Mothers' Intentions to Teach Adolescent Daughters about Breast Cancer Risk Reduction Activities: The Influence of Self-Efficacy, Response Efficacy, & Personal Responsibility

Doshik Yun, **Kami J. Silk**, **Nicholas David Bowman**, **Lindsay Neuberger**, and **Charles K Atkin**
Department of Communication, 443 Communication Arts Building, East Lansing, MI 48824-1212

Abstract

The current study examined whether self-efficacy (SE), response efficacy (RE), and personal responsibility (PR) affect mothers' intentions (N=139) to teach their adolescent and pre-adolescent daughters about breast cancer risk reduction measures such as maintaining a healthy diet, exercising on a regular basis, and avoiding chemical exposures. Results showed that both SE and RE were related to mothers' intentions to teach their daughters how to maintain a healthy diet, engage in regular exercise behavior, and avoid chemical exposures. However, PR was not related to any behavioral intention. Implications for breast cancer message development for communication campaigns are discussed.

Breast cancer is a serious disease responsible for premature deaths among women across the United States. In 2007, about 40,460 women were expected to die from breast cancer and about 178,480 were estimated to have been diagnosed with the disease (American Cancer Society, 2008a). Researchers have examined factors associated with breast cancer risk and suggest that early adoption of healthy behaviors is important in reducing harmful effects of risk factors (Ahlgren, Melbye, Wohlfhart, & Sorensen, 2004; Hamilton & Mack, 2003). For example, though explicit scientific findings are still lacking regarding environmental causal factors for breast cancer, physical activity and healthy diet are recommended for adolescent and pre-adolescent girls as a strategy to delay early menarche, which is associated with increased risk of breast cancer later in life (Ahlgren et al., 2004; American Cancer Society, 2008b). Consequently, risk reduction efforts need to be directed towards adolescent and pre-adolescent girls so they can decrease their later risk of breast cancer by adopting healthy behaviors early in their lives.

Adolescent and pre-adolescent girls, however, pose a challenging audience for health practitioners because they may lack knowledge regarding the risk of breast cancer, skills to understand intervention messages, and a sense of imminent risk perception (Silk, Bigbsy, Volkman, Kingsley, Atkin, Ferrara, et al., 2006). Thus, communication campaigns about the risk of breast cancer should be targeted towards parents who have adolescent and pre-

Correspondence: Doshik Yun, Department of Communication, Michigan State University, 465 Communication Arts Building, East Lansing, MI 48824-1212; yundoshi@msu.edu.
Doshik Yun (MA, Yonsei University, 2005), Nicholas David Bowman (MA, Univeristy of Missouri-St. Louis, 2004), and Lindsay Neuberger (MA, Wake Forest University, 2007) are doctoral students in the Department of Communication at Michigan State University, East Lansing, MI., where Kami J. Silk (PhD, University of Georgia, 2002) is an associate professor and Charles K Atkin (PhD, University of Wisconsin-Madison, 1971) is a professor.
yundoshi@msu.edu, Telephone: 517-353-0887
silkk@msu.edu, Telephone: 517-355-0221
bowmann5@msu.edu, Telephone: 517-355-2170
neuberg3@msu.edu, Telephone: 517-355-3329
atkin@msu.edu, Telephone: 517-353-3259

adolescent daughters because parents' supervisory and monitoring roles are crucial to adolescent health (Ellis, Podolski, Frey, Naar-King, Wang, & Moltz, 2007; Li, Stanton, & Feigelman, 2000). Female adolescents prefer mothers as a communicant when discussing personal issues (Youniss & Smollar, 1985) and seek them out for health information (Abramovitz & Birch, 2000). Thus, mothers comprise a primary audience for communication campaigns that aim to reduce later risk of breast cancer among adolescent and pre-adolescent girls.

The current study focuses on mothers with adolescent and pre-adolescent daughters under the age of 18 and examines whether mothers' self-efficacy (SE), response efficacy (RE), and personal responsibility (PR) influence behavioral intention to teach their daughters to maintain a healthy diet, exercise on a regular basis, and avoid chemical exposures. These factors (i.e., SE, RE, PR) are important and relevant to mothers' intentions to teach their daughters to engage in preventive behaviors for breast cancer. Mothers may lack self-efficacy regarding their daughters' health (as opposed to their own) because they can not constantly monitor their daughters' behaviors and change these actions when their daughters are not willing to cooperate. In this respect, self-efficacy is expected to play a primary role in mothers' intention to engage in educational activities. Similarly, personal responsibility is also crucial when individuals intend to perform behaviors to promote others' health. Lastly, given that conclusive scientific evidence regarding effectiveness of preventive measures is still lacking (BCERF, 2008), response efficacy, which is based on the perceived effectiveness of a preventive measure, deserves scholarly attention in the examination of individuals' risk reduction behaviors regarding breast cancer.

Uncertainty Regarding Causes of Breast Cancer

Researchers have tried to identify possible causes of breast cancer only to find mixed results on the relationship between breast cancer risk and both lifestyle (e.g., healthy diet, exercise), and environmental factors (e.g., chemical exposure). For instance, while some researchers have suggested that a healthy diet is related to a low risk of breast cancer (Adzersen, Jess, Freivogel, Gerhard, & Bastert, 2003), others have not found any clear link between vegetable consumption and reduction in breast cancer risk (BCERF, 2008). There is also no clear evidence regarding the role of exercise in reducing the risk of breast cancer (BCERF, 2008), although increased intensity of exercise has been found to increase resistance to breast cancer in specific situations (Thompson, Westerlin, Snedden, & Singh, 1995).

As for environmental factors, a recent meta-analysis reported inconclusive evidence regarding the link between environmental agents (e.g., pesticides, herbicides) and breast cancer (Mitra, Faruque, & Avis, 2004). Although women tend to be uncertain about causes of breast cancer and measures to prevent the disease in the midst of conflicting scientific evidence, they may perceive that lifestyle as well as environmental factors might be related to risk for breast cancer and acknowledge the necessity to take preventive measures (Silk, et al., 2006; Volkman & Silk, 2008). That is, consistent with the precautionary principle (Wingspread Statement on the Precautionary Principle, 1998), women tend to consider it wise to take protective actions when the consequences of a disease are possibly detrimental and/or irreversible, and might be even more inclined to do so in the context of potential risks for their children.

Factors Influencing Behavioral Intentions

Self-efficacy

Self-efficacy (SE), or "people's beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives" (Bandura, 1991, p. 257), is an important predictor for individuals' behaviors in health communication (Godin & Kok,

1996; Schwarzer & Fuchs, 1995). In the context of the current study, while some mothers may perceive they are capable of teaching their daughters how to maintain a healthy lifestyle and avoid chemical exposures, others may feel differently because of various internal and external factors that inhibit those behaviors. For example, mothers may feel like they have inadequate knowledge about nutrition, proper exercise, and/or specific products that contain harmful chemicals.

Response efficacy

A recent meta-analysis of 65 studies included response efficacy (RE), or the belief that a specific response will help effectively diminish a health risk (Bandura, 1986), and found that RE is related to behavioral intentions and behaviors in such diverse areas as cancer prevention, smoking cessation, AIDS prevention, and alcohol consumption (Floyd, Prentice-Dunn, & Rogers, 2000). In addition, individual studies have continued to report strong evidence on the utility of RE in encouraging preventive behaviors (Helmes, 2002; Milne, Orbell, & Sheeran, 2002). In the current study, mothers may be more likely to have behavioral intentions to engage in message recommendations with their daughters if they believe that regular exercise, a healthy diet, and avoidance of chemical exposures effectively reduce risk for breast cancer later in life.

Personal responsibility

Personal responsibility (PR) in health communication is often conceptualized as the attribution of outcomes resulting from healthy or unhealthy behaviors to the self (King, 1982; Rothman, Salovey, Turvey, & Fishkin, 1993). Research has demonstrated that individuals' self-attribution of responsibility is related to health behaviors such as mammography utilization (Rothman, et al,, 1993), fruit and vegetable consumption (Williams-Piehota, Cox, Silvera, Mowad, Garcia, et al., 2004), blood pressure screening (King, 1982), and smoking cessation (Colletti & Kopel, 1979). A more recent study, however, found that PR was not a significant predictor for many health-related behaviors, such as breast self-examination, dietary habits, medical checkups, alcohol intake, and exercise (Ziff, Conrad, & Lachman, 1995). One possible explanation for the lack of empirical support for PR might be that the purpose of health behaviors examined in previous studies was to promote one's *own* health rather than the health of close relatives or friends. In other words, individuals might have a much stronger sense of PR for their loved ones, especially when it comes to the health of their children. In the context of the current study, mothers may feel responsible for educating their daughters about healthy lifestyles because they largely assume the role of primary care taker (Horodynski, Silk, & Henry, 2007). In sum, consistent with previous research on SE, RE, and PR, the following hypothesis is advanced:

H1: Mothers' self efficacy, response efficacy, and personal responsibility will be positively related with behavioral intentions to teach their daughter(s) how to: a) maintain a healthy diet, b) exercise regularly, and c) avoid chemical exposures.

Method

Participants

A total of 590 women voluntarily participated in an on-line study about breast cancer messages, but only 139 women had daughters under age 18 – our primary population of interest; thus, only these 139 women were retained for analyses. Participants had one to three daughters ($M = 1.44$, $SD = 0.61$), and daughters' ages ranged from 0 to 18 ($M = 8.27$, $SD = 5.46$) years. We included mothers who had daughters across a wide age-range because mothers may form behavioral intentions for daughters' health early in their development as well as across their pre-adolescent and adolescent years. [1]

Most participants reported they lived in suburban areas (64.3%), while the rest resided in rural (15.7%) and urban areas (20.0%). Of the participants, 90% were Caucasian American, less than 1% were African American, 4.3% were Hispanic American, 1.4% were Asian American, and 3.6 % self-identified as "other." Participants' ages ranged from 22 to 57 years ($M = 39.30$, $SD = 7.80$). About 20% of participants had an income from $25,000 to $55,000, about 40% had an income from $55,001 to $100,000, and about 35% had an income more than $100,000. A majority of participants (60.7%) had a college degree. Lastly, 64 participants (45.7%) had a family history of breast cancer.

Procedure

A snowball recruitment email was sent through online networks of females. Specifically, breast cancer advocacy groups and community listservs were used as initial contacts and participants forwarded the recruitment email to their extended social networks. The recruitment email contained the URL for a Web-site where the online experiment took place, and interested women simply clicked on the URL, provided consent, and then proceeded with the study. Participants were randomly assigned to one of two message conditions related to breast cancer risk reduction which provided specific behavioral recommendations. The first message condition identified being overweight as a risk factor for breast cancer among adolescent and pre-adolescent girls and suggested preventive measures mothers could take such as teaching daughters how to have a healthy diet and exercise. The second message condition emphasized chemical exposure as a risk factor and encouraged mothers to take actions to reduce their daughters' chemical exposure. After reading the randomly assigned message (n = 76 for lifestyle; n = 62 for environmental), participants completed survey measures. Participants in the first message condition answered questions about response efficacy and behavioral intentions regarding healthy lifestyle (i.e., healthy diet and exercise behavior) and those in the second message condition answered questions about avoidance of chemical exposure.[2]

Measures

Behavioral intention items—In addition to demographic items, three types of behavioral intentions were measured using a five-point Likert scale format.[3] Behavioral intention to teach daughters how to maintain a healthy diet was measured with three items ($\alpha = .84$, $M = 4.14$, $SD = 0.59$; e.g., "I intend to teach my daughter how to make healthy food choices when she is at the grocery store with me"). Behavioral intention to teach daughters how to exercise on a regular basis was measured with a single item, "I intend to teach my daughter how to exercise on a regular basis" ($M = 4.27$, $SD = 0.68$). Lastly, behavioral intention to teach daughters how to avoid chemical exposure was measured with four items ($\alpha = .90$, $M = 4.26$, $SD = 0.54$; e.g., "I intend to teach my daughter how to wash foods treated with pesticides"). Higher scores represented a higher level of behavioral intention.

Self-efficacy items—Two types of self-efficacy were measured using a five-point Likert scale format. Self-efficacy for healthy lifestyle was measured with five items ($\alpha = .92$, $M =$

---

[1]Adolescence extends into the late teenage years and daughters who were 18 years or younger typically reside in parental households where mothers can more easily influence their health behaviors. Also, American Cancer Society (2008b) cancer prevalence rates group 12 to 19-year-olds together as an adolescent group. For practical purposes, communication campaigns should target mothers with daughters as early as possible to strengthen their behavioral intentions to teach their daughters, which subsequently can lead to actual behavior.

[2]The current study is part of a much larger research project regarding message strategies for communicating breast cancer risks to the lay public. In the current study, we focused on direct relationships between self-efficacy, response efficacy, and personal responsibility and behavioral intentions without examining message effects. Although variables were measured after exposure to a breast cancer message, results of t-tests indicated no significant differences between participants in the first message (i.e., healthy diet style and regular exercise) and those in the second message condition (i.e., exposure to chemicals) across variables considered in this study.

[3]Behavioral intention and response efficacy items were developed based on message recommendations, which differed in each of the messages. This resulted in varying numbers of items used to measure each construct.

4.45, $SD = 0.49$; e.g., "I have the ability to teach my daughter to engage in the breast cancer prevention practices recommended in the message"), and self-efficacy for avoidance of chemical exposure was also measured with five items ($\alpha = .93$, $M = 4.52$, $SD = 0.47$; e.g., "I have the ability to teach my daughter to check product labels for potentially harmful chemicals"). Items were adapted from previous studies on self-efficacy (Armitage & Conner, 1999), and higher scores represented higher levels of self-efficacy. Confirmatory Factor Analysis (CFA) was conducted to test the validity of the measure. Results showed an acceptable fit for self-efficacy for healthy lifestyle (CFI = .99, NFI = .99, IFI = .99) and self-efficacy for avoidance of chemical exposures (CFI = .99, NFI = .99, IFI = .99).

Response efficacy items—Two different kinds of RE were measured with a five-point Likert scale. First, four items were used to measure RE regarding healthy lifestyle ($\alpha = .93$, $M = 4.20$, $SD = 0.68$; e.g., "Eating a healthy diet is an effective way for young girls to protect themselves against breast cancer later in life"). Second, four items were used to measure RE for avoidance of chemical exposures ($\alpha = .90$, $M = 3.93$, $SD = 0.78$; e.g., "Washing foods treated with pesticides is an effective way for young girls to protect themselves against breast cancer later in life"). Higher scores represented a higher level of RE. CFA showed an acceptable fit for response efficacy for healthy lifestyle (CFI = .99, NFI = .99, IFI = .99) and response efficacy for avoidance of chemical exposures (CFI = .98, NFI = .97, IFI = .98).

Personal Responsibility—PR was measured with five items adapted from previous research (Williams-Piehota et al., 2004; $\alpha = .98$, $M = 3.89$, $SD = 0.88$). The measure included items such as "I am responsible for my daughter's health." and "My daughter's good health depends on me." For validity of the measure, CFA indicated an acceptable fit for a one factor solution (CFI = .99, NFI = .99, IFI = .99).

Results

Multiple regression analyses were conducted to test research hypotheses. For each criterion variable, participants' age, their youngest daughter's age, education level, income, and family history of breast cancer were entered into the first block, followed by SE, RE, and PR in the second block.

H1a: Intention to Teach Daughters How to Maintain a Healthy Diet

Hypothesis 1a predicted that SE, RE, and PR would be positively related with the intention to teach daughters how to maintain a healthy diet. The results indicated that the overall model was significant, $F(8, 68) = 5.33$, $p < .001$, *adj. R^2* = .31. While the control variables in the first block did not significantly contribute to the intention to teach daughters how to maintain a healthy diet, $F(5, 71) = 1.18$, $p = .33$, *adj. R^2* = .01, the predictors in the second block contributed significantly to intention, $F_{change}(3, 68) = 11.40$, $p < .001$, $R^2_{change} = .31$. Results indicated that SE ($b = 0.48$, $t = 3.58$, $p < .01$) and RE ($b = 0.36$, $t = 3.67$, $p < .001$) were significant predictors of behavioral intention, while PR was not ($b = -0.12$, $t = -1.52$, $p = .13$)

H1b: Intention to Teach Daughters How to Exercise on a Regular Basis

Hypothesis 1b predicted that SE, RE, and PR would be positively related with the intention to teach daughters how to exercise on a regular basis. Multiple regression analyses showed that the overall model was significant, $F(8, 68) = 4.87$, $p < .001$, *adj. R^2* = .29. The control variables in the first block were not significant, $F(5, 71) = 1.44$, $p = .22$, *adj. R^2* = .03, while predictors in the second block did significantly contribute to the intention to teach daughters how to exercise, $F_{change}(3, 68) = 9.72$, $p < .001$, $R^2_{change} = .27$. SE ($b = 0.36$, $t = 2.26$, $p < .05$) and RE ($b = 0.46$, $t = 4.02$, $p < .001$) were significant predictors of behavioral intention, whereas PR was not ($b = -0.07$, $t = -0.78$, $p = .44$)

H1c: Intention to Teach Daughters How to Avoid Chemical Exposures

The hypothesis predicted that SE, RE, and PR would be positive predictors of the intention to teach daughters how to avoid chemical exposures. The results revealed that the overall model was significant, $F(8, 54) = 7.68$, $p < .001$, $adj. R^2 = .46$. Again, control variables in the first block did not significantly contribute to intention, $F(5, 57) = 0.88$, $p = .50$, $adj. R^2 = .01$. Predictors in the second block significantly contributed to intention, $F_{change}(3, 54) = 17.71$, $p < .001$, $R^2_{change} = .46$. Results indicated that while SE ($b = 0.70$, $t = 6.10$, $p < .001$) and RE ($b = 0.16$, $t = 2.05$, $p = .04$) were positively related to mothers' intention to teach daughters to avoid chemical exposures, PR was not ($b = −0.03$, $t = −0.51$, $p = .62$).[4]

Discussion

The current study examined whether SE, RE, and PR would affect mothers' behavioral intentions to teach their daughters how to maintain a healthy diet, exercise regularly, and avoid chemical exposures in order to reduce breast cancer risk in later life. Results indicated that SE and RE were both related to mothers' intentions to teach their daughters how to maintain a healthy diet, exercise on a regular basis, and avoid chemical exposures. Consistent with predictions, mothers who perceived themselves as capable of teaching their adolescent and pre-adolescent daughters preventive measures were more likely to intend to perform educational activities. Additionally, mothers believed that a healthy diet, exercise, and reduction of chemical exposure could impact their daughters' later risk of breast cancer, which increased their intentions to promote these healthy behaviors with their daughters.

However, while mothers thought the behavioral recommendations were effective strategies for breast cancer risk reduction, PR was not related to any of the behavioral intentions. One explanation for this surprising result is that mothers may see their daughters as self-regulating individuals who will increasingly grow independent as they age, and thus are (or will be) ultimately responsible for and capable of managing their own health. Also, it is possible that PR was not significant because the current measurement did not directly ask mothers to consider their maternal roles (i.e., what are their responsibilities because they are the mother) as it relates to their daughters' health. The language in the items referenced responsibility, but did not directly link responsibility based on *maternal roles* to daughters' health. In other words, we may not have tapped participants' perceived responsibilities as a mother as strongly as we could have because we did not use item stems like, "As a mother, it is my responsibility…". Future research should seek to tease out these subtle differences in conceptualizing and measuring relevant responsibility concepts.

Implications for Communication Campaigns

As indicated by the results of the current study, SE is an important factor that practitioners need to consider when they compose campaign messages to encourage mothers to teach their daughters to adopt early healthy behaviors. The ease with which a behavior can be performed should be highlighted in campaign messages to increase the likelihood that women believe they can perform behaviors that reduce later risk of breast cancer. For example, promotion of activities and exercise that are easily integrated into daily life might provide mothers with greater SE than ambiguous messages that direct them to simply "be active." Thus, human and financial resources should be devoted to enhancing the SE of mothers across behavioral domains where mothers find difficulties in educating their daughters on risk reducing behaviors.

---

[4]In terms of multicollinearity for H1a and H1b, the variance inflation factor (VIF) ranged from 1.17 to 3.28. The variance inflation factor (VIF) ranged from 1.08 to 2.35 for H1c. Although there is "no good statistical rationale for the choice of any of the traditional rule of thumb threshold value," 10 is the traditional rule of thumb threshold value (Cohen, Cohen, West, & Aiken, 2003, p. 424).

Results from the current study showed that RE was related with mothers' intention to teach their daughters how to maintain a healthy diet, exercise regularly, and avoid chemicals. Although mothers in the current study were informed of the inconclusive nature of scientific evidence regarding the effectiveness of each risk reduction recommendation (i.e., healthy diet, exercise, and avoidance of chemicals), they still perceived the recommendations as effective for reducing breast cancer risk and relied on them in their decision-making. These results indicate that women tend to support the precautionary principle when considering potential health behaviors Thus, messages in communication campaigns targeted to mothers should focus on the RE of risk reduction behaviors even if the exact effectiveness of the recommendations for reducing breast cancer risk is unknown. The behavioral recommendations provided in campaign messages often confer health benefits across disease contexts, which mothers can easily identify and apply to their own and their family's overall health. Although PR might not seem like a fruitful message strategy to consider, it is possible that tapping other types of familial or maternal responsibility might prove useful. Future research should consider the multiple dimensions of responsibility for influencing individuals to take protective action on behalf of others.

Limitations

One clear limitation of this research is the use of a snowball sample, and results should be interpreted within the constraints of this sampling frame. As a result of a snowball sample, participants in the current study had a relatively high socioeconomic status, thus limiting the generalizability of results to individuals with lower socioeconomic status. Another limitation is the focus on behavioral intentions as opposed to actual behaviors. While research does indicate a link between behavioral intention and actual behavior (Webb & Sheeran, 2006), future studies should attempt to examine the actual behavior of mothers and daughters.

Conclusion

Although the relationship between breast cancer and most environmental factors lacks conclusive scientific evidence, mothers are willing to enact the precautionary principle in their personal lives by participating in risk reduction activities they perceive to be effective and are able to perform with their daughters. As science reveals more concrete findings related to the environment and adolescent health, mothers will continue to play a pivotal role in influencing daughters' health behavior, therefore making them a critical audience for breast cancer risk reduction messages.

Acknowledgments

References

Abramovitz BA, Birch LL. Five-year-old girls' ideas about dieting are predicted by their mothers' dieting. Journal of the American Dietetic Association 2000;100:1157–1163. [PubMed: 11043700]

Adzersen KH, Jess P, Frievogel KW, Gerhard I, Bastert G. Raw and cooked vegetables, fruits, selected micronutrients, and breast cancer risk: A case-control study in Germany. Nutrition and Cancer 2003;46:131–137. [PubMed: 14690788]

Ahlgren M, Melbye M, Wohlfhart J, Sorensen TIA. Growth patterns and the risk of breast cancer in women. New England Journal of Medicine 2004;351:1619–1926. [PubMed: 15483280]

American Cancer Society. Overview: Breast cancer. 2008a. Retrieved January 30, 2008 from http://www.cancer.org/docroot/CRI/content/ CRI_2_2_1X_How_many_people_get_breast_cancer_5.asp?sitearea=

American Cancer Society. Cancer prevention & early detection facts & figures. 2008b. Retrieved December 05, 2008 from http://www.cancer.org/downloads/STT/CPED_2008.pdf

Armitage CJ, Conner M. Distinguishing perceptions of control from self-efficacy: Predicting consumption of a low-fat diet using the theory of planned behavior. Journal of Applied Social Psychology 1999;29:72–90.

Bandura A. Social cognitive theory of self-regulation. Organizational Behavior and Human Decision Processes 1991;50:248–287.

Bandura, A. Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall; 1986.

Breast Cancer and Environmental Risk Factors. Vegetables and fruits and the risk of breast cancer. 2008 [Accessed March 1, 2008]. from http://envirocancer.cornell.edu/Factsheet/Diet/fs18.fruit.cfm

Colletti G, Kopel SA. Maintaining behavior changes: An investigation of three maintenance strategies and the relationship of self-attribution to the long-term reduction of cigarette smoking. Journal of Consulting and Clinical Psychology 1979;47:614–617. [PubMed: 528733]

Ellis DA, Podolski C, Frey M, Naar-King S, Wang B, Moltz K. The role of parental monitoring in adolescent health outcomes: Impact on regimen adherence in youth with type 1 diabetes. Journal of Pediatric Psychology 2007;32:907–917. [PubMed: 17426045]

Floyd DL, Prentice-Dunn S, Rogers RW. A meat-analysis of research on protection motivation theory. Journal of Applied Social Psychology 2000;30:407–429.

Godin G, Kok G. The theory of planned behavior: A review of its applications to health-related behaviors. American Journal of Health Promotion 1996;11:87–98. [PubMed: 10163601]

Hamilton AS, Mack TM. Puberty and genetic susceptibility to breast cancer in a case-control study in twins. New England Journal of Medicine 2003;348:2313–2322. [PubMed: 12788995]

Helmes AW. Application of the protection motivation theory to genetic testing for breast cancer risk. Preventive Medicine 2002;35:453–462. [PubMed: 12431894]

Horodynski, M.; Silk, KJ.; Henry, M. Parents as the primary target audience for healthy eating among young children. In: Fitzgerald, HE.; Mousouli, V., editors. Obesity in America: Development and Prevention. Vol. 2. Westort, CT: Praeger; 2007.

King JB. The impact of patients' perceptions of high blood pressure on attendance at screening: An extension of the health belief model. Social Science and Medicine 1982;16:1079–1092. [PubMed: 7112160]

Li X, Stanton B, Feigelman S. Impact of perceived parental monitoring on adolescent risk behavior over 4 years. Journal of Adolescent Health 2000;27:49–56. [PubMed: 10867352]

Milne S, Orbell S, Sheeran P. Combining motivational and volitional interventions to promote exercise participation: Protection motivation theory and implementation intentions. British Journal of Health Psychology 2002;7:163–184. [PubMed: 14596707]

Mitra AK, Faruque FS, Avis AL. Breast cancer and environmental risks: Where is the link? Journal of Environmental Health 2004;66:24–32. [PubMed: 15032110]

Rothman AJ, Salovey P, Turvey C, Fishkin SA. Attributions of responsibility and persuasion: Increasing mammography utilization among women over 40 with an internally oriented message. Health Psychology 1993;12:39–47. [PubMed: 8462498]

Schwarzer, R.; Fuchs, R. Changing risk behaviors and adopting health behaviors: The role of self-efficacy beliefs. In: Bandura, A., editor. Self-efficacy in changing societies. Cambridge: Cambridge University Press; 1995. p. 259-288.

Silk KJ, Bigsby E, Volkman J, Kingsley C, Atkin C, Ferrara M, Goins L. Formative research on adolescent and adult perceptions of risk factors for breast cancer. Social Science & Medicine 2006;63:3124–3136. [PubMed: 16978750]

Thompson HJ, Westerlind KC, Snedden J, Singh M. Exercise intensity dependent inhibition of 1-methyl-1-nitrosourea induced mammary carcinogenesis in female F-334 rats. Carcinogenesis 1995;16:1783–1786. [PubMed: 7634404]

Volkman J, Silk KJ. Adolescent females and their mothers: Examining perceptions of the environment and breast cancer. Journal of Health Psychology. (in press).

Youniss, J.; Smollar, J. Adolescent relations with mothers, fathers, and friends. Chicago: University of Chicago Press; 1985.

Webb TL, Sheeran P. Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. Psychological Bulletin 2006;132:249–268. [PubMed: 16536643]

Williams-Piehota P, Cox A, Silvera SN, Mowad L, Garcia S, Katulak N, Salovey P. Journal of Nutrition Education Behavior 2004;36:114–120.

Wingspread Statement on the Precautionary Principle. 1998. Retrieved on October 29, 2007 from the Science & Environmental Health Network at http://www.sehn.org/wing.html

Ziff MA, Conrad P, Lachman ME. The relative effects of perceived personal control and responsibility on health and health-related behaviors in young and middle-aged adults. Health Education Quarterly 1995;22:127–142. [PubMed: 7721598]

Table 1

Intention to Teach How to Maintain a Healthy Diet

	B	SE	β	t	sr
First Block					
Intercept	4.66	0.47		9.87***	
Age	−0.02	0.02	−.20	−0.99	−.11
Daughter's age	0.02	0.02	.15	0.76	.09
Education	−0.13	0.07	−.26	−1.86	−.21
Income	0.10	0.06	.25	1.71	.20
FHBC	0.14	0.14	.12	0.98	.11
$F_{(5, 71)} = 1.18, p = .33, adj. R^2 = .01$					
Second Block					
SE	0.48	0.13	.40	3.58**	.34
RE	0.36	0.10	.41	3.67***	.35
PR	−0.12	0.08	−.18	−1.52	−.14
$F_{change} (3, 68) = 11.40, p < .001, R^2_{change} = .31$					

*
$p < .05,$

**
$p < .01,$

***
$p < .001$

sr: semipartial correlation

FHBC: Family History of Breast Cancer

SE: Self-efficacy

RE: Response Efficacy

PR: Personal Responsibility

Table 2

Intention to Teach How to Exercise

	B	SE	β	t	sr
First Block					
Intercept	4.87	0.54		8.95***	
Age	−0.01	0.02	−.16	−0.78	−.09
Daughter's age	0.00	0.02	−.01	−0.07	−.01
Education	−0.16	0.08	−.27	−1.97	−.22
Income	0.13	0.07	.28	1.94	.22
FHBC	0.07	0.17	.05	0.44	.05
$F (5, 71) = 1.44, p = .22, adj. R^2 = .03$					
Second Block					
SE	0.36	0.16	.26	2.26*	.22
RE	0.46	0.11	.46	4.02***	.39
PR	−0.07	0.10	−.10	−0.78	−.08
$F_{change} (3, 68) = 9.72, p < .001, R^2_{change} = .27$					

*
$p < .05,$

**
$p < .01,$

***
$p < .001$

sr: semipartial correlation

FHBC: Family History of Breast Cancer

SE: Self-efficacy

RE: Response Efficacy

PR: Personal Responsibility

Table 3

Intention to Teach How to Avoid Chemical Exposures

	B	SE	β	t	sr
First Block					
Intercept	3.72	0.53		7.03***	
Age	0.02	0.01	.30	1.66	.21
Daughter's age	−0.03	0.02	.31	−1.70	−.22
Education	−0.03	0.07	−.01	−0.04	−.01
Income	0.00	0.05	−.01	−0.06	−.01
FHBC	0.12	0.14	.11	0.84	.11
$F(5, 57) = 0.88, p = .50, adj. R^2 = .01$					
Second Block					
SE	0.70	0.12	.61	6.10***	.57
RE	0.16	0.08	.23	2.05*	.19
PR	−0.03	0.07	−.06	−0.51	−.05
$F_{change}(3, 54) = 17.71, p < .001, R^2_{change} = .46$					

*
$p < .05$,

**
$p < .01$,

***
$p < .001$

sr: semipartial correlation

FHBC: Family History of Breast Cancer

SE: Self-efficacy

RE: Response Efficacy

PR: Personal Responsibility