Review

Fear, Anxiety, Worry, and Breast Cancer Screening Behavior: A Critical Review

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Abstract

Anxiety, fear, and worry are variously described as facilitators and barriers of breast cancer screening. However, several contradictions are evident in this research. A review article described the literature regarding the relations among fear, anxiety, and worry, along with emotion regulatory styles, and breast cancer screening behaviors before critiquing it in an attempt to uncover preliminary explanations for these discrepancies. Three main conclusions are drawn. First, it is suggested that researchers need to clearly define the components of cancer and the screening process that women are afraid of as each may bear a different relation to screening behavior. Second, greater care needs to be taken to employ psychometrically valid and reliable measures of fear and anxiety. Third, studies need to more systematically test findings across the minority and ethnic groups at greatest risk. A framework is presented and suggestions regarding the continued development of this promising area of research are made. (Cancer Epidemiol Biomarkers Prev 2004;13(4): 501–510)

Introduction

Despite some recent controversy (1), the bulk of the current literature confirms that breast cancer screening is an effective means for reducing breast cancer mortality (2–7). While screening rates are improving, a significant number of women are not screening at nationally recommended rates (8); the American Cancer Society recommends yearly mammograms for women over the age of 40 (9).

Screening rates have been linked to a wide range of social factors including background variables such as age (10–13), socioeconomic status (SES), and education (14–17) as well as other proximal indices of SES such as medical insurance (13, 18). Likewise, marital status (10), physician recommendation (4, 16, 19–21), and minority status (2, 22–25) may also play important roles.

Despite the volume of this research, there are good reasons to explore the impact of other variables. First, structural and demographic factors such as age, income, marital status, and ethnicity cannot be directly or easily modified. Hence, although the study of these variables can help identify those at risk for a poor screening profile, such research offers little direction in terms of viable interventions. Second, while physician recommendation remains critical, and women claim that they are more likely to get a mammogram if their physician recommends it (4, 19, 21, 26), most women still do not screen frequently enough although rates of physician recommendation are high (27), even among low income, minority groups (16). It seems increasingly clear that if we are to improve screening rates, we must develop interventions that target variables that are both amenable to change and for which there is room for improvement.

In the current review, we focus on research examining how the construct variously called ''fear,'' ''anxiety,'' or ''worry'' relates to breast cancer screening behavior. There are four reasons for this focus. First, emotions are well-documented motivators (28, 29) and are central to models of both self-regulation and health behavior (30–33) as well as models regarding the ''uptake'' of health-promoting messages (34–37).

Second, emotions and emotion regulatory styles differ systematically across ethnic groups; these differences may have important implications for explaining differences in screening behavior (16). Compared to European Americans, African Americans report lower negative emotion and stress (38–41), lower depression (42–44), and less grief following interpersonal losses (45). They are less likely to disclose in therapy (46, 47), may be less emotionally expressive during conflict than European groups (38), and manifest global differences in coping with stress (48).

Third, recent views of ethnicity have suggested that viewing it exclusively as a proxy for SES, access to services, or education is not useful (38, 49–51). Ethnicity is most usefully viewed as a global factor that *corresponds* to a pattern of social and individual factors (52); recent

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research suggests that differences in emotions and emotion regulation may explain substantial portions of the variance otherwise ''explained'' by ethnic group membership (53, 54).

Lastly, and perhaps most importantly, the literature linking emotion variables to breast cancer screening behavior is growing larger and is more fragmented. Researchers are investigating a range of divergent and atheoretical ''emotion'' constructs, and few connections between the various research programs are apparent. In the current review, we focus on the most commonly researched emotion variable, variously called cancer fear, anxiety, or worry, as well as the manner in which fear is regulated. We outline the extant literature before identifying trends and discrepancies and offer some preliminary interpretations and directions for future research. As will become clear, the state of the available literature is such that a more sophisticated meta-analytic approach is not possible.

Anxiety, Fear of Cancer, and Cancer Worry

In the context of screening behavior, the construct variously called anxiety, fear, or worry remains the most extensively studied emotion variable. Currently, however, it is unclear whether fear acts as a barrier or facilitator of screening (see Table 1). On the one hand, a fear of cancer and the medical establishment has been linked to poorer screening (55, 56), particularly among African American women (57). A fear of ''finding something wrong'' has been cited as a key obstacle to screening among both Hispanic (58) and Black (59) groups and a feeling that ''it is better not to know'' is a reported barrier among several European samples (60–62). Comparisons of screeners and nonscreeners have suggested that trait anxiety was significantly more pronounced among women who *did not* attend a screening in response to an invitation than among those who did (60), although other research has indicated no relation between screening behavior and trait anxiety (63).

Other studies, however, have suggested that greater fear(s) is associated with a *higher* likelihood of screening (10, 16, 63–65), perhaps for both intentions and actual behavior (63). One Swedish study of 434 nonattenders and 515 attenders showed that the women who worried most about breast cancer were *more* likely to screen (65). Another study of 1384 U.S.-born European and African American women, together with samples of English-speaking Caribbean, Haitian, Dominican, and eastern European women in New York City, showed that worry about cancer was positively associated with mammography and clinical breast examination frequency, even when background variables such as education and SES were controlled (16). Women who report recent symptoms of anxiety have been shown to be more likely to accept an invitation for a screening (10, 66) and those with a lifetime history of phobic disorders tend to present earlier with breast symptoms (67), again, even when demographics are controlled. The two prospective studies that are available (68, 69) are equally conflicted with one suggesting improved screening at intermediate levels of worry (68) and the other suggesting a negative relation between worry and mammography (69).

Emotion Regulation, Denial, and Repression

Emotions like fear, anxiety, and worry rarely occur in an unregulated state (Table 2). Because of their strong motivational qualities, people are impelled to regulate most emotional experiences (28). Several studies have linked a form of emotion regulation termed ''denial'' with delays in responding to possible breast cancer symptoms (64, 70, 71). One study, in which the coping styles of 100 women were assessed before biopsy, found that women who did not view a lump as a cause for concern (''nonidentifiers'') all used denial as a coping mechanism; they were thrice more likely to use avoidant coping mechanisms than identifiers (72). Other research has shown that beliefs indicative of realism and a willingness to directly face breast problems—attributes that appear antithetical to denial—were more prominent in women who screened compared with those who did not (73). In contrast, however, two studies have reported findings showing that the emotion regulatory style of repression may be associated with improved screening. One study compared 210 women who self-referred for screenings with 210 nonattenders and found that those who self-referred evinced *higher* repressiveness than nonattenders (74). Most recently, a study of 1364 women has also found that greater repression was associated with *increased* mammography and clinician breast examinations even when demographics and background characteristics were controlled (16).

Discrepant Findings

The literature on cancer-related fear, worry, or anxiety, emotion regulation, and screening behavior is growing. As the above review makes clear, however, data are frequently contradictory, making it difficult to coherently interpret them and thus develop practical solutions and interventions. In offering some interpretations and preliminary explanations for discrepancies, we focus on four interrelated issues: (*a*) the consideration of the target (and extent) of women's anxiety or fear, (*b*) the need for consensually accepted definitions and measurements of emotions, (*c*) the lack of explicit theoretical models relating emotions to screening behavior, and (*d*) the issues of generalizability, particularly across age and ethnic groups as well as across different stages of the cancer screening process.

What Are Women Afraid of? The most salient problem confronting researchers interested in the role of emotions in screening behavior is that they cannot determine exactly what women are afraid of or how these diverse fear components relate to one another or to screening behavior. Much research leaves the *object* of women's fear unspecified. Women's fears surrounding breast cancer seem to encompass nearly ''everything'' but certainly include fear of a breast cancer diagnosis (56, 58–62), fear of pain/discomfort (60), and, more complicating, fear of embarrassment. To this list, we can add fear of the medical establishment (55, 56, 75), radiation (60), nonspecific ''cancer worry'' (10, 16, 64, 65), general anxiety (10, 66), or phobia (67).

Given this state of affairs, clearly identifying the elements of cancer and the screening process that women

Table 1. Studies examining the role of anxiety, fear, and worry as related to breast cancer screening behavior

Author(s)	Year	Operationalization of anxiety, fear, or worry	Sample characteristics	Major findings/conclusion regarding anxiety/fear
Andersen *et al.*	2003	Worry about breast cancer risk (assessed using five questions): (*1*) During the past month, how often you thought about your risk of developing breast cancer? (*2*) How often do these thoughts affect your mood? (*3*) How often do they affect your ability to perform daily activities? (*4*) How often do you worry about your risk of developing breast cancer? (*5*) A general question asking women to describe their feelings of distress regarding their risk of breast cancer. All questions employed a four-point ordinal scale. No reliability analysis provided.	N = 6685 (97% Caucasian; 50–80 yr)	Quadratic or inverted-U relationship between worry and screening among women with and without family history (*i.e.*, screening greatest at intermediate levels of worry).
Aro *et al.*	2001	Illness worry: measured by an *ad hoc* list (27 items) of statements relating to screening behavior (*e.g.*, pain at mammography). Each rated on a four-point scale (1 = agree fully, 2 = agree partially, 3 = does not agree, 4 = cannot tell). An option for other reasons was provided.	436 Finnish nonattenders (50–59 yr)	Nonattenders of a screening invitation reported more trait anxiety as well as state anxiety than attenders. Reasons such concern about pain and radiation hazard at mammography were the most frequently reported reasons for nonattending screening.
Austin *et al.*	2002	Not applicable: review study	Literature review of Hispanic studies	Fear of finding something wrong inhibits Hispanic women mammography use.
Bloom *et al.*	1987	Fear of cancer: assessed by survey, called a preintervention survey of Oakland (no details). Questions included general knowledge about the disease as well as beliefs regarding cancer curability and treatment. No reliability analysis provided.	317 African American women, 251 men (300 were between 20 and 39 yr)	Greater fear of cancer was associated with lower likelihood/frequency of screening. Beliefs that medical treatment for cancer do ''more harm than good'' and ''cancer viewed as a death sentence'' are noted.
Caplan *et al.*	1996	Lack of fear of cancer (as a reason for delay): defined as patient belief that problem is not important or urgent (included a lack of concern, feeling that symptoms will disappear, misdiagnosing oneself, and uncertainty about symptoms) Fear (as a reason for delay): Incorporated fear of disease, fear of hospitalizations and fear of surgery.	367 breast cancer patients (161 Caucasian and 206 Black)	Lack of fear is a larger barrier to an efficient diagnosis than the fear of cancer.
Chaitchik and Kreitler	1991	Trait anxiety/fear: measured as part of a 39-item emotion adjective checklist assessing 10 basic emotions. Items ''never,'' ''sometimes,'' and ''often.'' Number of items assessing anxiety not clear; no reliability analysis provided.	466 women (210 nonattenders, 210 self-referred screeners, 46 in experimental/induced sample)	No differences in fear or anxiety between attenders and nonattenders.
Consedine *et al.*	2004	Breast cancer worry: measured with Cancer Attitude Inventory, a four-item scale tapping four domains of cancer concern. Scores on each item range from 1 to 6. Items added to form aggregate (α = .73)	1364 women from six ethnic groups (mean age, 53.9 yr)	Greater worry predicts greater screening even where background characteristics are controlled.

Table 1. Continued

Author(s)	Year	Operationalization of anxiety, fear, or worry	Sample characteristics	Major findings/conclusion regarding anxiety/fear
Diefenbach *et al.*	1999	Breast cancer worry: assessed with single item, ''During the past month, how often have you worried about your own chances of developing breast cancer?'' Scored 1 (not at all) to 4 (almost all of the time). No reliability analysis possible.	213 women with family history of breast cancer	Cancer worry is a better prospective predictor than generalized anxiety. Suggests that there may be a curvilinear relationship between worry and screening.
Edwards and Jones	2000	State anxiety: assessed via Symptoms of Anxiety and Depression Scale. No scale details or psychometrics given.	1604 women over 65 yr (51% between 70 and 79 yr)	Greater anxiety associated with greater indicated willingness to attend a future screening.
Friedman *et al.*	1995	Cancer-related fears and anxieties: assessed as a part of a seven-item ''barriers'' checklist and comprised an aggregate measure including included fear of radiation, unnecessary worry, and fear of finding something rather not think about it. Factor analytic, but no reliability analysis.	259 women (50+ yr)	Cancer fears/worries are major barriers to mammography for African Americans.
Kreitler *et al.*	1990	Trait anxiety and trait fear: measured as part of a 39-item emotion checklist assessing 10 basic emotions. Scored ''never,'' ''sometimes,'' and ''often. '' Number of items assessing anxiety not clear; no reliability analysis provided.	420 women (control: mean age, 40.5 yr; experimental: mean age, 40.9 yr; 63–65.7% Israeli, 20.5–22.4% Middle Eastern or North African)	Attenders higher than nonattenders on anxiety and fear.
Lagerlund *et al.*	2000	Breast cancer worry: 36 items assessing 17 subscales including emotional barriers (α = .58) and worry (α = .79). Up to one-third of data missing.	949 women (mean age, 55.5 yr for attenders and 56.1 yr for nonattenders)	Women who worry most about breast cancer more likely to screen than women who worry least.
Lauver and Chang	1991	Anxiety: measured by Spielberger State-Trait Anxiety Inventory (STAI), a 20 item, four-point scale. Participants were asked to imagine that they had just found a small lump and then respond to the STAI in terms of how they would feel about seeing a doctor for this breast change. Reliability unclear.	99 women aged 21–82 yr with no history of breast cancer	Anxiety positively related to intention to screen. Anxiety positively related to family history of breast cancer.
Lerman *et al.*	1991	Anxiety about breast cancer: assessed with structured questions, including level of anxiety about the results of future mammograms, current tendency to worry about developing breast cancer, current impairment in mood and in daily activities because of worrying about breast cancer; effects of having mammography on concerns about breast cancer. No reliability analysis provided.	308 women aged 50–74 yr (women with breast cancer were excluded)	Women with normal mammograms reported low anxiety about mammograms and less breast cancer worry and reported worry interfering less with mood or functioning. Mammography increased anxiety for high suspicion results.
Lindberg and Wellisch	2001	State and trait anxiety: STAI. 40-items, four-point Likert (1 = almost never to 4 = almost always); α for state scale = .80 Anxiety regarding Pap smear, mammography, and breast self-examination: single item for each, ''How anxious about *x*?''; four-point scale, 1 = min to 4 = max. No reliability analysis provided.	430 women from high-risk clinic aged 15–78 yr (84.4% White)	Anxiety regarding Pap smear less than that for either mammogram or breast self-examination. Significant positive correlations between breast self-examination and mammogram worry and STAI trait anxiety.

Table 1. Continued

Author(s)	Year	Operationalization of anxiety, fear, or worry	Sample characteristics	Major findings/conclusion regarding anxiety/fear
McCaul *et al.*	1998	Worry about breast cancer: measured using four items from Lerman *et al.* (1991): ''How often do you worry about breast cancer?'' ''How many days out of last 7 did you worry about breast cancer?'' ''Does breast cancer worry affect your mood?'' ''Does breast cancer worry affect your performance or daily activities?'' (α = .85), test-retest r = .61 across 1 month, and .58 across 1 yr	135 women with and without family history of breast cancer aged 18–77 yr	Thinking and worrying about breast cancer were modestly and positively related to the frequency of breast self-examination behavior and intentions toward mammography.
		Trait anxiety: STAI (Spielberger *et al.*, 1970). 20-items, four-point Likert (1 = almost never to 4 = almost always); α = .92		Trait anxiety not related to breast self-examination behavior or intentions.
McCaul, Reid *et al.*	1996	Fear/worry about breast cancer: three items measuring frequency of worry, extent of worry, and extent to which women were upset/frightened. Frequency and worry measured on a five-point scale; upset/frightened measured on a four-point scale. Combined to a single scale (α = .71).	838 women aged 40–75 yr	Greater fear associated with more frequent breast self-examination and mammography and greater intention to continue performing screening behaviors.
McCaul, Schroeder *et al.*	1996	Breast cancer worry: three items measuring frequency of worry, extent of worry, and degree of upset/frightened. Frequency and worry measured on a five-point scale; upset/frightened measured on a four-point scale. Combined to a single scale (α = .71)	353 women aged 40–75 yr taken from McCaul *et al.* (1996)	Greater concern about breast cancer was related to greater likelihood that women performed breast self-examination, went for a mammogram, and had clinical breast examination (controlled for susceptibility).
Miller and Hailey	1994	Anxiety about cancer: unspecified number of items (out of possible 40 items) extracted from Berrenberg's Cancer Attitude Inventory on the basis of a face validity assessment. No psychometrics provided.	32 African American women aged 35–73 yr	Higher levels of cancer anxiety with women who *never* had a mammogram, but no difference between women who did and did not complete regular breast self-examination.
Royak-Schaler *et al.*	1995	Breast cancer worry: four items taken from Lerman *et al.* (1991) measuring how often a women thought and worried about developing breast cancer. No psychometrics provided.	Telephone interview of 60 African American women with first-degree relatives with breast cancer	Majority felt that cancer worry did not affect their mood (70%) or daily activities (87%). Relation between worry and screening behavior not reported.
Schwartz *et al.*	2003	Breast cancer worry: two of three items from Lerman *et al.* (1993). No reliability analysis provided. Breast cancer distress: seven intrusion items from the Impact of Event Scale. α = .85, but skewed.	159 women with at least one first-degree relative with breast cancer who completing both baseline and follow-up (83% White, 50% college)	Prospective odds of obtaining mammogram 70% less among women with high levels of worry.
Styra *et al.*	1993	State and trait anxiety: measured by Spielberg State Anxiety Scale, a 20-item measure. No psychometrics provided.	100 women (mean age, 40.7 yr)	Symptomatic women who identified their lump as a concern had significantly more anxiety than women who did not.

Table 2. Empirical studies examining the role of emotion regulation as related to breast cancer screening behavior

Author(s)	Year	Operationalization of emotion regulation	Sample characteristics	Major findings/conclusion regarding emotion regulation
Caplan *et al.*	1996	Denial: undermining the importance and urgency of the problem; the concept includes lack of concern, feeling that it would go away, misdiagnosing oneself with a less severe disease, and uncertainty about actual symptoms	367 breast cancer patients (161 Whites, 206 Blacks; 48% between 20 and 49 yr)	Denial causes symptomatic women to delay breast cancer screenings.
Chaitchik and Kreitler	1991	Repression: a combination of social desirability and anxiety scales; scales not described and no psychometrics given	466 women (210 nonattenders, 210 self-referred screeners, 46 in experimental/induced sample)	Attenders scored higher on repressiveness than nonattenders.
Consedine *et al.*	2004	Repression: the Index of Self-Regulation (Mendolia, 2002) combines the Crowne-Marlowe Social Desirability Scale (α = .73) and the Anxiety subscale of the STPI (α = .75) to generate a continuous measure of repression	1364 women from six ethnic groups (mean age, 53.9 yr)	Greater repression associated with greater self-reported mammography and breast self-examination even where background characteristics were controlled.
Kreitler *et al.*	1990	Repression: a combination of social desirability and anxiety scales; scales not described and no psychometrics given	420 women (control: mean age, 40.5 yr; experimental: mean age, 40.9 yr; 63–65.7% Israeli, 20.5–22.4% Middle Eastern or North African, rest unknown)	Attenders scored higher on repressiveness than nonattenders.
Kreitler *et al.*	1994	Ability to face problems realistically: derived from coding of structured interview and meanings tasks	619 women from factories, kibbutzim, banks, cities, and university (mean age, 40.67 yr)	Women who screened had more readiness to face problems realistically.
Powell	1994	Review article	Review article	Denial causes symptomatic women to delay breast cancer screenings.
Styra *et al.*	1993	Denial: unpublished problem-solving inventory, structured interview format; no psychometrics	100 women (mean age, 40.7 yr)	Symptomatic women who did not identify their lump as a concern used denial and avoidance as coping mechanisms.

are most afraid of and how these anxieties relate to screening behavior are important research mandates. The model below offers a preliminary framework for organizing how diverse fears and anxieties may relate to screening behavior.

In the model, we identify three discriminable sources of anxiety: (*a*) fear of screening components, (*b*) fear of screening outcomes, and (*c*) undifferentiated cancer fear. However, although we think these components empirically separable, they are likely heavily interactive as indicated by the double-headed arrows. Because of this likelihood, the model suggests that fear has diverse effects on screening behavior, although we note a generally inverse relation between fear specificity and likelihood of screening.

In terms of screening outcome, the available data seem to suggest that undifferentiated fear or anxiety regarding ''getting cancer'' may generally be facilitative of screening, at least where the fear occurs within manageable limits (see below), and the target population has access to, and some faith in, the efficacy of the available screening procedures. As has been noted by many authors, treatment efficacy perceptions are important factors in screening behavior (24, 76–78) although their relations with emotional responding and coping remain poorly understood. Studies based on idiosyncratically developed instruments have tended to return a positive relation between nonspecified cancer worry and screening behavior (16, 63, 65, 66, 79, 80). Conversely, however, fear of the medical establishment and of the pain associated with mammography, fear of radiation, and fear that the procedure will prove embarrassing seem likely to deter screening, as does a fear of a breast cancer diagnosis. Operationally, these latter studies have tended to target more specific worries such as ''pain at mammography,'' ''fear of radiation,'' ''fear of disease,'' or ''fear of hospitalization and/or surgery'' (59, 60, 64). Fear of negative outcomes appears to occupy a middle

ground in terms of its impact on screening behavior. As such, its role in generating or inhibiting screening behavior may depend on the relations between this type of fear and other fears (see Fig. 1).

Our suspicion is that more specific cancer-related worries enable and encourage coping strategies that do not involve screening and thus do not generate the *same* impetus to act that more generalized cancer worries do. In many cases, specific fears are often about components of the screening process itself. For component-specific fears, avoiding screening situations will reduce anxiety and the individual may be less likely to screen. In contrast, where the anxiety is about cancer itself or is more diffuse, the feelings are more difficult to ''pin down'' and avoid. Acting to reduce generalized cancer worry may, in many cases, involve engaging in a screening behavior as the individual seeks to reduce their anxiety. However, these interpretations must be taken as preliminary, and researchers must begin to clearly define the aspects of cancer and the cancer screening process. Without knowing the *sources* of women's fears, much less their relation to outcome behavior, providers and health professionals interested in the development of interventions will be inevitably ill informed.

Issues of Operationalization and Theory. In many ways, the issue evident above stems inextricably from a more general issue involving the need to develop theories regarding *why* the anxieties and fears that revolve around breast cancer and breast cancer screening processes relate to screening. Researchers need to more systematically develop, test, and operationalize emotion variables in this domain (69), preferably by engaging with established models of emotions and health (30, 31, 53, 81, 82). Well-developed models of emotion have the potential to clarify complex literatures by offering frameworks within which to consider when anxiety will (and will not) facilitate screening. Here, we focus on two aspects of this overarching issue.

First, research tends to assume that the relation between fear/anxiety/worry and screening behavior is linear when, in fact, there are some grounds to suspect that the relation may be more complex. It may be, for example, that *moderate* levels of anxiety induce preventive care behaviors (75) while too little promotes inactivity and too much promotes avoidance of both the anxiety and the settings that elicit it. There are few data that bear on this possibility, although one recent study of 6512 predominantly Caucasian (97%) women demonstrated that women who described moderate levels of worry were more likely to have an annual mammogram than those who reported mild or severe levels (83). Operationally, this possibility may be reflected in differential relations occurring when ''fear'' (55, 56, 58, 59, 61, 62, 75) *versus* ''worry'' (10, 16, 65) are used. ''Fear'' measurements seem likely to index ratings within a high range that may be dysfunctional in the upper extreme, turning women to repressive regulatory styles or avoidance, while ''worry'' may access a lower, more manageable range of the affect, with lower levels indicating either apathy or avoidance and greater levels of ''worry'' indicating a level of anxiety conducive to appropriate vigilance and self-care (69).

Second, there is a pressing need to systematically operationalize and report such operationalizations in the measurement of fear, anxiety, and worry in this important public health domain. The studies summarized in Table 1 reveal a wide range of fear and anxiety measurement methods; they diverge in terms of both the precise source of anxiety they target and in how

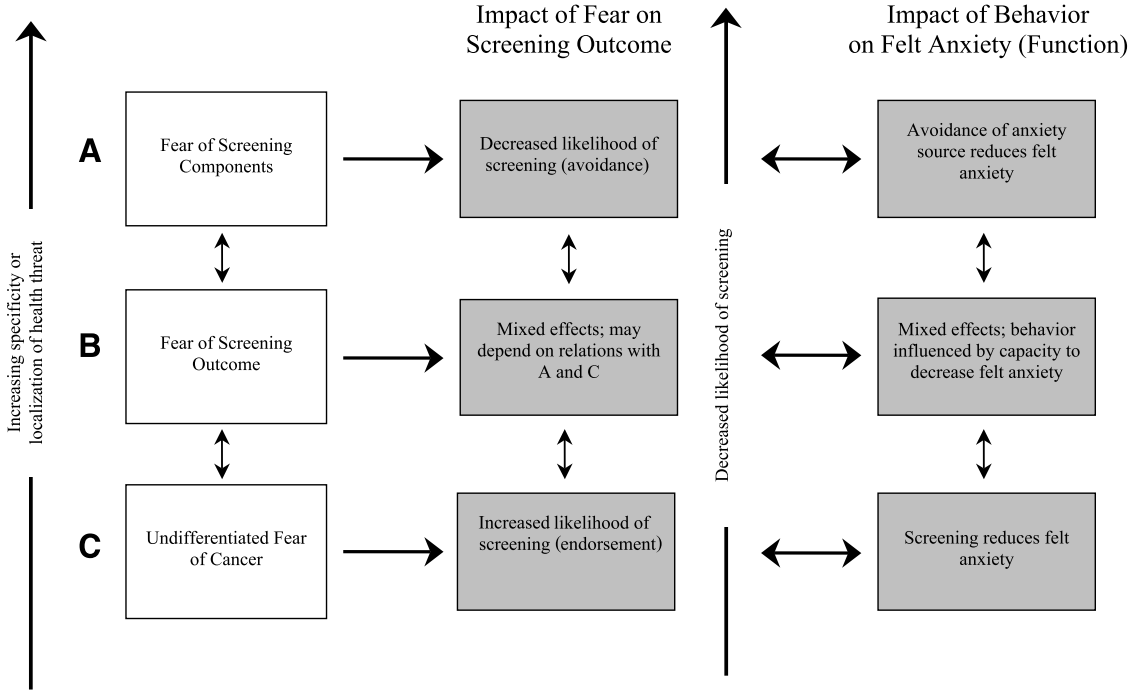

Fig. 1. Conceptual model depicting the relations between discrete aspects of cancer fear/anxiety, their function, and impact on screening behavior.

psychometrically robust the measurements used are. Studies targeting ''breast cancer worry'' (*e.g.*, Refs. 16, 65, 68, 75) do not always identify how many items from a large questionnaire are used in a worry subscale (65, 76) and sometimes equate negative cancer attitudes with anxiety (75). Other studies use only a single item to measure breast cancer worry (68)—Pap smear, mammography, or breast self-examination worry (84)—and most fail to report reliability coefficients for multi-item scales. Single-item measures are notoriously unreliable and only four studies report reliability coefficients (16, 63, 65, 79): 0.73, 0.85, 0.79, and 0.71 in these studies, respectively. Interwoven with these reliability issues are other psychometric issues regarding scale validity and the precision of terms. Some studies measure general anxiety (72, 74, 85) and some do not make it clear what is being measured (10). For example, without describing actual scale items regarding ''breast cancer worry,'' it is difficult to determine if the measure is telling us more about the *frequency* or *severity* of cancer worries. Studies frequently employ concepts such as ''risk'' and ''worry'' interchangeably when models of health behavior suggest they may have distinct predictive and theoretical value.

Overall, psychosocial approaches to breast cancer screening are being hampered by the lack of adequate instrumentation. In many cases, the assessment of anxiety, either about cancer or the screening process or a more general affective trait, does not appear to have been a focus of the study with a consequence that psychometric properties are poor. Perhaps as a result, authors have continued to develop their own sets of questions, inadvertently perpetuating an increasingly fragmented field. Because the interests of different research groups diverge, their measurements assess different facets of anxiety, making links between the different research programs difficult to discern. The need for multiple-item assessment and the description of items is likewise pressing as reliability and validity concerns remain key issues.

Issues of Generalizability. Lastly, the above literature pays little attention to, and infrequently tests, the generalizability of models relating fear, fear regulation, and screening behavior across ethnic groups, despite the presence of both theory (28) and data (53, 54), suggesting interethnic generalizability to be unlikely. Cancer researchers clearly need to begin systematically testing their models for generalizability, particularly across age and ethnic groups. Cancer research (16, 66, 86, 87) as well as research in several other areas show that emotions and emotion regulation both vary as a function of ethnicity (38–47).

Furthermore, barriers to mammography in asymptomatic Black and White women differ, with Black women more likely to report worry and fear as barriers and Whites more likely to report inconvenience, procrastination, and being too busy (59). Black women report higher scores of cancer anxiety than the majority population and are less likely to seek mammography (75). Such data are compatible with two interpretations. One likely possibility is that African American women are more afraid of cancer than Caucasian women. Complementarily, the screening behaviors of these minority women may be more strongly inhibited by fear. It has been suggested that contradictions in the relations between emotion regulation and screening may reflect changes in the way denial operates at different stages of cancer and the testing process (27). Our suggestion is that the same is likely to prove true of how cancer-related fears affect the screening behavior of women from different ethnic groups. Researchers need to use established theory, measurement tools, and analytic strategies more systematically to examine the possibility that these variables impact screening behavior differentially among distinct groups of women.

Future Research

It has recently been suggested that differences in health between African American women and Caucasian women are caused by African American women tending to put their health at risk at the service of regulating negative emotions (88). The eating of ''comfort foods'' (typically of high calorie, sugar, and fat contents) as well as smoking and drinking are short-term solutions to stress and negative emotions but have a deleterious effect on long term-health. Although this claim has not yet been empirically investigated, differences in emotional experience and emotional regulation across ethnicities remain worthy of future investigation, especially concerning their influence on care-seeking behavior (38, 53).

In addition to further empirical work, much scholarly and conceptual analysis remains necessary. If the contradictions in the data describing fear, anxiety, worry, and screening are to be resolved, the conceptual ambiguities responsible for these contradictions must be clarified. The similarities and differences between the various emotion and emotion regulation constructs must be more clearly spelled out so that the findings accumulated by researchers studying these constructs can be more coherently related. Such conceptual distinctions will pave the way for more rigorously differentiated research studies. As is implied above, the study of denial and repression as distinct variables may allow us to develop a clearer and more coherent understanding of the relationship between emotion regulation and screening behavior. Empirically differentiating the impact of variables such as fear, worry, and anxiety might be similarly helpful. In short, breast cancer screening researchers should begin to articulate a finer-grained body of data, which may then offer us clearer and more specific ideas about how health care practitioners can intervene.

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