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Concern as Motivation for Protection: An Investigation of Mothers' Concern About Daughters' Breast Cancer Risk

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Abstract

The current study surveyed mothers with daughters (N=386) to investigate how mothers' concern about their daughters' breast cancer risk influenced intentions to engage in preventive behaviors. Using Protection Motivation Theory as a framework, self-efficacy, response efficacy and level of concern were posited to influence protective behavioral intention in distinct ways. Results from regression analyses indicate that self-efficacy, response efficacy, and mothers' concern are significant predictors of intentions to engage in preventive behaviors with daughters. Additionally, a content analysis of mothers' open-ended reasons for their concern about their daughters' breast cancer risk yield a list of specific concerns as well as trends that vary by concern level and individual comment valence. Implications for incorporating mothers' concerns into breast cancer prevention messages are discussed as a novel strategy for campaign designers.

Although deaths from breast cancer have declined by 3.5% per year from 2001 to 2004 (Centers for Disease Control and Prevention, 2009), breast cancer remains a serious issue among American women. In 2009, approximately 40,610 people were expected to die from breast cancer and about 194,280 were predicted to be newly diagnosed with the disease (American Cancer Society, 2009). Recent research has identified pre-adolescent and adolescent pubertal development as a critical breast cancer risk timeframe (BCERC, 2008). As new evidence emerges about breast cancer there is a need to communicate scientific findings to mothers and adolescent girls about how current behaviors affect later breast cancer risk.

Mothers are a particularly interesting potential target audience because they are key role models and sources of health information for their daughters (Austin, 1995). The current study extends previous research (Silk, Bigsby, Volkman, Kingsley, Atkin, Ferrara, & Goins, 2006; Yun, Silk, Bowman, Neuberger, & Atkin, 2009) by first examining mothers' concern about their daughters' breast cancer risk as a predictor of behavioral intention to engage in

recommended health behaviors, and then using content analysis of open-ended responses to identify salient concerns.

First, concern is considered alongside Protection Motivation Theory (PMT; Rogers, 1975) constructs to assess its influence on behavioral intention. Specifically, mothers' self-efficacy, response efficacy and concern regarding their daughters' breast cancer risk are examined relative to intention to engage in recommended risk reduction behaviors. Then, the specific nature, frequency and valence of mothers' concerns about their daughters' breast cancer risk are investigated. Results test theoretically guided hypotheses and provide specific recommendations for breast cancer campaigns.

Mothers as an Important Audience for Health Messages

Adoption of healthy lifestyles by pre-adolescent and adolescent girls is important, but they may not be an appropriate target audience for breast cancer campaigns. Girls in this age range may lack imminent risk perceptions regarding breast cancer, and may not be motivated to actively seek health information about breast cancer. Additionally, adolescent girls may not be equipped with necessary abilities to understand breast cancer risk messages. This is problematic because motivation and ability have been frequently cited as prerequisites to adequate health message processing (Murray-Johnson & Witte, 2003; Petty & Cacioppo, 1984).

Research suggests that family is the primary source of detection related memorable breast cancer messages (Smith et al., 2009), and family members are the second most used source of breast cancer information (behind only doctors) and the most satisfying source (Pecchioni & Sparks, 2007). Mothers may be a particularly important audience as daughters often choose mothers as communication partners as opposed to fathers (Youniss & Smollar, 1985). Additionally, a majority of women (88%) believe communicating cancer risks to their family is a personal responsibility (MacDonald, Sarna, Giver, Servellen, Bastani, & Weitzel, 2008). Breast cancer is also typically a more relevant issue to mothers than fathers as women account for more than 90% of breast cancers in the United States (ACS, 2007).

Specifically, mothers may be ideal targets for such campaigns because parental supervisory and monitoring roles are essential to their children's health (Ellis, Podolski, Frey, Naar-King, Wang, & Moltz, 2007). Additionally, mothers are a significant source of emotional, instrumental, and informational support in a breast cancer context (Oktay & Walkter, 1991). In fact, Jones, Denham and Springston (2007) report that discussing breast cancer with mothers was associated with increased frequency of breast self-examinations later in life. Previous research has demonstrated that adolescent girls are influenced by their mothers' health behaviors (Birch & Fisher, 2000; Cutting, Fisher, Grimm-Thomas, & Birch, 2007; Hill, Weaver, & Blundell, 1990), and that mothers are concerned about their daughter's breast cancer risk (Silk et al., 2006).

Concern as a Motivator for Protective Behaviors

Protection motivation theory (Rogers, 1975, 1983) provides a framework to integrate the role of concern in understanding individual intention to perform protective behaviors. PMT proposes that coping and threat appraisals influence intention to engage in protective behaviors. Meta-analyses of PMT (see Floyd, Prentice-Dunn, & Rogers, 2000; Milne, Sheeran & Orbell, 2000) suggest that it is a robust model for predicting behavioral intention, and ultimately behavior.

Coping Appraisal

According to PMT, coping appraisal is the process of assessing a recommended response to address a threat; this includes perceived response efficacy and perceived self-efficacy. Perceived self-efficacy, an individual's perception of his/her ability to engage in the recommended response behaviors (Bandura, 1991), is an important predictor of behaviors in diverse contexts (Schwarzer & Fuchs, 1995; Godin & Kok, 1996; Ajzen, 2002; Giles, McClenahan, Cairns, & Mallett, 2004). Perceived response efficacy indicates how effective an individual believes a specific recommended response to be (Bandura, 1986). Individuals are more likely to engage in behaviors they believe will have a positive effect on their health (Rippetoe & Rogers, 1987; Neuwirth, Dunwoody, & Griffin, 1995). Breast cancer messaging research has indicated that both self-efficacy and response efficacy may influence behavioral intention (Yun, et al., 2009). In the current study, mothers' self-efficacy and response efficacy related to breast cancer risk reduction recommendations (e.g., avoiding chemical exposures) are proposed to influence their intention to engage in those recommended behaviors with their daughters.

Threat Appraisal

In PMT, threat appraisal refers to the evaluation of a message and the perception of risk associated with that message. Threat appraisal is comprised of perceived vulnerability, perceived severity, and fear arousal. Perceived vulnerability refers to an individual's sense of susceptibility to the communicated threat, perceived severity indicates the perceived seriousness of a threat, and fear arousal refers to the amount of fear evoked (Milne, Sheeran & Orbell, 2000). Interestingly, in contexts where severity and susceptibility to a threat are perceived as high for everyone, measures of threat appraisal may offer low variance. For example, in Namibia where the threat of AIDS is high, fear has been shown to be universally high (Muthusamy, Levine, & Weber, 2009). This is also the case with breast cancer (see Silk et al., 2006; Stein, Fox, Murata, & Morisky, 1992). In other words, most individuals acknowledge that breast cancer is severe and that susceptibility is high among women. The current study approaches threat appraisals by measuring mothers' concern about their daughters' breast cancer risk.

Concern—Health risk studies often examine participant concern about a given health issue, conceptually defining the construct as an affective (McCaul, Reid, Rathge, & Martinson, 1996), and/or a cognitive response to health risks (McComas, Trumbo, & Besley, 2007). Within a parent/child health context, concern has been operationalized as mothers' preoccupation regarding their child's health risk (see Thompson, Corwin, Rogan, & Sargent, 1999). In the current study, concern includes both cognitive and affective appraisals of threat that can be considered to be positively or negatively valenced. Positively valenced concerns reflect a sense of *not* being at risk, while negatively valenced concerns reflect a sense of being at risk. Thus, the current study allows concern to operate as a cognitive and affective representation of threat appraisal to predict protection motivation.

Mothers' concern about their daughters' breast cancer risk is a parsimonious way to approach the severity and vulnerability components of threat appraisal, and may be a more accessible term for mothers as they consider the risk of an "adult" disease relative to their young daughters. When mothers consider the distal nature of breast cancer for their daughters, they likely have more salient health concerns that make the immediate effects of breast cancer less palpable. Framing severity and vulnerability as concern may be a clear way for mothers to assess breast cancer as they consider many potential risks that may ultimately impact their daughters' health.

Thus, the current study uses concern to indicate mothers' threat appraisal, which in turn is proposed to influence relevant protection motivation responses:

H1: Self-efficacy, response efficacy representing, and level of concern will significantly predict behavioral intentions for mothers to engage in breast cancer risk reduction behaviors with their daughters.

Mothers' Concerns About Daughters' Breast Cancer Risk

It is both theoretically and practically important to investigate the specific concerns of mothers to test if they are related to behavioral intention. Thompson and colleagues (1999) investigated mothers' concern about their children's weight, but that research a) did not specifically evoke breast cancer, and b) provided a fixed list of concern options to mothers instead of allowing them to generate a list of their own concerns. Additionally, research suggests mothers find breast cancer salient and would like their daughters to be educated about breast cancer risk reduction behaviors (Silk et al., 2006). Currently, efforts to create effective measurement models and campaign messages have been limited because mothers' specific concerns have not been identified.

Identifying specific concerns mothers self-report regarding their daughters' breast cancer risk is a first step in providing a more ecologically-valid conceptualization of breast cancer concern. Asking mothers directly about their concerns could provide a data-driven set of concerns to aid in development of measures and campaign messages. Based on the lack of research in this area, several research questions are presented.

First, it is important to identify the specific concerns mothers report about their daughter's breast cancer risk:

RQ1: What reasons do mothers report when asked to explain their concern about their daughters' breast cancer risk?

Second, mothers will range in their level of concern (high to low) and the types of concerns they have about daughter's breast cancer risk. Mothers have reasons *for* their concern (e.g., family history; Kash, Holland, Halper, & Miller, 1992) as well as reasons for their *lack* of concern (e.g., daughter is too young). An examination of the valence of these comments may provide information regarding which factors distress mothers and which factors lead to their complacency:

RQ2: How do mothers' concerns about their daughters' breast cancer risk vary by the valence (positive or negative) of those concerns?

Finally, mothers with a low level of concern about their daughters' breast cancer risk may provide systematically different reasons for their concern than very concerned mothers. For example, a mother who reports that her daughter has a poor diet may have a higher level of concern while a mother whose daughter is an appropriate weight may have a lower level of concern. It is important to test these assumptions:

RQ3: How do mothers' concerns about their daughters' breast cancer risk vary by level of concern reported?

Method

Participants

Among the 590 women who participated in an online survey, 386 women had at least one daughter and were included in data analyses. Participants were 90.9% Caucasian American, 2.1% African American, 2.8% Hispanic American, 1.8% Asian American, and 2.3% self-

identified as “other.” Participant age ranged from 22 to 80 ($M = 46.61$, $SD = 10.90$) and participants had between one and five daughters ($M = 1.48$, $SD = 0.70$). Average age of participants’ youngest daughter was 16.76 ($SD = 11.49$). A majority of participants (94.8%) had a college level education, and 39.6% had an annual household income of more than \$100,000. Lastly, 48.7% of the sample had a family history of cancer and 19.9% of participants considered themselves breast cancer advocates.

Procedure

The current study utilized a snowball sampling method. Women were sent an email with a link to an online experiment. Participants were randomly assigned to receive a message focused either on lifestyle ($n=135$), chemical ($n=121$), or developmental ($n=130$) breast cancer factors.

Message stimuli—The *lifestyle message* focused on healthy diet, exercise and other lifestyle factors and recommended that mothers encourage daughters to engage in physical activity, eat more fruits and vegetables and count calories. The *chemical message* focused on environmental factors (e.g., exposure to smoke, pollution and chemicals) and recommended that mothers teach daughters to rinse chemicals off fruits and vegetables and avoid places with heavy pollution or smoke. The *developmental message* advised mothers to be aware of their daughters’ physical development.

Measures

Following message exposure, participants completed measures of self-efficacy, response efficacy, concern, behavioral intention, and demographic variables. See Table 1 for sample items. Unless otherwise noted, individual items were scored on a five-point Likert type scale with larger numbers indicating higher levels. Confirmatory Factor Analysis (CFA) was conducted for measures with more than three items. Fit indices such as Normed Fit Index (NFI), Incremental Fit Index (IFI), and Comparative Fit Index (CFI) demonstrated acceptable model fit in all cases.

Self-efficacy—Two types of self-efficacy were measured. First, five items were used to measure mothers’ perceived ability to teach daughters how to keep a healthy lifestyle ($M = 4.25$, $SD = 0.77$, $\alpha = .92$). Second, five items were used to measure mother’s perceived ability to teach daughters how to avoid harmful chemical exposure ($M = 3.99$, $SD = 0.75$, $\alpha = .93$).

Response efficacy—Response efficacy for healthy lifestyle was measured with four items ($M = 4.18$, $SD = 0.71$, $\alpha = .93$). Response efficacy for avoidance of chemical exposure was measured with four items ($M = 3.99$, $SD = 0.75$, $\alpha = .90$).

Concern—Mothers’ concern about their daughters’ breast cancer risk was measured both quantitatively and qualitatively. First, one item was used to measure mothers’ concern about their daughters’ risk for developing breast cancer (i.e., “How concerned are you about your daughters’ risk for developing breast cancer?”) ($M = 3.52$, $SD = 1.03$). These responses were trichotomized for specific analyses with participants who were “not at all concerned” or “unconcerned” in the low concern group ($n=61$), “neither concerned nor unconcerned” participants in the moderate concern group ($n=176$), and “concerned” or “very concerned” participants in the high concern group ($n=194$).

Second, an open-ended question was used to elicit reasons for mothers’ concern about their daughters’ breast cancer risk. Specifically, mothers were asked to explain their reasons for their quantitative concern appraisal. Mothers’ concerns were reported after answering a

question that asked how concerned they were about their daughters' breast cancer risk and women were likely to either a) explain why they felt their daughter *was* at risk (negative valence), or b) explain why their thought their daughter *was not* at risk (positive valence).

Behavioral intention—Four items were used to measure intention to teach daughters how to have a healthy lifestyle ($M = 3.94$, $SD = 0.84$, $\alpha = .89$). Three items were used to measure intention to teach daughters to avoid harmful chemicals ($M = 4.19$, $SD = 0.79$, $\alpha = .92$).

Demographic variables—Participants were asked to select an answer that best described their age, ethnicity, education level, number of daughters, family history of breast cancer, and breast cancer advocate status.

Content Analysis of Concerns

Unitization—Concern statements were first unitized into individual concern units; the unit of analysis defined as a subject/verb pairing or a simple sentence. Data from one participant could provide multiple concern statements for analysis.

Coding procedures—Initially, the research team generated categories from the specific concerns mothers reported. Eight primary categories emerged from the complete dataset (i.e., family history of breast cancer, precautionary or preventive measures, general risk factors, pervasive nature of the disease, medical history, other medical concerns, general worry, other). Within those eight categories, the team identified 52 unique concerns (e.g., BRCA genes in the family). See Table 2 for an excerpt of the coding scheme and explication of coding categories.

Each concern statement was coded into a main category and a subcategory. For example, a mother who reported concern about her daughter being overweight would have been coded in the general risk factors category and the overweight/obese subcategory. A sample dataset was coded to confirm scheme utility and comprehensiveness. Revisions were made based on concern statements that were incongruent with the coding scheme, and a final coding scheme was developed.

Two independent coders unassociated with prior scheme development were trained on a sample dataset and coded all 431 comments in the main dataset; inter-rater reliability was adequate ($\kappa=0.80$).

Results

Quantitative Analyses

Regression analyses were conducted to test research hypotheses. Participants in the developmental message condition did not answer intention questions and were included only in the content analysis of concerns. Thus, only participants in the lifestyle and chemical message conditions were included in regression analyses. Demographic factors were included in the first block, and theoretical variables were entered into the second regression block.

Intention to teach daughters how to have healthy lifestyle—Results revealed that the overall model was significant, $F(6, 127) = 26.38$, $p < .001$, $adj.R^2 = .53$. Predictors in the first block significantly contributed to intention to teach daughters to have a healthy lifestyle, $F(3, 130) = 9.50$, $p < .001$, $adj.R^2 = .16$. Specifically, youngest daughter's age was negatively related to intention, $b = -0.03$, $t = -4.18$, $p < .001$, family history of breast cancer was not significantly related to intention, $b = 0.13$, $t = 0.92$, $p = .359$, and breast cancer

advocacy status was positively related to intention, $b = 0.55$, $t = 3.33$, $p = .001$. The second block also significantly contributed to intention, $F(3, 127) = 35.67$, $p < .001$, $R^2_{\text{change}} = .38$. Results revealed that self-efficacy was positively related to intention, $b = 0.67$, $t = 8.65$, $p < .001$. Response efficacy was also positively related to intention, $b = 0.18$, $t = 2.37$, $p = .019$, as was concern $b = 0.14$, $t = 2.70$, $p = .008$.

Intention to teach daughters to avoid harmful chemicals—Results showed that the overall model was significant, $F(6, 110) = 21.54$, $p < .001$, $adj.R^2 = .52$. The first block significantly contributed to intention to teach daughters to avoid harmful chemicals, $F(3, 113) = 9.10$, $p < .001$, $adj.R^2 = .17$. Youngest daughter's age was negatively related to intention, $b = -0.03$, $t = -4.81$, $p < .001$, whereas family history of breast cancer was not related to intention, $b = 0.06$, $t = 0.42$, $p = .675$, and breast cancer advocacy status was positively related to intention, $b = 0.52$, $t = 3.03$, $p = .003$. The second block also significantly contributed to intention, $F(3, 110) = 27.56$, $p < .001$, $R^2_{\text{change}} = .35$. To be specific, self-efficacy was positively related to intention, $b = 0.79$, $t = 8.20$, $p < .001$. However, response efficacy, $b = 0.03$, $t = 0.38$, $p = .702$, and concern, $b = 0.04$, $t = 0.69$, $p = .490$, were not significantly related to intention.

Qualitative Analyses

A summary of the qualitative concerns mothers reported in reference to their daughters' breast cancer risk can be found in Table 2. Participants in all three experimental conditions ($N = 386$) were included in qualitative analyses.

Concern categories—The first research question asked what specific concerns did mothers report and which concerns were reported most frequently. Preventive or precautionary measures (i.e., statements regarding measures taken to prevent or lower breast cancer risk), family history (i.e., statements regarding family based sources of risk including genetic factors) and the pervasive nature of breast cancer (i.e., statements regarding the frequent occurrence or prevalence of breast cancer) were cited as the three primary areas of mothers' concern. Specifically, having a family history of breast cancer (e.g., "her maternal grandmother had breast cancer"), not having a family history of breast cancer (e.g., "it doesn't run in either side of her family), exercising or being active (e.g., "she is active and fit"), exposure to environmental pollutants (e.g., "I think she is exposed to more chemicals than I was growing up"), concern about other health issues (e.g., "I am more concerned about STDs"), and the fact that everyone is at risk (e.g., "everyone is at risk") were cited most frequently as reasons for concern or lack of concern among mothers.

Concern valence—The second research question asked how mothers' concerns about their daughters' breast cancer risk varied by the valence of the reported concern. Overall, mothers reported more negatively valenced reasons for their concern ($n=184$) than positively valenced reasons ($n=158$). Crosstab analysis was employed to assess the top positively and negatively valenced concerns reported by mothers.

The top positively valenced concerns provided by mothers were lack of breast cancer family history, engaging in exercise or having an active lifestyle, healthy diet or a vegetarian diet, feeling that one's daughter is too young to worry (e.g., "she's so young – it isn't on my 'radar' now") and daughter getting regular checkups. The most frequent negatively valenced concerns reported by mothers were having a family history of breast cancer, the perception that everyone is at risk, high exposure to environmental pollutants, concern about all health issues, and genetic risk factors (e.g., BRCA genes). Mothers also had negatively valenced concerns related to their daughters' weight (e.g., "my daughter has a history of childhood

obesity) as well as frequencies, odds ratios and statistics that make breast cancer seem dangerous (e.g., one in five women will get breast cancer).

Quantitative testing of research question two investigated how mothers' valenced (positive or negative) concerns would be related to overall level concern about daughters' breast cancer risk. An independent sample t-test demonstrated that mothers who reported positively valenced concerns had less concern about their daughters' breast cancer risk ($M=2.85$, $SD=0.68$) than mothers who reported negatively valenced concerns ($M=4.08$, $SD=0.81$), $t(340)=14.89$, $p<.001$.

Level of concern—The third research question asked how mothers' comments about their daughters' breast cancer risk would vary by level of concern. Mothers in the low concern group frequently reported they were not concerned because they had no family history, their daughter exercised, led a healthy lifestyle and was too young to worry. Mothers in the moderate concern group similarly reported no family history, exercise, healthy diet and healthy lifestyle as justification for their level of concern. Contrarily, mothers in the high concern group cited having a family history, being exposed to environmental pollutants, concern about all health issues and the pervasive nature of breast cancer as their primary reasons for concern. Complete results of this analysis are reported in Table 3.

Discussion

The Role of Efficacy and Concern

The current study presents support for applying PMT constructs to understanding breast cancer risk reduction intentions and provides novel insight regarding the nature of mothers' concerns about their daughters' health. The current study combined quantitative analysis of survey items with analysis of open-ended questionnaire items to provide a more complete picture of how mothers form and act upon perceptions about their daughters' breast cancer risk.

Hypothesis one proposed a model where mothers' self-efficacy, response efficacy and concern influence behavioral intentions to engage in risk reduction practices with their daughter(s). Self-efficacy was a significant predictor of behavioral intention in both the environmental and lifestyle focused message conditions. Response efficacy and concern were significant predictors only in the lifestyle condition. This inconsistent finding may be related to the uncertainty associated with breast cancer antecedents; mothers may believe that lifestyle factors influence breast cancer risk, but may not be convinced that avoiding chemical exposures will attenuate their daughters' risk. Mothers have been inundated with messages associated with childhood obesity and perhaps feel more able to help their children with diet and exercise compared to avoidance of chemical exposures – which may be challenging for mothers, particularly those with low scientific literacy. Overall, these results suggest the potential utility of concern in protection motivation, especially in contexts of more certain medical findings.

Additionally, breast cancer advocates and mothers with younger daughters had higher intentions to engage in message recommendations across both conditions. Though the finding about breast cancer advocates may seem intuitive when considering the involvement of those group members, results concerning youngest daughter's age are novel and informative. This significant relationship suggests that mothers are receptive to early preventive action, a promising finding with many positive implications for further campaign research.

Analysis of Mothers' Concerns

A series of research questions were aimed at gaining a more intimate understanding of mothers' specific concerns about their daughters' breast cancer risk. The first research question asked which concerns mothers would self-report to be the most salient in reference to their daughters' breast cancer risk. Content analysis of these responses revealed that taking preventive or precautionary measures, family history, and the pervasive nature of the disease were cited most often as reasons for mothers' concern. These findings indicate that while mothers take some personal responsibility for breast cancer prevention (e.g., eating a healthy diet), they are also concerned about uncontrollable factors (e.g., family history). Understanding that mothers have personal responsibility regarding the disease is promising for health campaigns; this suggests mothers know that engaging in preventive behaviors with their daughter(s) can lower breast cancer risk.

Mothers' concern was also higher when there was a family history of breast cancer; this is not surprising as it is increasingly common knowledge that family history is a major factor in assessing breast cancer risk. The pervasive nature of breast cancer is a bit more challenging for campaign message designers because it may lead to a belief that nothing can be done to protect against breast cancer. Unfortunately, this belief increases the likelihood that breast cancer messages will be ignored.

Furthermore, the valence of mothers' concerns provides further insight about which concerns are most worrisome. Overall, mothers reported more negatively valenced comments regarding their daughters' breast cancer risk; in other words, mothers focused on reasons that contributed to high rather than low levels of concern. For example, mothers appear to have higher levels of concern related to negative factors regarding breast cancer (e.g., unhealthy lifestyle), but are less concerned if they engage in risk reduction or judge their daughter as low risk. This finding that mothers are consistent in their appraisal of their daughters' breast cancer risk was revealed in both quantitative and content analyses.

Finally, differences in the valence of mothers' concerns emerge when concern is categorized into three levels. Mothers who perceived their daughters' risk to be low provided almost uniformly positive-valenced reasons for their lack of concern (e.g., no family history). Mothers who reported moderate levels of concern reported mostly positively valenced comments, but some negatively valenced concerns also appeared with this group. Finally, mothers who perceived their daughters as high risk for developing breast cancer reported negatively valenced concerns more frequently than positive ones. These findings are logically intuitive: mothers who are not concerned perceive they are successfully managing their daughters' breast cancer risk, while mothers who are highly concerned believe their daughter(s) to be at a particularly high risk.

These data can be interpreted two ways. On one hand, mothers who are well-informed may try to actively manage their daughters' risk factors and thus report it as a reason for their lack of concern, while mothers who are unable to actively manage their risk report it as a reason for their heightened concern. On the other hand, it may be the case that mothers' perceptions their risk factor management may not be as accurate as their actual level of control. This can be dangerous for health campaigns as mothers with a false perception of control may ignore or even be reactant to campaign messages as they assume that they have already managed the risks addressed in the message.

Campaign Implications

Findings from the current study have diverse implications for health campaign message construction. Even though concern accounts for less variance in behavioral intention than efficacy constructs, there is still some evidence that addressing mothers' concerns will

increase the likelihood of them engaging in recommended behaviors. The keys here – and perhaps the central contributions of this study – are in a) understanding protective maternal roles in health, and b) more directly linking message recommendations to address mothers' specific concerns.

Identifying mothers' most often reported concerns can help message designers better target that audience; this may increase the effectiveness of campaigns aimed at reducing breast cancer risk. In fact, using concerns actually reported by mothers to aid in campaign message construction instead of relying on purely scientific information or elite conceptions of what mothers *should* know could be particularly useful. Additionally, using mothers' positively valenced concerns to construct inoculation messages may be an effective way to target mothers who perceive their daughters to be at low risk. While replacing traditional health information exclusively with appeals to mothers' concerns is not advisable, campaigns may benefit from explicitly addressing the specific concerns reported by mothers.

Limitations

There are two factors that may limit the generalizability of findings from the current study. First, the sample may not be representative of all women with daughters because participants were not ethnically diverse and had high socioeconomic status. Given known disparities in breast cancer (Sabatino, Coates, Uhler, Breen, Tangka, & Shaw, 2008), a more economically and ethnically/racially diverse sample would have been desirable. However, the internal validity of the current study was not compromised; these findings still make a contribution to the understanding of cognitive mechanisms underlying mothers' decision-making.

Second, due to concerns about questionnaire length and subject fatigue, the current study used only one item to measure concern. Although the item was straightforward, multiple items may have been more valid and reliable. Despite this fact, the current study showed that mothers who had negatively-valenced concerns had a higher level of concern than mothers who had positively-valenced concerns, which demonstrates validity for the one-item measure.

Future Research

The results of this study confirm the potential utility of concern in health intention models and suggest increased inclusion in campaign messaging. Additionally, specific concerns reported by mothers should continue to be examined in both quantitative and qualitative fashions. Testing the effects of campaign messages targeting mothers' concerns about their daughters' breast cancer risk would be of particular value. The current study provides a list of those specific concerns for investigation. Future research may also employ pre-test/exposure/post-test designs to more definitively assess message effects.

Conclusion

Recent scientific findings suggest a need for young girls to engage in behaviors to reduce their later risk for breast cancer. One promising avenue for health communication research is to identify mothers' concerns about breast cancer in order to develop campaign messages. The current study provides evidence that addressing mothers' concerns while emphasizing self-efficacy and response efficacy may be an effective strategy.

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Table 1

Sample items for self-efficacy, response efficacy, and behavioral intention..

Variable	Sample item
Self-efficacy (lifestyle condition)	I have the ability to teach my daughter to read food labels to check for their nutritional value.
Self-efficacy (chemical condition)	I have the ability to teach my daughter to check product labels for potentially harmful chemicals.
Response efficacy (lifestyle condition)	Exercising is an effective way for young girls to protect themselves against breast cancer later in life.
Response efficacy (chemical condition)	Washing foods treated with pesticides is an effective way for young girls to protect themselves against breast cancer later in life.
Behavioral intention (lifestyle condition)	I intend to teach my daughter how to make healthy food choices when she is at the grocery store with me.
Behavioral intention (chemical condition)	I intend to teach my daughter to avoid places with heavy air pollution.

Table 2

Mothers' reasons for concern about their daughters' breast cancer risk.

Primary Category	Specific Concern	Count	Valence
Family history (n=112; 26%)			Mixed
<i>Statements regarding family based sources of risk including genetic factors and prior family history of breast cancer and other diseases</i>	family history of breast cancer	54 (12.5%)	–
	no family history of breast cancer	43 (10%)	+
	genetic risk factors (including BRCA)	7 (1.6%)	+
	other	5 (1.2%)	Neutral
Precautionary/preventive measures (n=123; 29%)			
<i>Statements regarding any measures taken to prevent or lower breast cancer risk</i>	exercise/active lifestyle	23 (5.3%)	+
	healthy diet/vegetarian	21 (4.9%)	+
	healthy lifestyle	21 (4.9%)	+
	other	17 (3.9%)	+
	daughter is too young	11 (2.6%)	+
	general prevention measures	8 (1.9%)	+
	regular checkups	8 (1.9%)	+
	healthy body weight	7 (1.6%)	+
General risk factors (n=57; 13.2%)			–
<i>Statements regarding any breast cancer risk factors that are not explicitly medical history related</i>	exposed to smoke/pollution/chemicals	22 (5.1%)	–
	daughter is overweight	7 (1.6%)	–
	other	6 (1.4%)	–
Pervasive nature of the disease (n=39; 9%)			–
<i>Statements regarding the frequent occurrence or prevalence of breast cancer</i>	everyone is at risk	26 (6%)	–
	breast cancer		
	frequencies/odds/statistics	6 (1.4%)	–
Medical history (n=20; 4.6%)			Mixed
<i>Statements regarding personal medical history factors</i>	doctor says risk is low/self-appraisal	6 (1.4%)	+
Other medical concerns (n=31; 7.2%)			Mixed
<i>Statements regarding general medical concerns or more heightened concern about diseases other than breast cancer</i>	more concerned about all health issues	22 (5.1%)	–
	more concerned about other diseases (e.g., heart disease)	6 (1.4%)	Neutral
General worry (n=36; 8.4%)			Mixed
<i>Statements regarding more general concern comments or lack of thought, control or certainty</i>	can't worry or stress about everything	14 (3.2%)	Neutral
	uncertainty	9 (2.1%)	Neutral
	may worry in the future	6 (1.4%)	Neutral
Other (n=11; 2.6%)			Neutral

Primary Category	Specific Concern	Count	Valence
<i>Statements did not fit into other categories</i>	other comments	11 (2.6%)	Neutral
TOTAL (N=431; 100%)		366 (85%)	

Note. only cells with 5 or more occurrences (1% of sample) were included in this table

Table 3

Mothers' reason for concern reported by level of concern.

level of concern	count	percent
<i>low concern</i>		
no family history	14	23%
exercise/active lifestyle	6	9.8%
healthy lifestyle	5	8.2%
daughter is too young	5	8.2%
doctor says risk is low/low self-appraisal	4	6.6%
may worry in the future	4	6.6%
<i>moderate concern</i>		
no family history	26	14.8%
exercise/active lifestyle	13	7.4%
healthy diet/vegetarian	13	7.4%
healthy lifestyle	12	6.8%
everyone is at risk	12	6.8%
other precautionary measures	10	5.7%
can't worry about everything	9	5.1%
<i>high concern</i>		
family history	48	24.7%
smoke/pollution/chemical exposure	18	9.3%
concerned about all health issues	17	8.8%
everyone is at risk	11	5.7%