A Breast Cancer Fear Scale: Psychometric Development

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Abstract

Fear of breast cancer has been inversely associated with participation in screening. However, investigators have generally used only one item or global scales to measure fear. This report describes development of a fear scale specific to breast cancer. Data from a large study involving mammography adherence were used to test the breast cancer fear scale for validity and reliability. Construct validity was verified through factor analysis and regression analysis predicting mammography. All items loaded on a single factor and theoretical relationships were verified by linear and logistic regression. The Cronbach alpha for the scale was .91.

Keywords

breast cancer, fear, mammography

ALTHOUGH regular screening has contributed to a 10 percent increase in 5-year survival, breast cancer remains the second leading cause of cancer death among women in the United States (Jemal, Thomas, Murray, & Thun, 2002). Both the American Cancer Society (ACS) and the National Cancer Institute (NCI) recommend regular screening mammography for women aged 40 years or older (American Cancer Society, 1999; National Cancer Institute, 2002). Mammography use has increased, but the proportion of women screened in the last 2 years is still below optimal levels; estimates range from 46 percent to 71 percent (Center for Disease Control and Prevention, 2000). Descriptive and intervention studies have shown that perceived barriers are a major deterrent to screening mammography (Champion, Foster, & Menon, 1997; Clark, Rakowski, Ehrich, Pearlman, Goldstein, & Dube, 1998). Some of these barriers are logistic, such as lack of time, or no insurance coverage. Fear-related barriers have also been linked to mammography use. These include worry, anxiety, fear of positive (i.e. breast cancer) results and fear of the procedure (Champion, 1994; Champion & Miller, 1996; Champion, Skinner, Miller, Goulet, & Wagler, 1997; Skinner, Arfken, & Sykes, 1998). In most studies, these fear variables have been measured using single items from larger scales that assess the umbrella concept of barriers.

Rather than being defined as a general emotion that might act as a barrier to screening, fear can be conceptualized as both physiologic arousal and subjective experience resulting specifically from perceptions of threat, few perceived benefits from action and low self-efficacy (Peterson, Witte, Enkerlin-Hoeflich, Espericueta, Flora, Florey, Loughran, & Stuart,1994; Witte, 1992). In order to examine breast cancer fear as a mediator of screening behavior or attempt to modify fear through interventions, we need a tool for measuring the physiological arousal and subjective aspects of this construct. In this article, we report the development and validation of an instrument targeted at assessing fear related to breast cancer. As part of the validation process, we tested construct validity in the context of a specific theoretical framework, which is described in the next section.

Theoretical framework

Because cancer fear has neither been well defined nor measured, understanding of the effects/effectiveness of fear appeals to encourage screening behavior is limited, and messages aimed at fear arousal have not always been successful (Leventhal, Watts, & Pagano, 1967). Research on the use of fear arousal messages has demonstrated both positive and negative behavioral effects, as well as curvilinear responses. Why are some fear arousal strategies successful, whereas others are not? Witte has attempted to address this question by integrating factors associated with an individual's response to fear into fear appeal messages (Peterson et al., 1994; Witte, 1992, 1995). She argues for integrating aspects of several theories into persuasive behavior-change messages. The Extended Parallel Process Model (EPPM), developed by Witte to address personal and situational characteristics related to screening behavior, incorporates perceived threat and efficacy from the Health Belief Model (HBM) and adds an anxiety/fear response. Although the HBM has been used extensively to assess breast cancer screening behavior, research is needed to use the HBM variables of threat, benefits and barriers to test theoretical relationships of these variables to breast cancer fear (V. Champion et al., 1997; Champion & Miller, 1996; Champion, 1994; Curry & Emmons, 1994).

According to Witte (1992), fear is conceptually defined as a negatively toned emotion accompanied by a high level of physiologic arousal stimulated by a threat that is perceived to be significant and personally relevant (Witte, 1992). Fear can be expressed as physiologic arousal (feeling 'jittery', heart beating faster), through verbal self-report of fear ('I feel scared'), or through overt acts such as facial expressions that exhibit fear. This emotional and physiologic response to the threat of breast cancer is conceptually different from the cognitive processing necessary when responding to perceived threat to breast cancer, benefits or barriers to behavior. Our conceptualization of breast cancer fear is specific to the threat of breast cancer and therefore a more useful construct than anxiety.

We propose combining theory-integrating concepts of the HBM with the EPPM into a predictive model for mammography screening (Strecher & Rosenstock, 1997). Fear in this context is defined as a generalized psychological and physiological state resulting from combined effects of perceptions of threat, low perceived benefits to action, self-efficacy and fatalism. We suggest that fear mediates relationships between the independent variables of perceived threat, perceived benefits, self-efficacy and fatalism respectively and the dependent variable of mammography use.

Several key terms merit definitions. *Perceived threat* is the combination of feeling personally at risk for harm (susceptibility) and believing the harm could have serious consequences (seriousness). *Response efficacy* is the belief that an action will lead to a decrease in threat and is, thus, similar to the HBM '*benefits*' construct. If a woman perceives benefits to breast cancer screening and believes she has the *self-efficacy* to be screened, her fear about breast cancer should decrease. Perceived benefit is, therefore, specific to mammography screening. However, *cancer fatalism*, 'the belief that death is inevitable when cancer is present' also relates to whether there is a benefit to screening and whether one has any ability to affect cancer outcomes (Powe, 1995). Perceived barriers are defined as costs associated with participating or engaging in a specific behavior. In this case, mammography barriers are hypothesized to have an inverse impact on mammography use. If perceived barriers are high, mammography use should be less likely. Indeed, several studies have reported that barriers impede screening (e.g. pain associated with mammography). Barriers have included fear of finding cancer or losing a breast (Bastani, Marcus, Maxwell, Das, & Yan, 1994; Burack, Gimotty, Stengle, Eckert, Warbasse, & Moncrease, 1989; Crooks & Jones, 1989; Salazar, 1996), fear of radiation (Bloom, Grazier, Hodge, & Hayes, 1991; Fox, Murata, & Stein, 1991), pain associated with mammography (Amos, Goldstein, & Harris, 1991; Champion & Miller, 1996; Fox et al., 1991) and worry about cancer (Champion & Miller, 1996; Champion, 1994). Each of these barriers has been associated with non-adherence.

Figure 1 shows a theoretical model in which the variables of threat, benefits, fatalism and self-efficacy predict fear, and barriers and fear predict mammography use. Increases in threat and fatalism should theoretically increase fear whereas perceptions of benefits and self-efficacy should act to decrease fear. We hypothesize that moderate fear will motivate the individual who believes the threat of breast cancer can be reduced by taking action (i.e. engaging in screening). However, if fear is too high, the behavioral response to control the fear will result in avoidance rather than participation in screening. If fear is too low, etc., the motivation for change will not be present. For this report, threat is defined as the perceived risk of getting breast cancer, perceived benefits is the belief in the benefits of mammography screening and fatalism is perceived powerlessness or helplessness associated with a diagnosis of cancer (Powe, 1996).

Purpose of study

The concept of fear of breast cancer has been neither well defined nor measured. Existing scales have not been tested for validity or reliability. The purpose of this study was to develop and test the psychometric properties of a comprehensive measure of breast cancer fear.

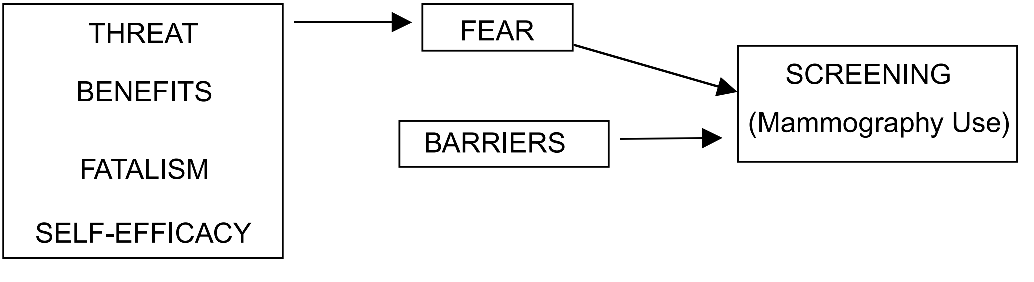

Figure 1. Proposed integrated model.

Quantification and better measurement of the fear concept will help us determine the relationship between women's emotional responses to breast cancer and mammography behavior. Better measurement should also lead to greater understanding of the use of fear appeals as interventions and, in turn, more effective interventions.

Increasing numbers of studies demonstrate the ability of theory-based tailored interventions to successfully increase screening rates (Champion et al., 2000; 2002; 2003; Rimer et al., 2001; Skinner et al., 1994). However, relatively few interventions have specifically promoted mammography as a means to assuage fear. As a basis for developing such interventions, we must understand the role of fear in mammography use by operationally defining and measuring breast cancer fear. Thus, in this report we describe development of the Champion Breast Cancer Fear Scale, (CBCFS) and report criterion and construct validity using data from a larger study.

Hypotheses

1. Construct validity will be demonstrated by unidimensionality, through exploratory factor analysis.
2. The CBCFS will demonstrate high internal consistency as indicated by a Cronbach alpha of .70 or above.
3. The CBCFS will demonstrate high test–retest reliability as indicated by a product-moment correlation coefficient of .70 or above.
4. Construct validity will be demonstrated by the following relationships:
   (a) Perceived threat, benefits, self-efficacy and fatalism will significantly predict fear of breast cancer.
   (b) Fear and perceived barriers will significantly predict compliance with mammography in the following three months.

Methods

Development of items for the fear scale resulted from an extensive literature review on the fear concept and expert consultation regarding the more general construct of anxiety (C. D. Speilberger, personal communication, 18 April 1997). The conceptual definition of fear in this context is specific to a threat of breast cancer; whereas anxiety is conceptualized as a generalized reaction to any number of threats. A 5-point Likert scale ranging from 'Strongly Agree' (5) to 'Strongly Disagree' (1) was used as response options. Ten items were developed and reviewed by four content experts who have studied the relationship between fear and behaviors. The experts judged all items appropriate to the conceptual definition of fear in the context of breast cancer and suggested some editorial changes in wording. Summing the 10 items yielded a potential range in scores from 5 to 50; in our study the actual range was 8 to 50. Several validated instruments used to determine both construct and criterion validity are described below.

Perceived threat of breast cancer was measured by a 3-item scale previously tested for validity and reliability in a sample of 618 women 50 and older (Champion & Springston, 1999). The Cronbach alpha was .79, and construct validity was tested using confirmatory factory analysis.

Perceived benefits were measured by a 5-item scale with demonstrated validity and reliability (Champion & Springston, 1999). Internal consistency was .78 and construct validity via factor analysis revealed all benefits items loading on the same factor with correlations above .4.

Perceived barriers were measured by 14 items, including structural barriers such as cost, lack of time or doctor recommendation, and emotions such as fear of radiation, pain and embarrassment. The Cronbach alpha was .81 and confirmatory factor analysis demonstrated construct validity.

Fatalism was measured as a 15-item scale developed by Powe (1995) to measure the degree of negativity and hopelessness a person associates with the cancer diagnosis (Powe, 1995). The Cronbach alpha was .87.

Self-efficacy is a summated 10-item scale measuring perceived confidence in ability to get a mammogram. The Cronbach alpha was .88. Construct validity has been tested by factor analysis and by a binary logistic regression in which the summated scale was used to predict adherence resulting in a Chi-square value of 38.80, d.f. = 1, $p < .0001$ (Champion, Menon, Rawl, & Skinner, submitted to *Research in Nursing & Health*).

Mammography adherence was measured by self-report, which has been well correlated with medical record data (Degnan, Harris, Ranney, Quade, Earp, & Gonzalez, 1992; Harris, 1998). We classified women as adherent if they had a mammogram in the last 15 months and non-adherent if they had not had a mammogram in the last 15 months. Mammography adoption was measured 6 months after assessment of attitudes.

Procedures

Data were collected as part of a larger intervention study funded by the National Institute of Nursing Research. Participants were either members of a Health Maintenance Organization (HMO) or seen at an indigent medicine clinic. All were 51 years or older and had not had a mammogram 15 months prior to study accrual. Women were not eligible if they had been diagnosed with breast cancer. Of 2599 eligible women contacted, 1390 were enrolled (54% response). Data were collected prior to intervention (Time 1) and at two months following intervention (Time 2) by computer-assisted telephone interview. Participants were randomly assigned to receive usual care (group 1), tailored print material (group 2), tailored telephone counseling (group 3) or tailored print plus telephone counseling (group 4). Interventions were tailored on variables from the model in Fig. 1. Although all participants were non-adherent at entry, by Time 3 data collection (9 months after intervention) 49 percent had received a mammogram.

Sample

Mean age of participants was 66.1 (SD = 10.4). Mean years of education was 11.9 (SD = of 3.3). A slight majority (54%) were African American, 43 percent were Caucasian and 3 percent other races. Only 29 percent reported living with a partner. Just over half (53%) had yearly household incomes of less than $15,000, 22 percent earned $15,000 to $30,000 and 25 percent earned $31,000 or above.

Data analysis

All data analysis was conducted using SPSS (SPSS, 1999). We first conducted an exploratory factor analysis on the 10-item fear scale using a factor analysis with the principal factors method of factor extraction. Squared multiple correlations were specified as the initial estimates of communalities. Following revisions based on this analysis, we proceeded to reliability testing and item analysis. We concluded by testing theoretical hypotheses: (1) testing theorized associations of threat, benefits, self-efficacy and fatalism with fear, and (2) testing fear and barriers for prediction of mammography adherence. Women were coded as adherent or non-adherent to mammography screening at 9 months after initial accrual (Time 1 data). Time 2 data (2 to 3 months after Time 1) were used for attitudinal scales of threat, benefits, fatalism, self-efficacy, barriers and fear, while Time 3 (9 months) data were used for mammography behavior. The longitudinal analysis was consistent with attitudinal concepts predicting later behavior. Time 1 and Time 2 data were used for test–retest correlation. In order to test the relationship of fear to mammography adherence, fear was divided into low, moderate and high-based using summated scores for the fear scale. The eight-item fear scale was used in the regression prediction models after preliminary exploratory factor analysis demonstrated that two items were not conceptually linked to the other eight. The 8-item fear scale had a range of score from 8 to 40. Low fear was defined as a total score of 8 to 15, moderate fear as a score of 16 to 23 and high fear as a score of 24 to 40. We used multiple linear and logistic regressions to test the hypotheses.

Hypothesis 1

Table 1 lists factor loadings for all 10 items of the fear scale. All factor loadings were above .45 as specified by Nunnally & Bernstein (1994) except for items 2 and 3. One common factor explained 48 percent of the variance due to common factors (there are 10 possible common factors). Items 2 and 3 reflected a cognitive as opposed to emotive direction. Item 2 stated 'I don't like to think about breast cancer' and item 3 indicated 'the more you think about breast cancer, the more likely you are to get it'. It was decided to drop these items before the

Table 1. Factor analysis principal component extraction

Item	*Fear factor loading*
1. Scared	.48
2. Don't like to think about	.35
3. Might happen to me	.25
4. Nervous	.70
5. Upset	.80
6. Depressed	.82
7. Jittery	.84
8. Heart beats faster	.76
9. Uneasy	.81
10. Anxious	.80

Note: The principal component extraction method was used, with squared multiple correlations as initial estimated of communalities. The number of factors specified was one
Variance accounted for = 48 percent

remaining analysis. Table 2 reflects the factor analysis with these items removed. All eight items were at .47 or above and the first factor accounted for 57 percent of the variance due to common factors as opposed to 48 percent. The eight-item scale was used for all subsequent analysis.

Hypothesis 2

We used Cronbach's alpha to estimate internal consistency reliability of the fear scale. Table 3 lists item/total correlations. Internal consistency reliabilities were calculated from Time 2 data. The Cronbach alpha was .91. and all items correlated well above the .3 minimum recommended by Nunnally & Bernstein (1994) (see Table 3).

Table 2. Factor analysis principal component extraction (items removed)

Item	*Fear factor loading*
1. Scared	.47
4. Nervous	.70
5. Upset	.80
6. Depressed	.82
7. Jittery	.84
8. Heart beats faster	.76
9. Uneasy	.81
10. Anxious	.80

Note: The principal component extraction method was used, with squared multiple correlations as initial estimated of communalities. The number of factors specified was one
Variance accounted for = 57 percent

Hypothesis 3

We hypothesized that the test–retest correlation would indicate a correlation coefficient of .70 or above. To test this hypothesis, we used data from the control group only and correlated the 8 item CBCFS from Time 1 with the 8-item scale from Time 2. The Pearson correlation was .70 and significant at the .0001 level.

Hypothesis 4a

We hypothesized that perceived threat of developing breast cancer, perceived benefits of mammography, perceived self-efficacy to get mammography and fatalism would together predict fear of breast cancer. A linear multiple regression (Table 4) demonstrated that all four variables were significant in uniquely predicting fear, even after controlling for each other (p = .004 to < .0001). Additionally, the combined linear combination of the 4 predictors was highly significant for predicting fear (F = 26.33, d.f. = 4,1002, p < .0001). It should be noted, however that the correlation of benefits with fear was positive when theoretically we anticipated a negative relationship.

To further explore this, we examined interactions and inspected scatter plots for curvilinear relationships. Benefits appeared to have a curvilinear relationship with fear, such that the correlation between benefits and fear was negative and non-significant for the low fear group (r = –.08, p = .23, n = 239), positive and significant for the middle fear group (r = .17, p = .0005, n = 433) and positive and significant for the high fear group (r = .14, p = .006, n = 373). Even though fear is the dependent variable in the present theoretical model, to help further explain this relationship, we performed an ANOVA with benefits as the dependent variable and the three fear groups as the independent variable. The result was significant (F = 12.96, d.f. = 2,1039, p < .0001). The mean benefits score for the low and high fear group were close (30.43 and 30.26 respectively) while the mean for the moderate fear group was 28.94. Using the Tukey-Kramer follow-up comparison, the low and high fear group was significantly higher in perception of benefits than the moderate fear group.

Additionally, the interaction between benefits

Table 3. Item analysis for fear scale

Item	*Corrected correlation to total*
1. The thought of breast cancer scares me	.46
4. When I think about breast cancer, I feel nervous	.68
5. When I think about breast cancer, I get upset	.76
6. When I think about breast cancer, I get depressed	.76
7. When I think about breast cancer, I get jittery	.78
8. When I think about breast cancer, my heart beats faster	.71
9. When I think about breast cancer, I feel uneasy	.77
10. When I think about breast cancer, I feel anxious	.75

Note: The correlation between the item and the total score excluded the item from the total score
Scale mean X = 21.18
SD = 8.52
Alpha = .91

Table 4. Multiple regression analysis of fear on perceived threat, self efficacy, fatalism and benefits (N = 1316)

Item	*Partial T*	*p*
Benefits	3.66	<.0001
Perceived threat	6.00	<.0001
Self-efficacy	–2.92	.004
Fatalism	6.47	<.0001

F = 26.33, d.f. = 4,1002, $p < .0001$

and mammography screenings compliance (on fear) during the first 2 months after intervention was marginally significant (p = .08). For those who did not comply for mammography screenings during the first 2 months after intervention (n = 789), the correlation between benefits and fear was positive and significant (r = .09, p = .01); however, the correlation was negative and non-significant (r = –.04, p = .53) for those who did comply during the first 2 months after intervention (n = 259). Moreover, the correlation between benefits and fear was not significant for those less than or equal to the median (score of 21) fatalism score (r = .025, p = .55) but was positive and significant for those above the median fatalism score (r = .104, p = .03). We will examine these complex curvilinear relationship and interactions in a future study. For now, suffice it to say that benefits did significantly predict fear, but the relationship was complex such that the theoretically expected negative relationship was observed but only for certain subgroups.

Hypothesis 4b

We hypothesized that the combination of perceived fear of breast cancer and perceived barriers would predict actual screening. As can be seen from Table 5 and these hypotheses were confirmed. Both fear and barriers significantly uniquely predicted mammography adherence, even after controlling for each other. Additionally, the combined linear combination of barriers and fear was highly significant for predicting the logit of mammography adherence (Chi-square = 63.03, d.f. = 3, p < .0001). The expected curvilinear relationship between fear and compliance was also demonstrated (Table 5). That is, the odds of compliance was significantly greater for the moderate fear group compared to the low fear group (adjusted odds ratio = 2.02, p = .001), but the odds of compliance was only marginally significantly greater for the high fear group compared to the low fear group (adjusted odds ratio = 1.32, p = .08).

Discussion

This report provides preliminary evidence that breast cancer fear, as a construct, can be validity and reliably measured. Using a well-supported theory, we tested construct validity of the fear scale using factor analysis, linear regression analysis and logistic regression. Unidimensionality of the fear scale was explored via exploratory factor analysis. Based on results, two items reflecting more cognitive activity of thinking were removed and exploratory analysis rerun. All subsequent analysis was completed with an eight-item scale.

Prior to testing construct validity by theoretical relationships, Cronbach alpha and item analysis demonstrated internal consistency of the eight-item scale. All items demonstrated

Table 5. Logistic regression of mammography adherence on barriers and fear (N = 1038)

Variable	*Beta*	*SE*	*Sig*	*Odds ratio (Exp B)*	*95% confidence interval*
Barriers	–.065	.009	<.0001	.94	(.92, .96)
Moderate fear	.701	.206	.001	2.02	(1.35,3.02)
High fear	.277	.156	.076	1.32	(.97,1.79)

Note: The odds ratio is the adjusted odds ratio, controlling for other independent variables in the model. The 95 percent confidence interval is for the odds ratio. Moderate fear and high fear are each compared to low fear X^2 = 63.03, d.f. = 3, $p \leq .0001$

excellent item-total correlation with the overall alpha at .91. Test–retest correlation (.70) was acceptable. The primary reason that test–retest is almost always lower than alpha is that it is almost impossible for a reliability coefficient based on a single administration of a test (Cronbach alpha) to capture all the errors of measurement in which we are interested. Therefore, alpha is actually an upper bound to reliability in practice (Brennan, 2001). Overall, both internal consistency and test–retest reliability of the sum of the eight-item fear score were supported.

The strongest evidence of construct validity was the support of the fear construct in relation to theoretically specified variables. As shown in Fig. 1, we tested two such relationships. First, our expectation that perceived threat, benefits, self-efficacy and fatalism would predict fear was supported (Table 4). Perceived threat, benefits, self-efficacy and fatalism significantly predicted fear as theoretically expected except for the benefits construct. Although benefits significantly predicted fear, the direction of the relationship was positive indicating that as perceived benefits increased, so did perceived fear. An ANOVA revealed that the low and high fear groups had significantly higher mean perceived benefits than the moderate fear group. This curvilinear relationship, as well as relationships involving fatalism and previous compliance, offer potential rationale for the direction of the relationship between benefits and fear. We will investigate these complex relationships in a future study. It is conceivable that an increased perception of mammography benefits led to thoughts of the need for obtaining a mammogram, which resulted in fear that breast cancer would be discovered. Both the moderate and high fear group had positive correlations of fear with benefits. We also know that the moderate fear group had significantly more mammograms and a lower mean benefits score that the high fear group. In order to maintain a moderate fear level, the women in this group might downplay the benefits of screening, which are discovery of a cancer at an early stage. Overall, the regression analysis offers evidence in support of our hypothesis that the emotional response of fear resulted from cognitive processing which included an individual's perception of their personal threat from breast cancer, the ability to do something about that threat (benefits and self-efficacy) and their belief in the overall potential of cancer being overcome (fatalism). Theoretically, if an individual believed they were susceptible to breast cancer, but also believed that breast cancer could be controlled and that they had the ability to control it, the emotional response or fear would be lower. On the other hand, if a person felt they were at risk for breast cancer and nothing could be done, fear increased. It should be noted however, that theoretically, benefits should be inversely correlated with fear and our analysis demonstrated a positive relationship. Curvilinear relationships, confounding factors and interactions, to be investigated in a future study, might explain this result.

Second, as theoretically predicted, both fear and barriers predicted Time 3 mammography adherence (Table 5). We included both fear and barriers in predicting mammography. Prior research has demonstrated overwhelmingly that barriers directly predict behavior (Champion & Miller, 1996; Stein, Fox, & Murata, 1991). Fear was hypothesized to additionally predict mammography adoption adding to our ability to predict the behavior. Fear was divided into low, moderate and high levels based on past research that demonstrated a curvilinear relationship of fear with behavior (Higbee, 1969). We hypothesized that individuals with moderate fear were significantly more likely to have obtained a mammogram than persons with low fear while people with high fear would not be different in behavior than those with low fear, which is why they would not be more likely to screen. Table 5 demonstrates this exact relationship and is consistent with past research (Skilbeck, Tulips, & Ley, 1977).

Conclusions

The Champion Breast Cancer Fear Scale (CBCFS) developed and tested in this research has potential for use in predicting mammography behavior. Fear as measured by the CBCFS along with barriers predicted adherence longitudinally. These results lend support to the thinking of Cameron, Leventhal, & Love (1998) who suggested that emotional arousal and processing may have a strong influence on subsequent behavior.

Although results of the initial phase for scale development for fear are encouraging, more work needs to be done. The relationship between fear and behavior should be explored further. The relationship of perceived threat, benefits, self-efficacy and fatalism to fear are strongly suggestive that the emotional response is dependent on processing several concepts.

The use of a fear scale in predicting mammography behavior may allow us to identify important areas for intervention allowing us to increase intervention efficacy. Intervening to reduce fear might include the work of Johnson and Leventhal, who demonstrated that information about sensations and encouragement of monitoring reduced fear and distress (Johnson, 1975; Johnson & Leventhal, 1974). A valid and reliable breast cancer fear scale will enhance our ability to test effectiveness of fear arousal messages and the use of fear-control processes, and it should lead to a clearer understanding of predictors of screening that mediate or are mediated by fear. This scale will also allow us to further investigate the variables and their interrelationships as they influence mammography adherence.

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