

Understanding Emotional Reactions for Negative Services: The Impact of Efficacy Beliefs and
Stage in Process

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Understanding Emotional Reactions for Negative Services: The Impact of Efficacy Beliefs and Stage in Process

We examine consumers' emotional reactions for a specific negative service – a mammography screening test – and measure how such reactions are influenced by the consumer's stage in the screening process and her beliefs in the efficacy of the test. We find that stage in process moderates the relationship between test efficacy beliefs and stress, such that those obtaining screening tests feel more stress as their belief in the efficacy of mammography increases, while those obtaining follow-up, diagnostic tests feel less stress as their belief in the efficacy of mammography increases. Process measures indicate that fear of a positive mammogram result is uniquely associated with stress for those receiving a screening mammogram, while uncertainty regarding diagnosis is uniquely associated with stress for those receiving a diagnostic mammogram. Implications for better managing the testing experience and for understanding negative services more generally are discussed.

One very common service event that has been neglected in the services literature is the testing experience. Consumers can engage in *routine* testing, where nothing is wrong but the test is triggered by some kind of schedule, such as a 30,000-mile car servicing or an annual physical exam. Consumers may also engage in testing for *diagnostic* reasons, where a specific problem or symptom has suggested follow-up, such as when the car is making a strange noise or a lump is detected in a woman's breast. We believe the type of test (or stage in testing) shifts the consumer's reference point such that in routine testing situations, the default is that nothing is wrong, while in diagnostic situations, the default is that there may be something wrong. In this research, we show that this factor – stage in testing – moderates consumers' emotional reactions to and evaluations of the testing experience.

Although some testing experiences may yield happy outcomes (e.g., pregnancy tests), most testing situations fall into the realm of “negative services,” i.e., services in which consumers must cope with unwanted or stressful situations (cf., Morgan and Rao 2006). Much of the services literature currently focuses on non-negative services (Berry and Bendapudi 2007; Morgan and Rao 2006), yet there is a growing recognition that negative services, and consumers' reactions to and expectations about them, may differ systematically from more traditional positive or neutral service encounters. Morgan and Rao (2006) argue that because consumers are often inexperienced dealing with aversive experiences and often feel anxious during them, consumers may be more likely to evaluate the process (i.e., how did it feel to go through the experience?) rather than the outcome of the experience. Yet, surprisingly few researchers have considered the affective dimension of services (Brown and Kirmani 1999).

Our research makes a contribution to the services literature in three ways. First, we focus on the emotional experience of the consumer. While other researchers have considered the role

of affect in services (e.g., Liljander and Strandvik 1997; Mattila and Wirtz 2000; Price, Arnould, and Deibler 1995; Smith and Bolton 2002; van Dolen et al. 2001), our focus is unique in that we consider consumers' stress and this stress is related to the general service context rather than any specific actions or aspects of the service provider. Within the services literature, affect is generally conceptualized either as a mediator between cognitive evaluations and satisfaction or as an independent variable used to explain satisfaction (Liljander and Strandvik 1997) and it is typically studied at the post-process stage (Mattila and Wirtz 2000). The stress we examine relates to specific fears about a personal outcome (i.e., whether cancer is present) and is present prior to the experience itself (i.e., the actual mammogram). We believe our focus on the consumer's emotional experience as our primary dependent variable is appropriate in this context (and negative service contexts more generally) because, as argued by Morgan and Rao (2006), the emotional experience may be more salient than the outcome of the process for negative services. Further, understanding the customer's emotional experience can provide valuable guidance for better managing the total service experience, particularly since emotions (unlike satisfaction) can be assessed both prior to and during the service encounter (Spake et al 2003).

Second, we examine consumer responses for a negative service, specifically mammography testing. By examining deleterious effects of stress within this environment, we can gain insight into how consumer responses to negative services may differ from responses to more positive services. Third, we consider how the emotional response to the service experience is affected by stage in process, i.e., whether the purpose of the screening test is routine or diagnostic. Specifically, we argue that service quality expectations (here, expectations regarding test effectiveness) have differential effects on consumers' emotions depending on the service context. These findings have a number of implications for how to better encourage repeat

medical testing, as well as how we view negative services more generally. Implicit beliefs that the reactions to service events are the same for positive and negative situations may need to be revised.

The rest of the paper is organized as follows. First, we examine the appropriate service measures for evaluating these types of negative experiences and test the potential relationships between these variables. Second, we consider how this relationship might be moderated by the consumers' testing stage (i.e., screening or diagnostic). Our hypotheses are tested in two studies. We conclude with a discussion of our results and their implications for both managers and consumers.

Appropriate Measures of Consumer Reactions in a Medical Testing Service Environment

Decisions to repeat service experiences are typically a function of perceived value, which in turn is a function of perceived quality (Zeithaml 1988). In the context of medical testing, one salient aspect of quality relates to beliefs about the accuracy of the test. The more accurate the test, the better it is presumed to be. Satisfaction with a medical screening procedure can only be measured after the test (Spake et al. 2003) and is likely to depend on many variables (Sitzia and Wood 1997), including factors outside the medical provider's control (e.g., whether cancer is actually present). Because of the complicated factors associated with satisfaction in this service situation, we focus on the stress associated with the testing process itself. This stress could be related to the fear of being diagnosed with cancer, discomfort associated with the test itself, fear of dying, and/or uncertainty.

Prior models that have examined the screening test decision (e.g., Protection Motivation Model (Rogers, 1983; Ripplettoe and Rogers, 1987) or the Health Belief Model (Rosenstock, 1974; Rosenstock and Kirscht, 1979)) generally postulate that the greater the belief in the efficacy of the test (i.e., the greater the belief in the likelihood that mammography will detect cancer if it is present), the greater the likelihood that the patient will engage in screening. These models also assume that stress is a barrier to testing that reduces the likelihood of the patient engaging in screening. Efficacy and stress are typically viewed as independent of each other (Consedine et al 2005). However, based on research exploring the cognitive appraisal of emotion (e.g., Lazarus 1991), we suggest that underlying beliefs such as those regarding efficacy can both determine (Smith and Ellsworth 1985) and be influenced by (Lerner and Keltner 2000, 2001) specific emotional states such as fear or stress. Our goal here is to explore the relationship between test efficacy (a component of service quality) and stress (an actionable outcome variable) during the testing experience. To our knowledge, researchers have not examined potential correlations between beliefs about the efficacy of the test and stress, even though both factors are often mentioned as important independent determinants of testing decisions. By understanding the relationship between test efficacy and stress during the testing experience, we can provide insight into consumers' responses to negative services, in order to both improve customers' experiences in such situations and potentially encourage increased adherence to testing guidelines.

Relationship between Test Efficacy and Stress

Research on emotion suggests that uncertainty is an important aspect of emotional experience (Lerner and Keltner 2000, 2001). Therefore, we expect stress, our measure of consumers' emotional response to the testing experience, to be related to test efficacy, a reflection of the test's ability to detect disease with certainty. A stronger belief in test efficacy reflects more certainty that the test result reflects the true underlying state, while a weaker belief in test efficacy represents more uncertainty about the test results.

We hypothesize that the relationship between stress and perceived test efficacy will be moderated by the stage of the testing process, i.e., whether the test is routine or diagnostic. If the patient is getting tested as a routine preventive measure, the a priori belief is that she is healthy and thus the goal of the test is to preserve that mindset. Alternatively, if the patient is getting a mammogram because of an a priori concern that something may be awry, then the patient is afraid she may be sick and the goal of the test is to change the existing mindset.

Moderating Role of Testing Stage

At the hospital where we conducted our study, patients are asked to wait in separate waiting rooms depending on whether they are there for a screening or a diagnostic mammogram. Although this distinction may not be as physically transparent in other hospitals, this is nonetheless a clear, a priori distinction in mammography testing. (Indeed, insurance reimbursements often differ for these two types of mammograms, with only screening mammograms included under free wellness care.) Thus, screening versus diagnostic status can be treated as a quasi-experimental factor.

As described above, patients awaiting screening versus diagnostic mammograms likely have very different goals and motivations for their testing. Patients obtaining screening mammograms typically view mammography as a way to help prevent disease and/ or maintain their current health. Consequently, they are likely to expect to end their screening process finding nothing wrong. Indeed, Dodendorf et al (2004) interviewed mammography patients to create a blueprint of the mammography appointment and found that the patients' group scripts did not include a contingency should abnormal results be found. Patients awaiting diagnostic mammograms, on the other hand, are more likely to view themselves in a 'sick' role. They are obtaining a mammogram to seek specific information, and are likely experiencing uncomfortable uncertainty regarding their medical symptoms. Scaf-Klomp et al. (1997) found that 40% of women in their sample reported being "very frightened" when they were told that they required diagnostic mammograms or other follow-up after initial screening. The main focus of these women may be on resolving this uncertainty, and returning to a state of "health."

We argue that if beliefs in test efficacy (or certainty about the test) affect feelings of stress, then the relationship between these variables will differ depending on whether the person is awaiting a screening or diagnostic mammogram. 'Screening' women may actually be threatened by the prospect of the mammogram finding something. Indeed, Hay, Buckley, and Ostroff (2005) report that as many as 39% of women who are not getting mammograms highlight fear about finding cancer as an important reason for their non-compliance, and that this fear also motivates compliant women. In this case, it may actually be soothing to think that a positive result (i.e., a result indicating that cancer may be present) may be in error. That is, because these women come into the testing situation with the explicit assumption that everything is normal, increased test efficacy in terms of cancer detection may increase the perceived threat

that any given screening test might result in bad news. Consequently, we predict a positive relationship between belief in the test's efficacy and emotional stress for women receiving screening mammograms.

This prediction is consistent with research which finds that consumers faced with a loss tend to be risk-seeking (cf., Kahn and Meyer 1991). For a woman obtaining a screening mammogram, the information received from the mammogram likely represents a loss when viewed vis-à-vis the status quo (since the information can either confirm the current state or indicate a state worse than the status quo). As such, these patients are likely to be in a "preserving" frame, and should therefore be ambiguity *seeking* (Kahn and Meyer 1991), suggesting increased uncertainty in test results (lowered test efficacy) may be preferable.

Women in the process of obtaining a diagnostic mammogram may approach the experience differently. In particular, many unique features of the diagnostic mammogram situation can dampen or reverse the processes predicted above for screening mammograms. First, because women obtaining a diagnostic mammogram are seeking specific information, they may be motivated to believe that if mammograms find cancer, they will find it early. Further, given their uncertainty regarding their medical symptoms, diagnostic mammogram patients may want a definitive answer regarding their diagnosis even if that answer is unfavorable. Indeed, many researchers highlight the importance of shortening waiting times between notifying women of a problem and scheduling an appointment to resolve the diagnosis (e.g., Brett et al. 2005), and many women report wanting immediate results (e.g., Barton et al. 2004). Thus, in the diagnostic case, believing the test is accurate can help reduce anxiety caused by uncertainty. Similarly, the more worried a woman is that she has breast cancer, the more motivated she may be to believe the test will help resolve her anxiety by providing accurate information and moving her towards

treatment (if necessary) as a coping mechanism. More generally, diagnostic patients are more likely to engage in “sick-role” behavior and incorporate the possibility of disease into their current reference point. Thus, they may be more likely to take an “enhancing” and hence risk-averse frame of mind (cf. Kahn and Meyer 1991). Thus, decreased uncertainty in the test results may be preferable. Consequently, we predict a negative relationship between belief in the test’s efficacy and emotional stress, for diagnostic patients.

H1: The relationship between stress and efficacy beliefs will be moderated by testing stage, such that, during mammography testing, beliefs in the efficacy of mammography as a cancer screening device will be positively related to stress for screening patients, but negatively related to stress for diagnostic patients.

Hypothesis 1 resembles other framing hypotheses with respect to the impact of a decision maker’s current perspective or reference position on uncertainty aversion and ambiguity seeking. It extends past research (e.g., Janz and Becker 1984) by anticipating that belief in test efficacy might actually have negative emotional effects in a screening (which is a “preserving” frame) situation and/or that a patient’s emotional state may influence their beliefs about a test’s accuracy. Further, it extends the services literature by examining factors which impact perceptions in negative service contexts, and also suggests that enhancing quality perceptions may not always lead to improved outcomes.

In study 1, we examine the relationship between efficacy beliefs and emotional stress for women obtaining screening and diagnostic mammograms in order to test hypothesis 1. In study 2, we replicate these results and begin to examine the specific processes of emotional appraisal and emotional generation which may explain this relationship within each perspective. Finally, we note that a coping argument can be advanced in which one predicts that stress negatively

impacts efficacy beliefs for diagnostic women. Specifically, given that diagnostic women may be obtaining a follow-up mammogram to explore a previously positive test result, they may find it comforting to believe the earlier result was in error. We address this possibility in study 2. Understanding the sources of women's fears about testing is important because it can lead to the development of more effective interventions to counter such fears and encourage adherence to screening guidelines (Consedine et al. 2004). More generally, by understanding reactions in this particular environment, we increase our understanding of consumers' responses to negative services.

STUDY 1

In order to test our hypotheses, we sampled from the population of women 21 and over who had already made the decision to get a mammogram. We were interested in women for whom the test was directly relevant so that genuine emotional reactions could be evaluated. To do this, we distributed paper surveys in the mammography waiting rooms of a university hospital where women were in dressing gowns in the process of getting tested. Research assistants (blind to the hypotheses) asked women to fill out our survey instrument and remained available to answer clarification questions. We paid 77 women \$10 each to participate in study 1. Two women were later omitted from the study due to errors made in filling out the survey, four were omitted for failure to indicate what type of mammogram they were receiving, and three were omitted due to having been previously diagnosed with cancer. (We omit women who have previously been diagnosed with cancer because of possible confounds with their reactions to the testing situation based on their previous experiences.) We asked women to report whether they

were in the process of obtaining a screening mammogram versus a diagnostic mammogram. We also asked the women a series of standard demographic questions as well as questions about their family and friends' histories with cancer and the dependent measures questions described below.

Primary Dependent Measures

Test Efficacy Measure. Participants were asked to indicate their belief in the efficacy of mammography for early detection by indicating agreement (5-point scale, 1 = disagree, 5 = agree) with the question "Mammograms can find breast cancer early." This measure has been used previously to assess perceived efficacy of mammography (see for example, Lerman et al. 1991) and is closely aligned with the definition of efficacy beliefs relevant to mammography (where early detection of cancer is the primary focus). A high score on this measure indicates a greater belief in the efficacy of the test, while a low score indicates more uncertainty. A single item was used to be consistent with prior literature and because recent research has suggested that one item scales may be sufficient since the incremental information value of multiple items in the scale may not offset the costs to the respondent having to answer more items (Drolet and Morrison 2001). Nonetheless, we include additional items to assess test efficacy in Study 2.

Breast Cancer Stress Measure. Breast cancer stress was measured using the Lerman Breast Cancer Worry Scale with 5-item response scales for all items. This scale contains three items: "How often do you worry about getting breast cancer someday," "How much does worry about breast cancer influence your moods and your ability to perform daily tasks," and "How anxious are you about results of future mammograms." The first two items were rated on 5-item

scales labeled 1 = not at all, 2 = rarely, 3 = sometimes, 4 = often, and 5 = almost all the time, while the third item was rated on a 5-item scale labeled 1 = not at all, 2 = a little, 3 (unlabeled), 4 = somewhat, and 5 = a lot. Factor analysis confirmed that these items measured a single construct (eigenvalue = 2.15) and that this construct was distinct from efficacy beliefs (eigenvalue = 1.06). Consequently, we combined the three breast cancer stress items to create a three-item breast cancer stress scale ($\alpha = .80$).

Participants

The sample contained 42 women receiving screening mammograms and 26 women receiving diagnostic mammograms. These women ranged in age from 25-80 with a mean age of 49.4. They had an average annual household income of \$61,486.36, with a range from \$5100 to \$250,000. The women ranged in the level of education they had achieved, with 5% reporting having had some high school, 29% having completed high school, 8% having had some college, 27% having completed college, and 31% having some type of graduate education. Additionally, 63% of the women were white, 36% were African American, and 1% was East Asian. None of these demographic variables, or questions that we asked regarding the cancer history of their family and friends, differed between the screening and diagnostic groups, except for age. (See Table 1 for statistical results). Therefore we controlled for age in all of our analyses.

INSERT TABLE 1 HERE

Results and Discussion

Test of Hypothesis 1. To examine hypothesis 1, we modeled breast cancer stress as a function of test efficacy beliefs, mammography stage, and their interaction, controlling for age (see Table 2). There was no main effect for test efficacy beliefs on breast cancer stress ($F < 1$). However, there was a main effect for mammography stage, with those obtaining screening mammograms reporting less stress ($M = 2.4$ ($sd = 0.8$)) than those obtaining diagnostic mammograms ($M = 2.7$ ($sd = 0.9$); $F(1,56) = 13.81$; $p = 0.0005$). Finally, as predicted by hypothesis 1, there was a significant belief in test efficacy by mammography stage interaction for predicting breast cancer stress ($F(1,56) = 12.14$; $p = 0.001$). This is a cross-over interaction, where the beta coefficient for test efficacy is significantly positive ($\beta = .50$, $p = .03$) for those obtaining screening mammograms and is significantly negative ($\beta = -.37$, $p = .006$) for those obtaining diagnostic mammograms (see Table 2).

INSERT TABLE 2 HERE

Discussion. These results support hypothesis 1. Women obtaining screening mammograms report more stress as they increase their belief that mammograms find cancer early, while women obtaining diagnostic mammograms report less stress as they increase their belief that mammograms find cancer early. These results illustrate that stage in process can influence the relationship between one aspect of quality beliefs (perceived test efficacy) and the consumers' emotional reaction in a testing context. Further, our results support the notion that the relationship between quality and the consumers' evaluation of the service experience may differ for negative service contexts compared to positive or neutral service contexts. In study 2, we investigate potential mechanisms underlying the impact of efficacy beliefs on stress (hypothesis 1).

STUDY 2

In study 2, we replicate the results from study 1 and provide evidence for the specific emotional appraisal and emotional generation processes that may explain the relationship between efficacy beliefs and stress within each perspective for a negative service.

For women receiving screening mammograms, the remote possibility of an unfavorable mammogram result leading to an unexpected cancer diagnosis is likely to be particularly threatening. On the other hand, for women receiving diagnostic mammograms, the uncertainty of the diagnostic process is likely to loom larger. Although not currently diagnosed with cancer, these women understand that there is some specific medical indication causing their diagnostic status. These women have already obtained a negative, if ambiguous, medical outcome and thus will be relatively more focused on uncertainty reduction. Therefore, we hypothesize:

H2: Stress will be driven by the prospect of positive (unfavorable) test results for screening patients and by uncertainty for diagnostic patients.

Method and Participants

Study 2, like study 1, was conducted in mammography waiting rooms. One hundred and twenty-one women were paid \$10 each to participate in the study. Eight women were later omitted from the study due to errors made in filling out the survey and 30 were omitted due to having been previously diagnosed with cancer. This left a sample of 83 women – 45 who were obtaining screening mammograms, and 38 who were obtaining diagnostic mammograms.

These women ranged in age from 21-84 with a mean age of 52. They had an average annual household income of \$87,238, with a range from \$4830 to \$1,500,000. The women varied in the level of education they had achieved, with 17% having had some or completed high school, 51% having had some or completed college, and 32% having some type of graduate education. Additionally, 56% of the women were white, 42% were African American, and 2% were other. None of these demographic variables differed between the screening and diagnostic groups (see Table 3).

INSERT TABLE 3 HERE

Measures

Test Efficacy. We created a test efficacy scale by adding three additional items to the original test efficacy item from study 1. The three additional items (rated on 5-point scales, 1 = disagree, 5 = agree) were: “Mammograms are the best way to find cancer in its early stages,” “Mammograms have very important health benefits,” and “Mammograms have real health benefits.” The four test-efficacy items loaded onto a single factor in a factor analysis (eigenvalue = 2.39) and formed a four-item test efficacy scale ($\alpha = 0.76$).

Breast Cancer Stress. The same breast cancer stress scale used in study 1 was used in the current study ($\alpha = .68$). Factor analysis confirmed that this construct was distinct from test efficacy, as the four test efficacy items loaded onto one factor (eigenvalue = 2.39) and the three stress items loaded onto a second factor (eigenvalue = 1.86). The two scales are also not significantly correlated ($r = .11, p > .3$), and the average variance extracted for each scale

exceeds the scales' squared correlation with each other, further supporting the discriminant validity of the two constructs (Fornell and Larcker 1981).

Measures of Underlying Psychological Mindset. Prior research has not been concerned with the psychological mindset of mammography patients and thus, we were unaware of any measures designed to assess our contention that women obtaining screening and diagnostic mammograms are at psychologically different stages of the mammography process and have different expectations regarding their expected results. Therefore, we created new measures.

Two items assessed participants' expectations regarding their results: (1) A 'positive' result indicates that something was found that requires follow-up. A 'negative' result indicates nothing suspicious was found. What result do you believe you will get from your mammogram today? (1 = definitely positive, 4 = don't know, 7 = definitely negative); and (2) I am getting a mammogram today even though I do not think anything is wrong. (1 = disagree, 5 = agree). A third item assessed the degree of ambiguity participants found tolerable in the results: "How reassuring is it for you to think that sometimes even positive mammogram results (indicating something is found that needs to be followed up) are in error? (1 = not reassuring, 5 = very reassuring)."

Mediation Measures. To specifically assess the uncertainty associated with diagnosis, we asked participants to indicate how much they agreed or disagreed (1 = disagree, 5 = agree) with the statement: "I am feeling uncertain about the diagnosis I will receive after my mammogram." To assess the threat participants associated with diagnosis, we asked participants to indicate how much they agreed or disagreed (1 = disagree, 5 = agree) with the statement: "The thought that a mammogram can find something is scary."

Verification of Group Differences in Mindset

The argument that stage in process is a key moderator of the relationship between efficacy beliefs and stress is predicated on the belief that women receiving screening versus diagnostic mammograms are at psychologically different stages of the mammography process and hence, should have different expectations regarding their expected results. Our results provide some evidence for this argument. We asked the question: "A 'positive' result indicates that something was found that requires follow-up. A 'negative' result indicates nothing suspicious was found. What result do you believe you will get from your mammogram today?" (1 = 'definitely positive', 4 = 'don't know', 7 = 'definitely negative'). Those obtaining screening mammograms tended to indicate nothing suspicious would be found ($M=5.1$) while those obtaining diagnostic mammograms tended to indicate they didn't know ($M=4.0$; $F(1, 80) = 7.64$, $p=0.008$). Similarly, agreement with the statement "I am getting a mammogram today even though I do not think anything is wrong." (1=disagree, 5=agree) was higher for screening patients ($M = 4.6$) than for diagnostic patients, ($M = 2.9$, $F(1, 79) = 35.99$, $p=0.0001$).

Consistent with our contention that these different expectations lead patients to be in either a risk-seeking or risk-averse mindset, screening patients found it more acceptable for positive results to be erroneous ($M = 3.6$) than did diagnostic patients ($M = 2.9$; $F(1, 80) = 4.78$, $p = .04$).

In summary, therefore, diagnostic patients were both less optimistic and more risk-averse regarding their anticipated mammography results, consistent with our overall conceptualization of these women as being further along the "diagnosis" trajectory or at a more advanced stage in the diagnostic process. While these results are not surprising, they illustrate that patients in the

two groups had different reference points or expectations, against which they would be likely to evaluate various elements of the mammography process.

Hypothesis Tests

Hypothesis 1 predicts that increased test efficacy beliefs will be associated with heightened breast cancer stress for screening, but not diagnostic, patients. To test this hypothesis, we modeled breast cancer stress as a function of efficacy beliefs, stage in process, and their interaction (see Table 2). The test efficacy variable does not have a significant main effect on stress ($F < 1$). The stage factor does ($F(1, 78) = 6.21, p=.01$), with diagnostic patients ($M = 2.3$) reporting more breast cancer stress than screening patients ($M = 2.1$). Finally, as expected, the two variables interact ($F(1, 78) = 5.34, p=0.02$). Beta-coefficients indicate that screening patients report significantly more stress as their test efficacy beliefs increase ($\beta = 0.30, t = 2.30, p=.03$); this effect reverses for diagnostic patients ($\beta = -0.21, t = -1.15, p > 0.2$), although the relationship is not significant (see Table 2).

Hypothesis 2 postulates that general breast cancer stress will be driven by fear regarding positive test results for screening patients and by uncertainty for diagnostic patients. In order to investigate these psychological processes, we tested whether our process measures had differential effects on breast cancer stress and on the relationship between stress and test efficacy for the two groups. Our method of analysis is similar to Schwarz et al.'s (1991) use of correlational analysis, specifically showing how a processing measure relates to a response, in order to examine process.

We argued that because screening patients are at a different stage with regard to the information they expect to receive, a more accurate test could be perceived as more threatening due to the potential of being diagnosed with cancer; thus greater efficacy beliefs should be associated with greater threat. We assessed the degree to which patients perceived this threat by asking to what extent they agreed (1=disagree, 5=agree) with the statement that “The thought that a mammogram can find something is scary.” For the group receiving screening mammograms, this measure both significantly influences breast cancer stress ($F(1,42) = 7.76$, $p < 0.009$) and mediates the effect of test efficacy on stress (test efficacy predicts the “scary” measure ($\beta = .94$, $p < .001$), the “scary” measure significantly influences stress, and the significant test efficacy measure drops from $F(1, 42) = 5.31$ to $F(1,41) = 1.32$, $p > 0.2$ in the new model). However, as expected, the measure does not have a significant effect for diagnostic patients ($F < 1$). Thus, uniquely for women receiving screening mammograms, belief in test efficacy seems to generate test-related fear (expressed by the “scary” measure) which in turn creates more stress about breast cancer in general.

We predicted that *uncertainty* about test results would be predictive of stress for those receiving diagnostic mammograms, but not for those receiving screening mammograms (Hypothesis 2). Consistent with this prediction, agreement with “I am feeling uncertain about the diagnosis I will receive” (1 = disagree, 5 = agree) has a significant effect on stress for diagnostic patients ($F(1, 34) = 4.39$, $p < .05$), but not for screening patients ($F < 1$). Due to the insignificant relationship between stress and efficacy beliefs for diagnostic patients in this study ($\beta = -0.21$, $p > 0.2$), we were unable to assess whether uncertainty acted as mediator.

Robustness Check

Because we rely on quasi-experimental analysis, it is particularly important to rule out unanticipated differences between the screening and diagnostic participants as an alternative explanation for our results. As summarized in Table 3, the screening versus diagnostic groups did not differ in terms of our demographic measures. Similarly, they did not differ in terms of self-reported risk factors for, or vulnerability to, the disease.

However, there were some directional differences between the groups. Specifically, while none of the variables in Table 3 reached conventional ($p < .05$) significance levels for concluding the screening and diagnostic groups differed, we explored any differences that crossed the more conservative (for ruling out differences) threshold of $p = .20$. Women in the diagnostic group reported a directionally greater family history of breast cancer ($M = 2.2$ on a 5-point scale where 1="no family history" and 5="family history") than those in the screening group ($M=1.7$; $F(1, 67)=2.11$, $p=0.15$). In addition, those in the screening group were directionally more likely to have had a close friend who was diagnosed with cancer ($M = 55\%$, compared to 37% of the diagnostic group; $F(1, 80)=2.59$, $p=0.11$) or to have known someone who had died from breast cancer ($M = 66\%$, compared to 47% of the diagnostic group; $F(1, 80)=2.90$, $p=0.09$). Those obtaining screening mammograms also reported that they thought they had a directionally higher probability of getting breast cancer ($M = 36\%$, 0=definitely will not and 100=definitely will) than those obtaining diagnostic mammograms did ($M = 26\%$; $F(1, 79)=2.54$, $p=0.12$).

When we reanalyze the data controlling for the above differences, the test efficacy by stage interaction on stress remains significant ($F(1, 59) = 4.57$, $p=0.04$).¹ Consistent with the

prior analysis, beta-coefficients indicate a positive relationship between test efficacy beliefs and stress for screening patients ($\beta = .21$, $t = 1.63$, $p = .1$), and a negative relationship between test efficacy beliefs and stress for diagnostic patients ($\beta = -.31$, $t = 1.53$, $p = .1$). This provides further evidence that the differences we observe are due to the different psychological states of diagnostic versus screening patients and not some other demographic difference between the two groups.

Discussion

The results of Study 2, like the results of Study 1, show that stage in process moderates the relationship between stress and efficacy beliefs. For those obtaining screening mammograms, stress increased as beliefs about the test's efficacy increased; for those obtaining diagnostic mammograms, stress and test efficacy beliefs were (non-significantly) negatively related. Fear of a positive mammogram result mediates this relationship for those obtaining screening mammograms, while uncertainty regarding diagnosis plays a more focal role for those obtaining diagnostic mammograms.

The relationship between test efficacy and stress was significantly negative for those obtaining diagnostic mammograms in study 1, but only directionally negative in study 2. We believe this result may have arisen because the participants in this study may have been feeling less uncertainty about their diagnosis than those in the previous study. As can be seen in Table 3, those obtaining diagnostic mammograms in study 2 reported a low probability that they would get breast cancer (26.2%), did not believe they had a lot of risk factors for breast cancer ($M = 2.2$ on 1-5 scale), and generally thought they were in good health ($M = 3.6$ on 1-5 scale). Perhaps as

a consequence of these feelings, they also reported lower levels of stress ($M = 2.3$) than those in study 1 ($M = 2.7$). Given that our findings in this study provide support for our contention that the potential for uncertainty reduction explains why efficacy beliefs lower stress for those obtaining diagnostic mammograms, if this sample was less concerned about their diagnosis, the relationship between efficacy beliefs and stress may have been weakened. Despite this, the stage by efficacy belief interaction is significant in both studies, providing support for our main hypothesis that stage in the decision process is an important moderating variable in understanding the decision process.

GENERAL DISCUSSION

Research on services tends to focus on positive or neutral services rather than negative services (Berry and Bendapudi 2007). Yet, consumers' reactions to and expectations about negative services may differ from their reactions to and expectations about more traditional services. In this research, we examine a specific type of negative service – screening tests. Such screening tests can be routine or diagnostic, and occur in a number of service contexts, such as healthcare, car repair, home repair, computer repair, and environmental testing. We focus specifically on mammography testing and on the relationship between efficacy (quality) beliefs and stress (an emotional reaction to the testing experience). Across two studies, we find that mammography patients have differential reactions to beliefs in the efficacy of mammography, depending on their specific testing stage (routine or diagnostic). While women getting diagnostic mammograms feel (directionally or significantly) less stress as their belief in the efficacy of mammography increases, women in the process of getting screening mammograms

feel more stress as their belief in the efficacy of mammography increases. Process measures indicate that fear of a positive mammogram result is uniquely associated with stress for screening patients, while uncertainty regarding diagnosis is uniquely associated with stress for diagnostic patients.

Theoretical Implications

These findings contribute to theory in three ways. First, we focus on the emotional reactions of consumers in a negative service context and how these reactions are affected by one aspect of quality beliefs (perceived test efficacy). Emotional reactions are likely to be particularly salient for negative services, such as medical screening tests (cf., Morgan and Rao 2006), and are able to be assessed before and during the service experience (Spake et al 2003). Thus, work focusing on emotional reactions is an important complement to common outcome variables such as overall satisfaction. Our findings suggest that quality beliefs affect emotional reactions, but the relationship between quality beliefs and emotional reactions depends on the psychological state of the consumer.

Second, our findings contribute to an understanding of how consumer evaluations of negative services may differ from evaluations of non-negative services. While the service literature is replete with evidence that quality perceptions positively impact the overall experience, we find that such relationships may not hold in all environments. In our mammography context, we find that when the service (mammogram) helps resolve uncertainty (as for diagnostic patients), increased test efficacy beliefs (perceived quality) result in lower stress levels. However, when the service itself (mammogram) introduces psychological or

physical costs (as for screening patients), the traditional finding is reversed – increased test efficacy beliefs were associated with higher levels of stress. Thus, we find that accuracy beliefs can be a double-edged sword.

Third, we identify an important moderator for understanding consumer reactions to service events involving screening tests – stage in process (i.e., routine or diagnostic). Stage in process impacts consumer reactions because consumers at different stages have different expectations regarding their expected outcome. As a result, they evaluate information differently. Those obtaining screening tests are likely to believe that everything is fine and thus, the possibility that the test may find something is perceived as threatening. In contrast, those obtaining diagnostic tests, typically believe that something is wrong, and thus, are focused on resolving uncertainty, even if the news is unfavorable.

Managerial Implications

These findings have a number of practical implications. First, it is important for service providers to recognize the importance of the consumer's stage in process. Whether consumers are obtaining a routine screening test or a diagnostic test to resolve a previously identified concern impacts the consumer's psychological state, and consequently impacts his or her reactions and expectations. Therefore, service providers need to be aware of the threatening aspects of service encounters and provide consumers with mechanisms for coping. For example, Kahn and Luce (2003) show that information interventions designed to facilitate coping can reduce how threatening a false positive medical test result is perceived to be, ultimately increasing planned adherence with testing.

Further, our findings suggest that the positive relationship between quality and satisfaction generally found in the services literature may not hold for negative service events. Indeed, past work (Miller, Kahn, and Luce 2008) has found that traditional relationships between service variables and ensuing emotion (e.g., the relationship between waiting time length and stress) differ for positive versus negative services. Therefore, service providers should be wary of stressors inherent in the service environment and recognize that these stressors can interact with the service experience itself to impact reactions. By recognizing such stressors and providing mechanisms for coping with them, service providers can improve their customers' overall experiences. Past research in mammography has indicated that stress about screening tests can be viewed as a barrier to subsequent adherence, particularly for at-risk women (e.g., Kash et al. 1992; Lerman et al. 1990; Lerman et al. 1993; Lerman, Kash, and Stefanek 1994). In addition, to the degree that increased stress during the testing process leads to a more negative experience, those experiencing high stress prior to the test (e.g., in the waiting room) may be less likely to test again in the future. Thus, understanding the various sources of consumers' stress during a service experience and providing ways to reduce these sources of stress will likely lead to increased testing and higher overall levels of satisfaction.

These concerns are particularly important in the healthcare service area where the cost of neglecting tests can be high. As healthcare becomes more of a consumer-driven service context where patients are becoming more informed and participating more in their own medical decisions, it becomes more important for healthcare service providers to understand consumer reactions and to provide supporting materials to mitigate possible stress. More informed patients will begin to understand that diagnostic tests cannot be 100% reliable, and therefore there is

uncertainty with regard to the accuracy of the test results. Emotional responses to this uncertainty can create stress with the testing experience.

We find that at the point of testing, beliefs that mammograms are efficacious tools for finding breast cancer can have emotional costs for women obtaining screening mammograms. For these patients, where the expectation is likely that everything is fine, increased belief in the power of the test to identify cancer actually results in increased stress. We find this result is mediated by the fear that mammograms can find something. This suggests that it is the salience of the association between medical testing and cancer that is stressful for the screening patients. Hence, communications that explain the power of medical tests for detecting cancer might cause unintended increases in stress during the testing process.

For diagnostic patients, however, who feel less certain that everything is okay, belief in the power of the test to identify cancer actually appears to mitigate stress. Communications focusing on the early detection benefits of mammography should therefore be highlighted for this group. More generally, it is important to tailor communication regarding medical testing to the respondent's stage in testing. One concrete suggestion regarding the tailoring of communication might involve physically separating patients receiving screening versus diagnostic tests (e.g., with different waiting rooms or testing hours). Such separation should allow medical professionals to better tailor interactions to each patient's testing stage. This approach would be consistent with recent findings that mammography screening can be encouraged by appeals that are matched to the patient's general coping styles (Williams-Piehota et al. 2005).

Even though we find a positive relationship between stress and efficacy beliefs for those obtaining screening mammograms, we are not suggesting that less accurate tests would be

preferable nor that women should be led to believe the test is less accurate than it is. Rather, our findings highlight the need to recognize that the test itself (and its ability to detect cancer) is a source of threat for those obtaining screening tests, but not for those obtaining diagnostic tests. (Indeed, for those obtaining diagnostic tests, it is comforting to know that the test will help resolve the uncertainty they are currently feeling.) Therefore, it is important to tailor communications appropriately. Thus, for those obtaining screening mammograms, facilities may want to focus on more emotion-focused coping strategies and designing the waiting room to help facilitate such coping efforts. For example, playing soothing music or providing magazines and other distractions in the waiting room may be particularly beneficial for those obtaining screening mammograms. In contrast, providing materials which highlight the accuracy of the test and/or help reduce women's uncertainty about their diagnosis will be more beneficial for those obtaining diagnostic mammograms.

Limitations and Future Research

Our hypotheses are tested with only quasi-experimental, not manipulated, independent variables, so one must be somewhat cautious in interpreting causality from our data. However, this difficulty is mitigated because the screening vs. diagnostic mammography variable is unambiguous and independent of our other questions. Further, the screening variable is itself an important and actionable (by doctors and public policy makers) classification variable. Thus, we believe that the public policy implications regarding this variable remain important even given its quasi-experimental status.

We rely on self-report measures from women who are in the process of obtaining mammography. Because we are interested in women's perceptions of the efficacy of the test as well as their perceived emotional state, we believe such self-report measures are appropriate. Nonetheless, future research may wish to include additional behavioral measures of stress, such as GSR (galvanic skin response). Further, because we are interested in the actual experience with a mammogram test and the implications of this experience for repeated testing over time, we believe this sample provides an important complement to research on medical testing that samples patients more broadly, comparing those who are currently getting testing versus those who are not currently adhering to test guidelines.

Our stress and efficacy measures are taken simultaneously, and there is the potential for bi-directional causality whereby stress motivates changes in perceived efficacy instead of or in addition to efficacy appraisals altering stress (cf. Lazarus 1991). We believe that the pattern of our auxiliary variables suggests that stress is primarily influenced by efficacy, and not vice versa, in this situation. However, future work could use longitudinal or experimental methods in order to more definitively test the direction of causality.

We did not ask women about their previous mammography history. It is possible that prior experiences could exacerbate or mitigate the effects found here by changing women's expectations regarding results. For example, following a false positive result many women have heightened stress about having cancer (Kahn and Luce 2003) and such concerns might lead these women to view test efficacy more similarly to women receiving diagnostic mammograms. Similarly, someone who has never had a positive result may be even more likely to believe everything is ok and hence, even more threatened by the prospect of the mammogram finding something. These questions could be examined in future research.

Finally, we examine broad beliefs about test accuracy. Future research may wish to distinguish between type I and type II errors and how beliefs about certain types of errors vary with stress levels. While our measure of test efficacy reflected a standard construct from the testing literature (Lerman et al. 1991), other approaches might be relevant to the retesting decision. For instance, belief in the accuracy of a negative test result may alleviate lingering anxiety following mammography testing and hence may be generally predictive of cancer worries.

NOTES

1. The degrees of freedom here are considerably less than the previous statistic because some subjects left the “family history” question blank.

REFERENCES

- Barton, Mary B., Debra S. Morley, Sara Moore, Jennifer D. Allen, Ken P. Kleinman, Karen M. Emmons, and Suzanne W. Fletcher (2004), "Decreasing women's anxieties after abnormal mammograms: A controlled trial," *Journal of the National Cancer Institute*, 96 (7), 529-38.
- Berry, Leonard L. and Neeli Bendapudi (2007), "Health care: A fertile field for service research," *Journal of Service Research*, 10 (2), 111-22.
- Brett, Joanne, Clare Bankhead, Bethan Henderson, Eila Watson, and Joan Austoker (2005), "The psychological impact of mammography screening: A systematic review," *Psycho-oncology*, 14 (11), 917-38.
- Brown, Tom J. and Anna Kirmani (1999), "The influence of pre-encounter affect on satisfaction with an anxiety-provoking service encounter," *Journal of Service Research*, 1 (4), 333-46.
- Consedine, Nathan S., Carol Magai, David Horton, Alfred I. Neugut, and Michael Gillespie (2005), "Health Belief Model factors in mammography screening: Testing for interactions among subpopulations of Caribbean women," *Ethnicity and Disease Journal*, 15 (3), 444-52.
- , -----, Yulia S. Krivoshekova, Lynn Ryzewicz, and Alfred I. Neugut (2004), "Fear, anxiety, worry, and breast cancer screening behavior: A critical review," *Cancer Epidemiology, Biomarkers, and Prevention*, 13 (4), 501-10.

- Dodendorf, Diane M., Gurvinder K. Deogun, Amy Risch Rodie, and Louis G. Pol (2004),
 “Assessing the patient’s mammogram experience,” *Health Care Management Review*, 29
 (1), 77-87.
- Drolet, Aimee and Donald G. Morrison (2001), “Do we really need multiple-item measures in
 service research?” *Journal of Service Research*, 3 (3), 196-205.
- Fornell, Claes and David F. Larcker (1981), “Evaluating structural equation models with
 unobservable variables and measurement error,” *Journal of Marketing Research*, 19
 (February), 39-50.
- Hay, Jennifer L., Tamara R Buckley, and Jamie S. Ostroff (2005), “The role of worry in cancer
 screening: A theoretical and empirical review of the literature,” *Psycho-Oncology*, 14 (7),
 517-34.
- Janz, Nancy K. and Marshall H. Becker (1984), “The Health Belief Model: A Decade Later,”
Health Education Quarterly, 11(1), Spring, 1-47.
- Kahn, Barbara E. and Mary Frances Luce (2003), “Understanding high-stakes consumer
 decisions: Mammography adherence following false-alarm test results,” *Marketing
 Science*, 22 (3), 393-410.
- and Robert Meyer (1991), “Consumer Multiattribute Judgments Under Attribute Weight
 Uncertainty,” *Journal of Consumer Research*, 17 (March), 508-22.
- Kash, Kathryn M, Jimmie C Holland, Marilyn S Halper and Daniel G Miller (1992),
 “Psychological distress and surveillance behaviors of women with a family history of
 breast cancer,” *Journal of National Cancer Institute*, 84 (1), 24-30.
- Lazarus, Richard S. (1991), “Progress on a cognitive-motivational-relational theory of emotion,”
American Psychologist, 46, 819-34.

- Lerman, Caryn E., Mary Daly, Colleen Sands, Andrew Balshem, Edward Lustbader, Tracy Heggan, Lori Goldstein, Joan James, and Paul Engstrom (1993), "Mammography adherence and psychological distress among women at risk for breast cancer," *Journal of the National Cancer Institute*, 85 (July), 1074-1080.
- , Kathryn Kash, and Michael Stefanek (1994), "Younger women at increased risk for breast cancer: Perceived risk, psychological well-being, and surveillance behavior," *Journal of the National Cancer Institute Monographs*, 16, 171-76.
- , Barbara K. Rimer, Bruce Trock, Andrew Balshem, and Paul F. Engstrom (1990), "Factors associated with repeat adherence to breast cancer screening," *Preventive Medicine*, 19 (3), 279-90.
- , Bruce Trock, Barbara K. Rimer, Christopher Jepson, David Brody, and Alice Boyce (1991), "Psychological side-effects of breast cancer screening," *Health Psychology*, 10 (4), 259-67.
- Lerner, Jennifer S. and Dacher Keltner (2000), "Beyond valence: Toward a model of emotion-specific influences on judgment and choice," *Cognition & Emotion*, 14 (4), 473-93.
- (2001), "Fear, anger, and risk," *Journal of Personality and Social Psychology*, 81 (1), 146-59.
- Liljander, Veronica and Tore Strandvik (1997), "Emotions in service satisfaction," *International Journal of Service Industry Management*, 8 (2), 148-69.
- Mattila, Anna and Jochen Wirtz (2000), "The role of preconsumption affect in postpurchase evaluation of services," *Psychology & Marketing*, 17 (7), 587-605.

- Miller, Elizabeth G., Barbara Kahn, and Mary Frances Luce (2008), "Consumer wait management strategies for negative service events: A coping approach," *Journal of Consumer Research*, 34 (5), 635-48.
- Morgan, Ivor and Jay Rao (2006), "Growing negative services," *MIT Sloan Management Review*, 47 (3), 69-74.
- Price, Linda L., Eric J. Arnould, and Sheila L. Deibler (1995), "Consumers' emotional responses to service encounters: The influence of the service provider," *International Journal of Service Industry Management*, 6 (3), 34-63.
- Rippletoe, Patricia A. and Ronald W. Rogers (1987), "Effects of components of protection-motivation theory on adaptive and maladaptive coping with a health threat," *Journal of Personality and Social Psychology*, 52 (March), 596-604.
- Rogers, Ronald W. (1983), "Preventive health psychology: An interface of social and clinical psychology," *Journal of Social & Clinical Psychology*, 1(2), 120-27.
- Rosenstock, Irwin M. (1974), "Historical origins of the health belief model," *Health Education Monographs*, 2 (5), 409-19.
- and John P. Kirscht (1979), "Why people seek healthcare," in *Health Psychology*, ed. George C. Stone, Frances Cohen, and Nancy E. Adler, San Francisco: Jossey-Bass, 161-88.
- Scaf-Klomp, Winnie, Robbert Sanderman, Harry B van de Wiel, Renee Otter, and Winn J. van den Heuvel (1997), "Distressed or relieved? Psychological side effects of breast cancer screening in The Netherlands," *Journal of Epidemiology and Community Health*, 51 (6), 705-10.

- Schwarz, Norbert, Herbert Bless, Fritz Strack, Gisela Klumpp, Helga Rittenauer-Schatka, and Annette Simons (1991), "Ease of retrieval as information: Another look at the availability heuristic," *Journal of Personality and Social Psychology*, 61 (2), 195-202.
- Sitzia, John and Neil Wood (1997), "Patient satisfaction: A review of issues and concepts," *Social Science & Medicine*, 45 (12), 1829-1843.
- Smith, Amy K. and Ruth N. Bolton (2002), "The effect of customers' emotional responses to services failures on their recovery effort evaluations and satisfaction judgments," *Journal of the Academy of Marketing Science*, 30 (1), 5-23.
- Smith, Craig A. and Phoebe Ellsworth (1985), "Patterns of cognitive appraisal in emotion," *Journal of Personality and Social Psychology*, 48 (4), 813-38.
- Spake, Deborah F., Sharon E. Beatty, Beverly K. Brockman, and Tammy Neal Crutchfield (2003), "Consumer comfort in service relationships: Measurement and importance," *Journal of Service Research*, 5 (4), 316-32.
- Van Dolen, Willemijn, Jos Lemmink, Jan Mattson, and Ingrid Rhoen (2001), "Affective consumer responses in service encounters: The emotional content in narratives of critical incidents," *Journal of Economic Psychology*, 22, 359-76.
- Williams-Piehota, Pamela, Judith Pizarro, Tamera R. Schneider, Linda Mowad, and Peter Salovey (2005), "Matching health messages to monitor-blunter coping styles to motivate screening mammography," *Health Psychology*, 24 (1), 58-67.
- Zeithaml, Valerie A (1988), "Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence," *Journal of Marketing*, 52 (3), 2-22.

BIOGRAPHICAL PARAGRAPHS

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Table 1: Mean Values of Demographic Variables, Cancer History of Family/Friends, and Dependent Variables (Study 1).

Variable	Mean	Screening Patients	Diagnostic Patients	p-value
Do you have a family history of breast cancer? (1=no family history, 5=family history)	2.1	2.2	1.9	.44
Have you ever had a close friend diagnosed with cancer? (1=yes, 0=no)	0.55	.54	.56	.87
If yes, how many?	2.4	2.3	2.5	.71
Have you ever had a close friend die of breast cancer? (1=yes, 0=no)	0.30	.31	.28	.82
If yes, how many?	1.9	1.8	2.0	.74
Have you ever known anyone who has died from breast cancer? (1=yes, 0=no)	0.66	.65	.68	.81
If yes, how many?	2.8	2.5	3.2	.46
Age of patient	49.44	52.8	44.3	.002
Annual Income	61,486	51,208	73,820	.17*
Race				.32
Education				.24

Stress	2.6	2.4	2.7	.0005
Efficacy Beliefs	4.5	4.7	4.3	.07

* There were 20 respondents who did not answer this question. We re-ran the analyses controlling for income as well as age and there were no differences in the results.

Table 2: Influence of Efficacy Beliefs on Stress by Stage in Process (Studies 1 and 2)

STUDY 1Omnibus ANOVA Results

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Model	4	9.91	2.47	4.04	.006
Error	56	34.32	0.62		

	<i>df</i>	<i>F</i>	<i>p-value</i>
Age	1	2.75	p > .1
Efficacy Beliefs	1	0.70	ns
Stage in Process	1	13.81	.0005
Interaction	1	12.14	.001

For those obtaining screening mammograms:

	Beta	SE	p-value
Intercept	-.217	1.32	t < 1
Age	.006	.01	t < 1
Efficacy Beliefs	.500	.22	.03

For those obtaining diagnostic mammograms:

	Beta	SE	p-value
Intercept	2.63	.81	.003
Age	.04	.02	.03
Efficacy Beliefs	-.37	.12	.006

STUDY 2Omnibus ANOVA Results

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Model	3	4.73	1.58	2.61	.05
Error	78	47.05	0.60		

	<i>df</i>	<i>F</i>	<i>p-value</i>
Efficacy Beliefs	1	0.17	ns
Stage in Process	1	6.21	.01
Interaction	1	5.34	.02

For those obtaining screening mammograms:

	Beta	SE	p-value

Intercept	.86	.56	ns
Efficacy Beliefs	.30	.13	.03
<u>For those obtaining diagnostic mammograms:</u>			
Intercept	3.23	.80	.0003
Efficacy Beliefs	-.21	.18	ns

Table 3: Mean Values of Demographic Variables, Cancer History of Family/Friends, and Dependent Variables (Study 2).

Variable	Mean	Screening	Diagnostic	p-value
Family history of breast cancer (1=no family history, 5=family history)	1.9	1.7	2.2	.15
Have you ever had a close friend diagnosed with cancer? (1=yes, 0=no)	0.46	.55	.37	.11
Have you ever known anyone who has died from breast cancer? (1=yes, 0=no)	0.57	.66	.47	.09
Age of patient	52	53	50	.32
Annual Income	87,238	68,246	105,616	.45
Race				.22
Education				.36
Vulnerability	2.2	2.1	2.4	.25
Prob. BC	31.7	36.3	26.2	.12
I am in Excellent Health Overall	3.7	3.7	3.6	.88
I have a lot of Risk Factors for BC	2.3	2.3	2.2	.78

Stress	2.2	2.1	2.3	.01
Efficacy Beliefs	4.2	4.2	4.3	.65
Expected result (1 = positive, 7 = negative)	4.6	5.1	4.0	.008
Do not think anything is wrong	3.9	4.6	2.9	.0001
Knowing about false positives reassuring	3.3	3.6	2.9	.04
Uncertain about diagnosis	3.0	2.6	3.5	.02
Mamm finding something is scary	3.6	3.5	3.7	.65