Effects of a psychosocial intervention on breast self-examination attitudes and behaviors

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Abstract

An educational intervention to promote breast self-examinations (BSEs) among young women was tested. In a group (intervention versus control) × time (Session 1 versus Session 2) mixed design, 172 college females were randomly assigned to either an intervention or control condition. Both groups attended two sessions; the second session was 48 hours after the first. The intervention consisted of an essay, lecture, video portraying young survivors of breast cancer, group discussions, self-test and instructions on performing BSEs. The control group had the same format; however, the information was focused on nutrition and exercise. Participants in the intervention group scored higher on rational problem solving and behavioral intentions, suggesting that the intervention increased adaptive responses to breast cancer threat. Conversely, control participants scored significantly higher on maladaptive reactions (e.g. hopelessness, avoidance and fatalistic religiosity) to breast cancer threat. For intervention participants, the initial decline in maladaptive reactions remained stable at 3-month follow-up, but adaptive reactions decreased. Intervention participants had greater confidence in performing BSEs compared with controls but performed them on an irregular basis. Results were interpreted in terms of protection motivation theory, a model that applies the social psychology of persuasion to preventive health.

Introduction

Breast cancer is the most commonly diagnosed cancer and the second leading cause of death for women [1]. Although breast cancer usually develops after age 45, its age of onset is decreasing, and more young women than ever are affected [2]. Younger women have a lower survival rate than older women due to cancers being at advanced stages at diagnosis [1, 3].

Until 2003, the American Cancer Society recommended that women perform monthly breast self-examinations (BSEs) to become familiar with both the appearance and feel of their breasts so that any change that occurs is noticeable. The group altered its recommendation in response to a recent study [4], which involved educating 266,000 women in Shanghai, China, about the importance of BSEs and its appropriate practice. Researchers were unable to find that BSE played a significant role in decreasing breast cancer mortality rates. A similar number of cancers were detected in both the control and instruction groups and survival time from diagnosis and staging of disease were similar. Conversely, a meta-analysis [5] found BSEs to be effective in detecting the early symptoms of breast cancer. Currently, the American Cancer Society recommends that women should be informed of the benefits and limitations of BSE and use BSE only if
they have no symptoms of breast cancer or are not at a significantly higher risk for the disease. These guidelines may not apply equally to women of all ages. Indeed, BSEs are especially important for younger women. Although mammograms are generally recommended detection tools for older women, differences in breast tissue density make mammograms virtually ineffective for younger women [3]. The Young Survival Coalition [6] points out that BSE is the only method of early detection of breast cancer for young women. In a study assessing how current members of the Young Survival Coalition discovered their breast cancer, 83% reported having found the lump themselves [3]. Forty-three percent reported that they found the lump through BSE, whereas an additional 40% indicated that they found the cancer through simple touching/feeling of their breast. Thus, the Young Survival Coalition [6] advocates BSE as the primary method for early detection of breast cancer for young women.

BSEs are still not practiced regularly by the majority of American women [7]. Health education interventions to promote BSE generally focus on increasing breast cancer knowledge and/or immediate behavior [8, 9]. Although some researchers [10] have found that BSE education can increase BSE performance for older women, few studies have focused on younger women. Varied outcomes have resulted from presenting persuasive health messages to individuals. In some studies [11, 12], perceived threat positively predicted performing preventive measures, whereas in others threatening information increased anxiety and led to avoidance [13, 14]. These results indicate that threatening information must be presented carefully to promote desired behavior.

**Protection motivation theory**

Protection motivation theory (PMT) [15–17] explains the cognitive processes that occur when people receive health information. As may be seen in Fig. 1, such information (e.g. a pamphlet about breast cancer and BSE) initiates two types of appraisals that determine the extent to which the individual will respond adaptively or maladaptively to the health information.

The threat appraisal evaluates the maladaptive response (e.g. not performing BSEs). Perceived severity of the threat and vulnerability to the threat decrease the likelihood of a maladaptive response occurring. Any perceived rewards of not performing BSEs reduce threat appraisal.

The coping appraisal process evaluates one’s ability to address the threatened danger. The belief that the recommended adaptive response (e.g. performing BSEs) is effective (response efficacy) and that one can successfully perform the response (self-efficacy) increases the probability of performing the recommended response. Coping appraisal is the summation of response efficacy and self-efficacy, minus any response costs. Response costs refer to the social, physical and monetary expenses of performing the recommended response.

PMT variables have been shown to be effective in several health domains in a meta-analysis of 65 studies involving ~30,000 participants [18]. An independent meta-analysis [19] corroborated these conclusions. Subsequent studies [20–22] indicated that threat information motivates individuals to act and that coping information plays a vital role in channeling their reactions in more adaptive directions.

**Need for study**

The current study arose from the scarcity of BSE promotion interventions that target young women.
and from the desire to apply a health promotion theory that has been used successfully in other domains. We evaluated the effects of a PMT-based intervention on BSE-related attitudes and behavior in college females and predicted that participants in the PMT intervention would have higher adaptive responses (e.g. intentions to perform BSEs and rational problem solving) than would those who did not receive the intervention.

Maladaptive coping modes focus primarily on the emotions created by the threatening information rather than on directly resolving the problem. We predicted that individuals exposed to the PMT intervention (compared with control group participants) would have lower levels of hopelessness, avoidance, and fatalistic religiosity because they were given information on how to effectively deal with breast cancer threat.

Following the intervention, interest in obtaining additional information was recorded. In addition, BSE frequency was noted at a 3-month follow-up assessment. We predicted that BSE frequency would be higher in individuals who were in the intervention group.

Methods

Design

A group (intervention versus control) × time (Session 1 versus Session 2) mixed factorial design was used. The dependent variables consisted of two adaptive coping modes (intentions to perform BSE and rational problem solving) and three maladaptive coping modes (fatalistic religiosity, avoidance and hopelessness). An interest measure was collected following Session 2 and follow-up measures were given after 3 months. Procedures and materials used in this study were similar to those used by prior researchers [21–23].

Participants

Participants were 197 females from three southeastern US universities who participated to satisfy a course requirement or to earn extra credit. One hundred and seventy-two participants (98 in the intervention group and 74 in control group) completed the initial two sessions and were used for data analyses. Although the majority of participants was Caucasian (n = 150), African American (n = 20), Hispanic (n = 1) and Indian individuals (n = 1) were also represented in the study. Twenty-five participants did not complete both sessions. Reasons given for the attrition were unexpected schedule conflicts, forgetting about the session and forgoing the session because one had sufficient course credit. No significant differences were found among the three universities on any outcome measure used in the study; therefore, data were collapsed across groups.

Intervention

Participants were randomized into either the intervention group or the control group at the beginning of the study. Groups at all university sites were led by the same person to assure consistency in the presentation of materials.

Session 1 (90 min)

The study was presented as an effort to develop an educational program to provide college-aged women with current information about breast cancer. After the consent was obtained, a coping modes questionnaire that contained manipulation checks for the PMT variables and assessments of adaptive and maladaptive coping was administered. Participants then read a PMT-based essay (available from the authors) that focused on breast cancer. Similar to that used in a previous work by Prentice-Dunn and colleagues [21–22], the 12-page essay included information about breast cancer severity and risk in college-aged women and accompanying photos of cancerous breasts. It also contained vivid descriptions of chemotherapy side effects and a radical mastectomy.

The essay also included response efficacy information on the importance of early detection, the effectiveness of performing BSEs and the high cure rate associated with early detection. Self-efficacy was stressed by pointing out that women are able to perform effective monthly BSEs and that they can detect changes in their own breasts.
To ensure sustained attention, participants listed the most important sentence in each paragraph. After reading the essay, participants were divided into groups of three to four to discuss the themes of the essay. Once the group sessions were completed, all groups shared their ideas.

A 30-min segment of the video ‘Fighting for Our Future’ [24] was then shown. The video focused on three young breast cancer survivors and reiterated the importance of early detection, the severity of breast cancer in young women, the emotional aspects of dealing with breast cancer and the lack of appropriate screening measures for young women. Groups of three to four identified the main themes of the video and then all groups shared their ideas. At the end of the session, the experimenter reviewed the major themes of the session.

Session 2 (90 min)

Participants returned for the second session 2 days after the first session. After a review of the first session, participants watched an American Cancer Society video that provided BSE instructions and reiterated that it is easy to learn. A BSE knowledge test (http://www.komen.org/intradoc-cgi/idc_cgi_isapi.dll?IdcService=SS_GET_PAGE&nodeId=480) was followed by a review of intervention themes. Participants again completed the coping modes questionnaire and provided an e-mail address where the researcher could send the follow-up measures.

All participants received American Cancer Society shower cards and pamphlets providing an example of the correct method for performing a BSE. Interest was measured by distributing postcards at the end of the Session 2 with an e-mail address individuals could contact for additional information regarding breast cancer.

Follow-up

After 3 months, participants received an e-mail with detailed instructions on how to access the coping modes questionnaire, which was posted on a secure Internet site. Self-report of BSE performance was also assessed. Follow-up respondents received 10 dollars.

Control group

Individuals in the control group attended two 90-min sessions that provided information on general health and exercise, but no information on breast cancer. The procedures mirrored those used in the intervention condition (i.e. lectures, essay, video, discussion and knowledge test).

Coping modes questionnaire

Manipulation checks

To determine the impact of the PMT variables, four to five items were summed for each variable. Each item was rated on a 14-point Likert scale. Examples include the following. (a) Severity: ‘In spite of advances in modern medicine, breast cancer is as serious and dangerous a disease as it was several years ago.’ (b) Vulnerability: ‘There is a good probability that a cancerous lump may now be developing in my breast.’ (c) Response efficacy: ‘If I examine my breasts regularly, my chances of detecting breast cancer early are extremely high.’ (d) Self-efficacy: ‘I believe I can effectively examine my breasts for abnormalities.’ (e) Response costs: ‘It takes a lot of time to perform breast self-examinations.’

Coping modes

These items assessed how participants responded to information about the threat of breast cancer. The coping modes were developed by McRae [25] and were used successfully in other studies [21–23]. Each coping mode was a sum of three to seven items, with each item rated on a 14-point Likert format.

Rippetoe and Rogers [23] pointed out that all coping modes are protective in the sense of reducing stress produced by the breast cancer threat. Adaptive modes directly address the threat of developing breast cancer through rational problem solving (e.g. ‘I will feel better about the threat of breast cancer if I read and hear more about BSE of the breasts’) and behavioral intentions (e.g. ‘Within 2 weeks, I intend to adopt monthly breast self-examinations as a regular habit’).
The maladaptive coping modes focus primarily on the emotional response to the threatening information rather than directing attention to resolving the problem. These approaches include avoidance (e.g. ‘I try not to think about the possibility of developing breast cancer’), hopelessness (‘In this day and age, it sometimes seems a hopeless task to stay healthy’) and fatalistic religiosity (e.g. ‘When it comes to the possibility of developing breast cancer, I think it is best to pray and put the problems in God’s hands’). Fry and Prentice-Dunn [21] reported that religiosity used in this manner is maladaptive because individuals who rely exclusively on God to solve the problem do not explore additional ways to deal with the threat. However, this is but one way that religion may be used in confronting a potential threat [26]. Additional filler items related to nutrition, exercise and skin cancer were also included in the questionnaire.

**Results**

**Psychometric properties**

Coefficient $\alpha$ were computed for the primary PMT processes manipulated in the essay: coping appraisal and threat appraisal. Coping appraisal ($\alpha = 0.72$) comprised of response efficacy-plus-self-efficacy ($a$) minus response costs ($b$). Threat appraisal ($\alpha = 0.59$) was the sum of severity and vulnerability items. Although this low value may be due to the small number of items in the scale, it is more likely to originate in the multifaceted nature of threat. The $\alpha$ obtained here are consistent with those of prior successful PMT studies [21–22].

The $\alpha$s for the adaptive and maladaptive coping modes were as follows: rational problem solving = 0.88, behavioral intentions = 0.89, hopelessness = 0.69, avoidance = 0.70 and religiosity = 0.90.

**Manipulation checks**

A 2 (intervention versus control) $\times$ 2 (Session 1 versus Session 2) mixed analysis of variance (ANOVA) was performed on the threat appraisal sum and on the coping appraisal sum. For threat appraisal, significant main effects for group ($P = 0.001$) and time ($P = 0.001$) were qualified by a significant group $\times$ time interaction; $F (1,170) = 60.58, P = 0.001, \eta^2 = 0.26$. The same main effects were found for coping appraisal (both $P = 0.001$), as was the significant interaction; $F (1,165) = 72.86, P = 0.001, \eta^2 = 0.31$. Follow-up $t$-tests (see Table I) indicated that participants began the study with similar levels of appraisal, but the participants in the intervention group scored significantly higher at Session 2 than did those in the control group. These findings suggest that the PMT variables were manipulated successfully in the intervention.

**Dependent measures**

To assess the effects of group and time on reactions to breast cancer information, a 2 $\times$ 2 mixed ANOVA was calculated on each of the two adaptive (behavioral intentions and rational problem solving) and three maladaptive (avoidance, religiosity, and hopelessness) coping modes. Although significant group main effects were found on all five coping modes, these effects were qualified by significant group $\times$ time interactions. All $P < 0.001$ and $\eta^2$ ranged from 0.10 for religiosity to 0.34 for behavioral intentions. Follow-up $t$-tests revealed that the interactions were produced during Session 2 (see Table II). During Session 2, individuals in the intervention group scored significantly higher on the adaptive coping modes. Additionally, individuals in the control group scored significantly higher during Session 2 on the maladaptive coping modes than did intervention participants.

**Table I. Follow-up t-tests for group $\times$ time interactions on threat appraisal and coping appraisal**

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No analyses were performed on the interest measures as no participants in either group requested additional information.

3-Month follow-up

Follow-up assessments were completed by 66 participants (37 in intervention and 29 in control). Initial analyses of the 3-month data revealed that individuals in the intervention group scored significantly higher than the control group on threat appraisal; $F(1,65) = 11.62, P < 0.05; M = 62.9$ (SD = 9.9) and $M = 54.9$ (SD = 9.1), respectively. No significant differences were found between the groups for coping appraisal; $F(1,65) = 2.78, P > 0.05$.

PMT variables

To assess the durability of the intervention, paired sample $t$-tests compared Session 2 and the 3-month follow-up. The analyses focused only on the intervention group, as the primary goal of the study was to assess the impact of a breast cancer intervention on attitudes and behaviors. Individuals scored significantly higher on threat appraisal during Session 2 compared with the 3-month follow-up ($M = 68.5$ and 62.9, SD = 8.0 and 9.9, respectively; $P = 0.01$). The same pattern was found for coping appraisal ($M = 69.0$ and 54.1, SD = 18.1 and 21.4, respectively; $P = 0.002$).

Pair t-tests were also calculated on the intervention group to determine if there were differences on appraisals between Session 1 and the 3-month follow-up. Individuals scored higher on threat appraisal at the 3-month follow-up than they did at the outset of the study ($M = 62.9$ and 56.2, SD = 9.9 and 8.1, respectively; $P = 0.003$). The same pattern was found for coping appraisal ($M = 69.0$ and 54.1, SD = 18.1 and 21.4, respectively; $P = 0.002$), suggesting that the intervention had an overall beneficial effect.

Coping modes

Paired sample $t$-tests revealed that the adaptive coping modes decreased over the 3-month period. Individuals in the intervention group scored significantly higher on threat appraisal during Session 2 as compared with the 3-month follow-up ($M = 73.4$ and 59.3, SD = 11.6 and 16.1, respectively; $P = 0.001$). The same pattern was found for rational problem solving ($M = 62.7$ and 56.1, SD = 7.8 and 9.7, respectively; $P = 0.001$). No significant differences were found between Session 2 and the 3-month follow-up on the maladaptive coping modes ($P = 0.22–0.53$). This indicates that the lower use of maladaptive coping modes created by the intervention was maintained at 3 months.

Additional paired sample $t$-tests were conducted to compare Session 1 with the 3-month follow-up. No significant differences for either the adaptive or maladaptive coping modes were found ($P = 0.07–0.89$). These results suggest that the patterns of coping mode use created by the intervention had returned to levels present at the beginning of the study.

BSE frequency

Self-reported BSE behaviors were analyzed with chi-squares on four items that each used a yes–no

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format: (a) ‘Monthly BSEs have become part of my regular routine in the last 3 months,’ (b) ‘I have performed BSEs consistently each week over the last 3 months,’ (c) ‘My confidence in doing BSEs correctly has increased over the last 3 months,’ (d) ‘Although I have done some BSEs over the last 3 months, I have not done them regularly.’ Compared with the control participants, intervention participants reported higher levels of confidence in performing BSEs ($P = 0.006$). In addition, there was a trend toward intervention participants performing more BSEs, at least on an irregular basis ($P = 0.08$). However, there were no significant differences between the groups on items that assessed incorporation of BSEs into a regular routine ($P = 0.94$) and consistent performance of BSEs ($P = 0.81$).

Further analyses revealed that confidence ratings were significantly correlated with making BSE a part of a regular routine ($r = 0.57, P = 0.001$) and with performing BSEs on an irregular basis ($r = 0.38, P = 0.02$), suggesting that confidence levels play an integral role in actual BSE behavior.

**Ratings of intervention components**

To gauge the impact of various aspects of the intervention, participants rated the components on a seven-point scale (1 = ‘no impact’ and 7 = ‘extremely strong impact’). The video ‘Fighting for Our Future’ was rated highest ($M = 6.7, SD = 0.8$). The breast cancer essay, photos in the essay and the American Cancer Society BSE video were ranked next ($M = 5.8, SD = 1.1$). Components that were not rated highly included the experimenter’s lecture ($M = 5.1, SD = 1.1$) and group discussions ($M = 4.7, SD = 1.3$). However, even the lowest rated elements were rated ‘somewhat strong’. Multiple regression analyses indicated that individual component ratings accounted for 20% of the variance in behavioral intentions.

**Discussion**

The current study suggests that a multifaceted educational intervention on breast cancer can initiate adaptive coping reactions and decrease maladaptive reactions over a short-term period. Participating in the intervention group significantly reduced the use of avoidance, hopelessness and fatalistic religiosity in response to information about breast cancer. It also led to higher behavioral intentions and more rational problem solving compared with the control condition. These results add to an increasing body of research [20–23], indicating that health promotion efforts are facilitated by convincing individuals that they are vulnerable to a health threat and that recommended actions are effective and easily enacted. However, the effectiveness of the intervention was short-lived, as evidenced by a decline in the use of adaptive coping modes 3 months later and inconsistent effects on BSE behaviors.

The intervention proved effective because information was conveyed through several means. In a previous study [21], only an essay was used to provide information focused on breast cancer threat. While the essay decreased maladaptive reactions, an expected increase in adaptive responses was not found. Because recent research has indicated that individuals process health information differently [27], we presented information in several formats. Our intervention not only contained an essay but also a testimonial video and group discussions that may have led to deeper processing of the information. Individuals therefore had several opportunities to learn about BSE and have ambiguities about the technique removed. Indeed, the impact ratings indicate that all components played a substantive role in altering attitudes.

Conclusions about the intervention’s long-term effectiveness must be taken with caution because of the low participation rate. Individuals in the intervention group had significantly higher levels of threat appraisal and coping appraisal at the 3-month follow-up as compared with levels before the intervention was introduced. Although this result suggests that the intervention had some lasting impact, that effect was beginning to wane, as evidenced by the declines in threat and coping appraisals that occurred between Session 2 and the follow-up. Although adaptive coping reactions (e.g., behavioral intentions, rational problem solving) decreased significantly between Session 2 and the
3-month follow-up, maladaptive coping mode use did not increase from its relatively low level observed at Session 2.

Although no individuals in either group requested additional information following Session 2, this is likely because they were given an extensive array of facts, recommendations and resources for future reference. As a result, they probably left the study feeling that they received sufficient information.

After 3 months, intervention participants reported higher confidence in performing BSEs and a trend toward at least irregular BSEs compared with control participants. However, both groups reported similar incorporation of BSEs into their routine and similar consistency of BSE performance. Although these effects suggest a low impact of the intervention, it is also possible that our dichotomous measure was not sufficiently sensitive and that frequency counts would have provided a clearer picture of the intervention’s impact. Additionally, it is possible that media coverage of breast cancer affected the current results. Assessing individual exposure to media coverage in future studies would answer questions about its impact.

It is also unclear why higher levels of confidence (i.e. self-efficacy) in performing BSEs were correlated with BSE performance and yet did not produce higher performance when manipulated in the intervention. The nature of this relation might be understood by future assessments of participants’ perceptions of limitations and costs to performing BSEs as well as their questions about performing BSEs.

Taken together, our results suggest that the intervention produced the intended changes in threat appraisal and coping appraisal, which then remained operative even after 3 months, albeit to a reduced degree. While adaptive coping modes increased as a result of the intervention, their use declined to pre-study levels at follow-up. On the other hand, use of maladaptive coping modes declined as a result of the intervention and did not increase after 3 months. Thus, it is possible that PMT interventions first alter appraisal processes and then affect the use of maladaptive coping modes followed by use of adaptive coping modes. Although threat appraisal and coping appraisal were still operating after 3 months, they were only strong enough to affect maladaptive coping modes. Threat appraisal and coping appraisal were not present in sufficient strength after 3 months to alter rational problem solving and behavioral intentions—the antecedents of behavior.

Several participants suggested that hearing a survivor talk in person about her experience would have an even stronger effect than watching the video, which was the strongest rated component in the intervention. Booster information between Session 2 and the 3-month follow-up period might also improve the effectiveness of the intervention. Phone calls, e-mails or mailings would refresh the risk information and reiterate the importance of performing regular BSEs and increase the rate of participation in the follow-up assessment. Another idea would be an Internet site for participants to access breast cancer information and to e-mail the experimenter as questions arose.

**Limitations**

The magnitude of the observed group differences may have been affected by all participants receiving the same dependent measures questionnaire containing several items about breast cancer. Some individuals in the control group may have ruminated about breast cancer as a result of reading the items. The control group did not receive any coping information about breast cancer, which might have contributed to the higher levels of maladaptive coping reactions and lower levels of adaptive coping reactions that were reported.

Additional measures may have given us a more complete picture of how participants reacted to our intervention. More demographic information would have allowed us to better understand differences between those who did and did not participate in the 3-month follow-up.

Measuring the perceived rewards of not performing an adaptive behavior such as BSE might suggest content for more effective health interventions. Additional variables such as body image and need for cognition [28–29] affect the processing of health information and might be used to develop more
personalized health messages that will be more effective than general, one-size-fits-all approaches.

The current results offer initial encouragement for a theory-based breast cancer intervention for college-aged women. Given the inundation of messages in the mass media, health educators may have better opportunities to effect change in more limited settings, such as schools, churches and community centers. Interventions based on models such as PMT are relatively low in cost, low in time commitment and replicable. As such, they offer a promising avenue for changing public health.

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References


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