indiana University-Purdue University Indianapolis, 2005-2006**

Bachelor of Arts, Psychology, May 2007  
Concentrations: Clinical Rehab. Psychology/Drugs & Addictions

#### PROFESSIONAL PUBLICATIONS

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Steffens, R.F., Graue, L.O., Likens, E. B., Hester, M.Y., Wright, H.R., Andrykowski, M.A. (2009). *Factors Associated With Distress After a Benign Breast Biopsy (BBB)*. Poster to be presented at the Society of Behavioral Medicine's 30<sup>th</sup> Annual Meeting and Scientific Sessions, Montreal, Canada.

Steffens, R.F., Atwood, K.A., Zimmerman, R.S., Cupp, P.K., Kilkus, J.L., Studts, J.L. (2009). *Predicting Reported Likelihood to Vaccinate Daughters Against HPV: A Survey of Mothers Residing in Public Housing*. Poster to be presented at the Society of Behavioral Medicine's 30<sup>th</sup> Annual Meeting and Scientific Sessions, Montreal, Canada.

Floyd, A., Rachel Steffens, R.F., Pavlik, E., Michael Andrykowski, M. *Receipt of a False Positive Test Result During Routine Screening for Ovarian Cancer: A Teachable Moment?* Paper to be presented at the Society of Behavioral Medicine's 30<sup>th</sup> Annual Meeting and Scientific Sessions, Montreal, Canada.

Kilkus, J.L., Atwood, K.A., Zimmerman, R.S., Cupp, P.K., Steffens, R.F., Studts, J.L. *Social Influences and Norms on Anticipated HPV Vaccine Uptake* (2009). Poster to be presented at the Society of Behavioral Medicine's 30<sup>th</sup> Annual Meeting and Scientific Sessions, Montreal, Canada.

Steffens, R.F., Graue, L.O., Likens, E. B., Hester, M.Y., Wright, H.R., Andrykowski, M.A. (2008). *Distress and Health Information Interests after Benign Breast Biopsy (BBB)*"

Poster presented at the Society of Behavioral Medicine's 29<sup>th</sup> Annual Meeting and Scientific Sessions San Diego, California.

Steffens, R.H., Lydon, J., & Bigatti, S. M. (2007). *High Emotionality Predicts Higher Perceived Risk and More Distress in First Degree Female Relatives (FDRs) of Breast Cancer Patients*. Poster presented at the Indiana University Cancer Center Annual Cancer Research Day, Indianapolis, Indiana.

Hernandez, A.M., Steffens, R., & Bigatti, S. (2007). Depression among Mexican-american caregivers. Poster presented at the Society of Behavioral Medicine's 28<sup>th</sup> Annual Meeting and Scientific Sessions, Washington DC.

### ***PROFESSIONAL EXPERIENCE***

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**Research Assistant:** August 2007 – Present

Michael A. Andrykowski, Ph.D.: Behavioral Oncology Lab, University of Kentucky College of Medicine Dept. of Behavioral Science

Jamie L. Studts, Ph.D. : Studt's Oncology Lab East, University of Kentucky College of Medicine Dept. of Behavioral Science,

**Administrative Support:** 01/06 – 07/07

*Gregory & Appel Insurance – Indianapolis, Indiana*

**Pre-kindergarten Teacher:** 01/05 – 01/06

*Alternative Learning Center & Academy – Indianapolis, Indiana*

**Licensed Sales and Marketing Specialist:** 7/03 – 8/04

*State Farm Insurance - Indianapolis, Indiana*