Online Exclusive Article

Effects of Tailored Message Education About Breast Cancer Risk Appraisal for Obese Korean Women

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Purpose/Objectives: To examine the effects of tailored message education about breast cancer risk in obese Korean women.

Design: Pretest/post-test with two comparison treatments.

Setting: Rural community settings in South Korea.

Sample: Non-random sample of 64 obese women.

Methods: Based on the Health Belief Model, tailored message education involved a one-session individual approach addressing cognitive, emotional, and behavioral domains. The comparison group received a one-time standard education group session. Data on breast cancer risk factors and mammography findings were recorded.

Main Research Variables: Knowledge, awareness, emotional barriers, self-efficacy, and intent to screen and prevent breast cancer.

Findings: Compared to standard education, tailored message education showed significantly higher score changes on awareness of personal risk ($F = 5.21$, $p < 0.05$), self-efficacy for breast self-examination (BSE) ($F = 5.16$, $p < 0.001$), intent to perform BSE ($F = 6.24$, $p < 0.05$), intent to have mammography ($F = 5.45$, $p < 0.05$), and intent to prevent breast cancer with eating habits ($F = 7.28$, $p < 0.05$) and exercising ($F = 12.51$, $p < 0.001$).

Conclusions: Individually tailored education effectively enhanced awareness of personal risk for breast cancer, self-efficacy for BSE, and intent to screen and prevent breast cancer.

Implications for Nursing: Tailored message education targeting breast cancer and risk associated with obesity is useful in breast cancer screening education. Future studies should incorporate individualized messages on nutrition, exercise, and cultural barriers to reduce breast cancer risk in obese women.

Knowledge Translation: Individual educational strategies can effectively enhance breast cancer prevention and early screening. Public and preventive education should include a focus on cultural, cognitive, and emotional domains. For obese women, a heightened awareness and self-efficacy may influence screening behaviors.

The prevalence of breast cancer among Korean women since 2001 has alarmed health professionals and prompted Korean national health organizations to provide active breast cancer prevention education and screening services. Unlike the decrease in breast cancer rates in the United States (American Cancer Society [ACS], 2011), incidence rates in Korea increased an average of 6% per year from 1999–2009, a rise from 24.5 per 100,000 people in 1999 to 43.8 per 100,000 people in 2009, based on data from the Korean Ministry of Health and Welfare (National Cancer Information Center [NCIC], 2012b).

The growth in breast cancer incidence rates has been attributed to several factors, including a more Westernized food pattern, lower birth rate, longer estrogen exposure, and an increasing proportion of women with high body mass indices (BMIs) (Paik, 2009). The obesity rate in Korean women has increased from 25% to 27% since 2000. About 64% of women are considered overweight or obese; in particular, women aged 60–69 years had the highest prevalence of obesity at 56% in 2009 (Ministry for Health, Welfare, and Family Affairs, & Korea Centers for Disease Control and Prevention [MHWFA & KCDCP], 2010), based on Korean Society for the Study of Obesity BMI definitions (Ou et al., 2002) of overweight as 23–24.9, mild obesity as 25–29.9, and severe obesity as 30 or higher. The change in obesity rates is attributed to a prevailing Westernized diet and fast food consumption, excessive intake of carbohydrates in the staple Korean diet, and a more sedentary work and living style (MHWFA & KCDCP, 2010).

Increased BMI and obesity rates are significantly associated with the risk of developing breast cancer in Korean studies (Jee et al., 2008; Song, Sung, & Ha, 2008). Obese people may suffer from restricted mobility that limits access to screening sites, or they may be less willing to undergo testing (Amy, Aalborg, Lyons, & Keranen, 2006). Consistent with findings in Western studies (Ferrante, Chen, Crabtree, & Wartenberg, 2007; Wee, McCarthy, Davis, & Phillips, 2000), one Korean study showed that, compared with normal-weight women, overweight and mildly obese women were less likely to have undergone mammography (odds ratio [OR] = 1.28, 95% confidence interval [CI] [1.09, 1.51] and OR = 1.21,

95% CI [1.05,1.41], respectively) (Kim, Koh, Hur, Park, & Park, 2009). That lower mammography rate could result in overweight and mildly obese women having a delay in cancer detection and an increase in breast cancer mortality. In addition, overall breast cancer screening rates in Korea are low, at 63% for mammography, 55% for clinical breast examination (CBE), and 58% for breast self-examination (BSE), with only 32% of women following all three recommended breast cancer screening strategies for their age group (Lee, Kim, & Kim, 2010). Although ACS (2011) guidelines identify BSE as optional, it continues to be recommended in Korea, in part because the country's rural populations have much lower access to clinics than urban-living individuals, and 70% of patients with breast cancer in Korea have reported finding breast abnormalities by themselves, rather than at clinic visits (NCIC, 2012a). Considering the growing obese population in Korea, healthcare providers need to understand breast cancer screening behaviors and related characteristics of women with obesity.

The Health Belief Model (HBM) has been a key theoretical framework in the breast cancer screening literature (Yarbrough & Braden, 2001). According to the HBM, levels of perceived susceptibility and severity of breast cancer provide the stimulus to act, and the perceived benefits and barriers provide a preferred path to action (Janz & Becker, 1984). If women understand their own breast cancer risk and the benefits of screening, they might participate more in screening and adopt appropriate prevention behaviors. Knowledge about breast cancer, its detection, and perceived efficacy have been associated with specific early-detection efforts (Champion & Miller, 1996). Interventions tailored to unique individual characteristics have shown promise for increasing breast cancer screening (Rimer et al., 2001). Unlike traditional interventions, tailored interventions are intended for and unique to a particular person, rather than a group, and are based on an individual-level assessment, as well as factors potentially related to that person's health or behavior outcomes (Kreuter, Farrell, Olevitch, & Brennan, 1999; Kreuter & Skinner, 2000). Studies have found that tailoring breast health interventions to a woman's individual beliefs (Champion & Huster, 1995) and stage of mammography adoption (Skinner, Strecher, & Hospers, 1994) significantly increased the probability of her having mammography done and adhering to screening recommendations in the future (Champion et al., 2003). A meta-analysis of tailored interventions to promote mammography screening found that those using the HBM coupled with a physician recommendation produced the strongest effects (Sohl & Moyer, 2007).

Despite the benefits of tailored education, no interventions catering to individual risk factors for breast cancer in obese women have been tried in Korea. Obese women may perceive particular risks, judgments, or experiences about breast health issues, and understanding these perspectives about breast cancer risks can be particularly important for decision making about screening (Denberg, Wong, & Beattie, 2005). In addition, because the effectiveness of breast cancer education depends on which messages are actively processed and considered to be personally applicable (Kreuter & Wray, 2003), nursing interventions that target obese women need to be individualized beyond just general breast health education.

The authors aimed to test the effects of tailored message education about breast cancer risk appraisal in obese Korean women residing in rural areas. They hypothesized that, compared to an age- and BMI-matched comparison group receiving standard education, an experimental group receiving tailored message education would have greater improvement (i.e., from pre- to post-test) in (a) knowledge about breast cancer and BSE, (b) awareness of personal risk of breast cancer, (c) self-efficacy for BSE, (d) intent to follow health behavior recommendations for breast cancer screening (e.g., BSE, CBE, mammography) and breast cancer prevention (e.g., eating habits, exercising), and (e) emotional barriers to breast cancer screening.

Methods

Design and Sampling

This study used a pretest/post-test design with a comparison group. Participants were recruited from the Korean Genomic Regional Cohort registry using a nested cohort sampling method. The cohort included women from small rural towns located in the southeastern peninsula of Korea. Details of the sample registry have been described in a previous article (Lee, Kim, Kim, Kim, et al., 2010). The institutional review board of the Wonju College of Medicine at Yonsei University in the Republic of Korea approved the study.

Based on data in the registry, women were selected for the current study if they had a BMI of 30 kg/m^2 or greater, were older than 40 years, and had no history of breast cancer or mastectomy. Women who had received mammography within the past year of the initial recruitment phone contact were excluded to avoid unnecessary radiation exposure and remain consistent with national guidelines in Korea for mammography every one to two years in women aged 40 years and older (NCIC, 2012a). A total of 204 women in the registry met the eligibility criteria and formed a primary contact list for the study.

The research team involved one trained recruiter, two research assistants, and two study interventionists. A trained recruiter, who remained blind to treatment group assignment and was only responsible for recruitment, contacted eligible women by telephone and told them about the study to determine interest in participating. Women were listed in random order for

these contacts, with the first woman who agreed to participate assigned by the investigator to the experimental group and then matched to another woman on the list by age (± 5 years) and BMI (± 2 kg/m^2), variables known to influence screening behaviors (Malotte et al., 2000; Mitchell, Padwal, Chunk, & Klarenbach, 2008). The matched woman then was called and, if she agreed, she was assigned to the comparison group. Contacts continued to be made and treatment groups assigned in this manner until 64 women were recruited. The sample size was planned a priori based on power calculations using Cohen's formula with power 0.8, medium effect size of 0.25, and alpha of 0.05 (Cohen, 1988). During initial recruitment contacts, 11 women could not be reached, 9 were not interested in participating, and 19 indicated they did not have enough time to participate.

Verbal consent to participate was obtained from each woman during the initial recruitment phone contact, after which the mammography and pretest were scheduled. Women received a reminder phone call one day before the scheduled appointment. At the beginning of the scheduled appointment, one of two research assistants provided participants with full information about the study purpose, procedures, and risks, as well as the voluntary nature of their participation and their right to withdraw at any time. After the women gave signed informed consent to participate, mammography was conducted to facilitate appropriate tailoring of the intervention for the experimental group and to ensure women in the comparison group also were provided with the recommended screening. Women were not charged for these mammograms. No women declined participation during this consent process.

Data Collection Procedures

Two research assistants were trained by the investigators on the data collection protocols. They were not informed of the intervention protocols or if a particular participant assigned to them for data collection was in the experimental or comparison group. To minimize awareness of intervention protocol differences, one research assistant conducted the pre- and post-tests for the tailored message education group while the other did the two tests for the standard education group. The research assistants were trained separately from each other and from the study interventionists and were asked to conduct the pre- and post-tests of their assigned participants at different time points and places.

The research assistants used interview questionnaires to administer the pre- and post-tests to participants. The pretest data collection was carried out in the waiting room of the clinic where participants were waiting to undergo mammography. The delivery of the intervention and subsequent post-test data collection occurred about three weeks later to allow a discrete time between pre- and post-test measurement and sufficient time to obtain the mammogram results. The comparison group design in this study helped to avoid testing threats (e.g., memory, sensitization) to internal validity, because the experience of testing from pre- to post-test would be similar in both groups (Polit & Beck, 2012). The research assistants conducted the post-tests immediately after the intervention ended.

Two study interventionists were trained by the investigators on the respective intervention protocols. Both study interventionists were nurses and had expertise in education and research on female cancer prevention behaviors. The experimental intervention involved tailored message education in one individual session while the comparison intervention involved standard education in one group session. One study interventionist provided all of the tailored message education sessions; another study interventionist provided all of the standard education sessions. To minimize possible bias in the collection of outcome data, they were not involved in pre- or post-test data collection.

Measurements

Breast cancer risk factors: A body composition analyzer (JEUS®, version 9.9) was used to measure height and weight and to calculate BMI in all participants before the intervention sessions. Waist and hip circumferences were measured twice by tape measure by research assistants, who then calculated the mean score of the two measures.

Age, family history of first- and second-degree relatives with breast cancer, age at first delivery, breastfeeding history, BMI, menopause history, and breast biopsy history were used for an Estimation of Individualized Probabilities of Developing Breast Cancer for Korean Women (EIPDBC-K) relative risk calculation (Kim et al., 2008). The EIPDBC-K algorithm, which incorporated BMI as a risk factor, was developed from a Korean database and is a web-based tool used to estimate a person's breast cancer risk ratio. The risk ratio was considered a participant characteristic, incorporated into an information sheet provided to the participant about her individual data, and used to tailor the intervention message. In previous research, the EIPDBC-K has shown positive correlations with risk ratios calculated from the Gail model (Park, Cochrane, Koh, & Chung, 2011).

Lipid profiles were obtained from the registry database. Diet patterns, frequencies of fast-food and fried-food intake, patterns of meat intake, and number of meals with meat per day were assessed to identify obesity-related factors. Exercise habits were assessed by collecting information on frequency of exercise per week and duration per exercise session. The diet and exercise items were based on recommendations from a dietitian and preventive medicine physician.

Knowledge about breast cancer and breast self-examination: Knowledge about breast cancer and BSE was measured by a 25-item questionnaire used in a previous study (Park, Kim, Park, Ahn, & Chung, 2010). The questionnaire contained items on breast cancer risk factors, BSE, and breast cancer symptoms. The items were true/false statements with answer choices of "right," "wrong," and "not sure." Each item was scored as 1 for the correct answer and 0 for incorrect answers or responses of "not sure," with a possible total score range of 0–25. Higher scores meant that women were more knowledgeable about breast cancer and BSE. Internal consistency reliability by Cronbach alpha for this questionnaire was 0.86 in the Park et al. (2010) study and 0.83 in the current study.

Awareness of personal risk of breast cancer: Women ranked the statement, "I am concerned that I could have breast cancer," on a scale from 0–100 to assess their degree of perceived risk. Higher scores indicated a higher perceived risk of breast cancer. This single item was derived from a previous study (Park, Hur, Kim, & Song, 2007) that had explored major themes of women's knowledge about risk factors and prevention of breast cancer. The item then was validated by three nursing researchers with expertise in breast cancer research.

Emotional barriers to breast cancer screening: The emotional barriers part of the assessment included possible experiences, based on previous research, that these obese women may have had during BSE and mammography. An initial questionnaire incorporated two items from research findings about emotional barriers to BSE (Park et al., 2007) and one item on obese women's healthcare avoidance (Drury & Louis, 2002). Content validity of these items was confirmed by three nursing researchers with expertise in breast cancer research who evaluated the extent to which each item was related to emotional barriers. The following three items each were ranked on a scale ranging from 0–5 points: (a) "I worry that the exam will be unable to find any breast abnormalities because I am overweight," (b) "The large size of my breasts makes me hesitate to have the exam," and (c) "I am embarrassed to be touched by health professionals during the exam." The total possible score ranged from 0–15, with higher scores indicating more emotional barriers to breast cancer screening. The Cronbach alpha reliability for this measure was 0.72 in the current study.

Self-efficacy for breast self-examination: A woman's perceived ability to perform BSE was known as her self-efficacy for BSE. Champion's Health Belief Model Scale–Korean, which has been tested by Lee, Kim, and Song (2002), was used. Ten items were rated on a five-point scale ranging from 0 (not at all) to 5 (very likely). The total possible score ranged from 0–50, with higher scores indicating greater confidence in BSE performance. The Cronbach alpha reliability was 0.91 in the Lee et al. (2002) study and 0.93 in the current study.

Intent to have breast cancer screening and adopt breast cancer prevention behaviors: The women's intent to screen and prevent breast cancer was assessed by five items regarding recommendations for breast cancer screening, exercise, and diet. The items included performing monthly BSEs, having CBEs, having mammography, changing eating habits, and exercising. These items were drawn from guidelines from Korea's NCIC (2012a). Each item was ranked on a scale from 0–10, with higher scores indicating more positive breast health behaviors. The Cronbach alpha reliability was 0.87 in the current study.

Although it would be ideal to measure actual behaviors (e.g., mammography) rather than intent, following women for the length of time needed to measure these outcomes was not feasible. Based on a previous longitudinal study in Korean women showing a statistically significant increase ($p < 0.01$) in BSE stage of change (e.g., from intention to actual performance) (Park, Song, Hur, & Kim, 2009), intent was considered a reasonable proximal outcome to actual breast health behaviors in this study.

Intervention

The HBM guided the development of the tailored message education (see Table 1). The HBM encompasses four main perceptions of susceptibility, seriousness, benefits, and barriers (Janz & Becker, 1984), which are comparable to the cognitive and emotional domains of the tailored message. The cognitive domain was targeted to provide women with accurate knowledge about risk factors and prognosis of breast cancer, which raised their cognition of the seriousness of breast cancer. The cognitive domain also covered the benefits of following guidelines for breast cancer screening to eventually lead them to adopt appropriate health behaviors. The content was based on evidence that increasing women's knowledge about breast cancer and screening behaviors, as well as motivating general health behaviors, may influence their actual practice of breast cancer detection behaviors (Rutledge, Barsevick, Knobf, & Bookbinder, 2001). The intervention involved tailoring clarifications about incorrect knowledge based on each individual's pretest.

The emotional domain covered personal experiences, feelings about breast cancer screening, and awareness of personal risks of breast cancer. Women generally are embarrassed by the thought of exposing their breasts for screening, underuse their general practitioner in decisions to carry out screening, and practice considerable denial to avoid confronting their fears of breast cancer (Park et al., 2007). In particular, obese women often are unwilling to undergo mammography because of a negative body image and the embarrassment of excessive body weight (Kim et al., 2009; Mitchell et al., 2008).

Table 1. Summary of Tailored Message Education

Domain	Content	Methods	Measured Outcomes
Cognition (10 minutes)	Informing about cancer risks and prognoses for obese women with breast cancer	Research evidence and tables and figures	Knowledge
	Providing correct knowledge based on the pretest results about breast cancer and BSE	Individual information sheet[a]	
	Informing about guidelines for breast screening	National guidelines	
Emotion (15 minutes)	Realizing her own risk factors (e.g., body mass index, lipid profile, anthropometry, mammography finding, EIPDBC-K)	Individual information sheet	Awareness
	Exploring barriers or hesitations to having screening in her experiences	Discussion	Emotional barriers
Behavior (20 minutes)	BSE demonstration by the interventionist	Nodules BSE Model	Self-efficacy for BSE
	Performing BSE and correcting BSE skill in each woman		
	Prompt live feedback		
	Identifying and guiding patterns of breast cancer screening for each woman	Individual information sheet	Intent to screen and prevent breast cancer
	Exploring eating and exercising habits	Individual information sheet	
	Informing desirable patterns of eating and exercising	Diet and exercise recommendations for cancer prevention	

[a] The individual information sheet was a summary sheet created for the tailored message education intervention, based on an individual's pretest data. The sheet included risk factors, knowledge, and screening behaviors of breast cancer, as well as breast cancer prevention behaviors.
BSE—breast self-examination; EIPDBC-K—Estimation of Individualized Probabilities of Developing Breast Cancer for Korean women

Although the perceived barrier has been the most powerful HBM predictor in studies of breast cancer detection behaviors, Champion and Miller (1992) proposed that interventions should be developed that target attitudes related to susceptibility, barriers, and health motivation, with a goal of influencing adherence. The current study targeted women's awareness of their own emotional barriers by having each woman evaluate and discuss her own breast cancer risks and mammography results. Women's breast cancer risks were estimated by comparing each individual's characteristics and risk factors to the average risk of developing invasive breast cancer in women of the same age group, using the EIPDBC-K (Kim et al., 2008).

The behavioral domain in this study corresponded to the HBM outcome variable of intention. Screening behaviors, such as BSE, CBE, and mammography, as well as lifestyle factors of diet and exercise, were identified, and then the woman's intention to adopt behavioral changes was confirmed. In particular, BSE required that women assume responsibility for performing their own BSE; their self-efficacy to do so was reinforced by live feedback during the session. This content was focused on beliefs and perceived efficacy that influence intention to act in a specific way and, therefore, affect actual behavior (Ajzen & Fishbein, 1980; Champion & Miller, 1996). The behavioral domain included breast cancer screening for early detection and lifestyles (eating habits and exercising) relevant to breast cancer risk factors that were identified in the pretest. BSE demonstrations were given by the study interventionist using an Interchangeable Nodules BSE Model. The women then performed BSE, which was promptly confirmed or corrected by the study interventionist to enhance the accuracy of their performance.

The tailored message intervention involved one educational session conducted with each individual woman in a private room; 45 minutes were allocated for each session. Time was allotted to cover each domain, and the session proceeded based on the woman's understanding and overall flow to ensure the content of the domains was covered. A 10-minute interval between sessions was planned to allow some flexibility in the time management of these sessions.

The standard education consisted of general information developed by the NCIC for breast cancer prevention (NCIC, 2012a). The content included breast cancer risk factors and symptoms, lifestyles for preventing breast cancer, and recommendations for screening tests. The session was delivered as a group intervention, using established visual materials. Two groups with 15 and 17 women, respectively, received this intervention at a regional senior community center. When the women in this group visited the clinic for mammography, they chose one of the two scheduled days for the groups. A study interventionist, who was not exposed to the tailored message education, led the standard education group sessions. A leaflet containing

BSE pictures also was given to the participants. After the group sessions and the post-test, women in the standard education group were informed of their individual mammography results.

Data Analysis

SPSS®, version 20–Korean, was used for the statistical analysis. Distribution and homogeneity tests for breast cancer risk factors in the two treatment groups were carried out using descriptive statistics and chi-square or t tests, depending on level of measurement. Homogeneity tests of pretest scores and change in mean scores from pre- to post-test measurement of knowledge about breast cancer and BSE, awareness of personal risk of breast cancer, emotional barriers to breast cancer screening, self-efficacy for BSE, and intent to follow recommendations for breast cancer screening (BSE, CBE, and mammography) and breast cancer prevention (eating habit and exercising) were tested by independent and paired t tests. Statistical significance was set at a p value of less than 0.05. Exercise duration was the only characteristic that was different between the two groups, so intervention effects were analyzed using an analysis of covariance.

Results

Participant Characteristics

The average age of the 64 participants in the sample was 52 years. Table 2 shows the results of the homogeneity tests of breast cancer risk factors for the two groups. No significant differences existed in age, anthropometry, lipid profiles, risk appraisal, eating habits, or mammography findings. The only difference between the two groups was in exercise duration ($\chi^2 = 4.58$, $p < 0.05$). The proportion of women who never exercised and those who exercised for 30–60 minutes at each exercise session was significantly different between the two groups (a higher percentage of women in the standard education group never exercised). Participant waist-to-hip ratios and total cholesterol in both groups fell outside of normal ranges (8% or more and greater than 119 mg/dl, respectively).

Table 2. Distributions and Homogeneity Test for Breast Cancer Risk Factors (N = 64)

Variable	Tailored Message Education (n = 32) $\bar{X}$	SD	Standard Education (n = 32) $\bar{X}$	SD	t/χ^2
Age (years)	52.25	5.67	52.2	5.54	0.00
Weight (kg)	77.75	6.98	77.08	6.08	0.41
Height (cm)	157.26	5.69	156	4.92	0.94
Body mass index (kg/m²)	32.21	2.25	31.68	1.21	1.19
Waist circumference (cm)	96.43	4.37	94.62	5.36	1.49
Hip circumference (cm)	106.71	5.38	106.73	4.55	–0.02
Variable	**n**		**n**		**t/χ^2**
Waist-to-hip ratio (%)					
Less than 80[a]	–		–		–
80 or higher	32		32		–
Total cholesterol (mg/dl)					
Less than 200[a]	–		–		–
200 or higher	32		32		–
High-density lipoprotein (mg/dl)					
Less than 60[a]	32		28		4.27
60 or higher	–		4		–
Low-density lipoprotein (mg/dl)					
Less than 130[a]	21		21		0.00
130 or higher	11		11		–
Relative risk of breast cancer[b]					
Higher risk[c]	23		20		0.64
Lower risk[d]	9		12		–
Mammography finding					
Negative	27		22		2.65
Probably benign	5		9		–
Suspicious abnormality	–		1		–
Eating habit patterns					
Meat preference diet	5		1		5.01
Vegetable preference diet	8		10		–
Carbohydrate-heavy diet	17		15		–
Well-balanced diet	2		6		–
Fast-food intake					
Sometimes	9		12		0.64
More than once a week	23		20		–
Fried-food intake					
Sometimes	20		21		0.07
More than once a week	12		11		–
Meat intake					
Sometimes	16		15		0.06
More than once a week	16		17		–
Number of meals per day					
2	4		–		4.27
3	28		32		–
Weekly exercise frequency					
None	18		24		9.18
2–3 times	7		8		–
Every day	7		–		–
Exercise duration (minutes)					
None	18		26		4.58*
30–60	14		6		–

* $p < 0.05$

[a] Values given are normal range.

[b] Based on data from the Estimation of Individualized Probabilities of Developing Breast Cancer for Korean women

[c] Calculated five-year risk is higher than that of the same age group.

[d] Calculated five-year risk is the same or lower than that of the same age group.

Table 3. Homogeneity Test for Pretest Variables (N = 64)

Variable	Tailored Message Education (n = 32) $\bar{X}$	Tailored Message Education (n = 32) SD	Standard Education (n = 32) $\bar{X}$	Standard Education (n = 32) SD	t
Cognition					
Knowledge about breast cancer and BSE	11.78	3.94	9.63	5.61	1.78
Emotion					
Awareness of personal risk of breast cancer	24.37	17.02	21.88	16.74	0.65
Emotional barriers to breast cancer screening	7.63	2.94	7.19	2.88	0.6
Behavior					
Self-efficacy for BSE	23.47	8.47	22.72	8.92	0.35
Intent to perform BSE	2.81	2.03	2.37	1.97	0.87
Intent to have CBE	6.28	3.07	5.9	2.83	0.5
Intent to have mammography	3.75	2.34	3.34	2.25	0.71
Eating habits	2.9	2.21	1.9	1.82	1.91
Exercising	3.46	1.93	2.72	1.8	1.6

BSE—breast self-examination; CBE—clinical breast examination

Effects of Tailored Message Education

Based on the homogeneity of the study variables (see Table 3), with exercise duration as a covariate, the changes in mean scores from pre- to post-test were significantly greater in the tailored message education group than in the standard education group for the emotional and behavioral domains, although the change was not significantly different for the knowledge domain (see Table 4). Specifically, significantly greater improvements occurred on awareness of personal risk of breast cancer ($F = 5.21$, $p < 0.05$) and self-efficacy for BSE ($F = 5.16$, $p < 0.001$) in the tailored message education group from pre- to post-test. For intention to have breast cancer screening, significant changes were seen in BSE ($F = 6.24$, $p < 0.05$) and mammography ($F = 5.45$, $p < 0.05$), whereas change in intention to have CBE was not significantly different between the two groups. Changes in eating habits ($F = 7.28$, $p < 0.05$) and exercising ($F = 12.51$, $p < 0.01$), as breast cancer prevention behaviors, showed significantly greater improvements in the tailored message education group.

Discussion

This was the first study in Korea of a tailored message education intervention for breast cancer screening in obese women. Health education is a central dimension of professional nursing practice. It reduces feelings of helplessness, empowers patients, and promotes continuity of compliance (Rankin & Stallings, 2001). Previous studies in Korea of breast cancer education programs have shown no differential changes in risk perceptions between high and low breast cancer risk groups of women after standard breast cancer education (Hur et al., 2009) or among women at different stages of appraised breast cancer risk after an integrated breast health program (Lee, Kim, Ko, & Ham, 2003). Although education with audiovisual materials (Choi & Suh, 1998; Seo, 2003), BSE education using a breast model (Hur et al., 2009), and a program involving husbands as facilitators (Park et al., 2009) all have been implemented in Korea to increase breast cancer screening, an intervention targeting obese women was needed because obesity has become a particularly important health concern in Korea (MHWFA & KCDCP, 2010). Previous research has indicated that the relationship between obesity and breast cancer is complex but important (Jee et al., 2008; Lahmann et al., 2004; Song et al., 2008). In that regard, tailored messages were developed for this intervention with obese women using individual breast cancer risk factors, and including content within cognitive, emotional, and behavioral domains. That strategy was thought to provide personally meaningful information for each woman by tailoring the approach to her individual characteristics, needs, and interests (de Nooijer, Lechner, & de Vries, 2002; Shaya & Gbarayor, 2006). Information targeted to each woman's level of obesity and other risk factors, including her mammography results, lifestyle, anthropometrics, and lipid profiles, resulted in an improved awareness of her personal risk of breast cancer compared with standard group education. Because Asian women tend to think that having cancer is a result of fate (Lu, 1995), a strategy that strengthens the accuracy of perceived breast cancer risk should not be overlooked. In fact, enhanced risk awareness has been associated in previous research with reduced mortality (Katapodi, Dodd, Lee, & Facione, 2009).

Many formats exist for health education programs (e.g., self-directed, individual, small group, large group), but individual teaching, often called one-to-one teaching, is ideal for technical skill training and to promote sharing of cultural barriers (Rankin & Stallings, 2001). The authors of the current study conducted individualized teaching for building BSE skill to allow participants to share why they hesitate to comply with breast cancer screening recommendations. In addition, the BSE demonstration and individualized feedback from the educator were effective for enhancing women's self-efficacy for BSE. Self-efficacy is critical when individuals adopt challenging behaviors and set goals to pursue appropriate behaviors (Luszczynska & Schwarzer, 2003). The results suggest that skill-based knowledge, such as how to perform BSE, is best learned in a practical way, rather than through lectures or leaflets (Hur et al., 2009; Park et

al., 2009; Paskett et al., 2006). Although those standardized education formats offer cost-effective education that does improve behavior, the greater improvement in the tailored message education group probably reflects the effects of having the opportunity for actual performance and live feedback.

Emotional barriers to breast cancer screening also were considered in the tailored message education intervention, based on evidence that obese women generally have low self-esteem and negative body images. These factors can affect their willingness to initiate breast cancer screening (Kim et al., 2009; Mitchell et al., 2008; Wee et al., 2000). A significant difference did not exist in post-test changes to emotional barriers between the tailored message and standard education groups. That result may be related to one of the disadvantages of individual teaching, which is a lack of sharing with and support from peers or other women (Rankin & Stallings, 2001). An in-depth investigation and discussion of ways to get over emotional barriers is needed to assess the difficulties women face during breast cancer screening and, therefore, enhance clinical practice. For example, some studies suggest that more female technicians should be present to support women who are embarrassed or reluctant to have mammography and CBE by men (Kang, Thomas, Kwon, Hyun, & Jun, 2008). Discomfort and pain during mammography also can prevent women from returning for follow-up or future examinations (Sabatino, Burns, Davis, Phillips, & McCarthy, 2006), but can be explored and addressed (e.g., by relaxation techniques or verbal positive reinforcement about life-saving by early detection) when discussing barriers to screening. Barriers related to discomfort and pain during mammography were not measured directly in the current study and might be important to emphasize and evaluate in future research.

Although knowledge about breast cancer and BSE was gained over time for all participants, no significant difference existed in knowledge gain in the tailored message education intervention compared to standard education. This rural study sample may have had fewer opportunities to obtain health education than urban samples, such that both types of education had substantial effects on the women's knowledge level. That result suggests that education content should be chosen based on the target population's regional characteristics and accessibility to health services. Above all, as Burbank, Reibe, Padula, and Nigg (2002) described, concrete and correct knowledge seems to be essential for women who are less likely to have adequate information about the benefits of breast cancer screening or feasible ways to carry out such screening.

Nursing research is essential for the development of nursing knowledge that promotes evidence-based practice. Because lower rates of breast cancer screening could be a result of poor efficacy of educational programs (Cohen & Azaiza, 2010), the current study assessed the ability of the tailored message education to improve cognitive, emotional, and behavioral factors relevant to breast cancer and obesity. The tailored message education in this study resulted in significantly greater improvements in pre- to post-test scores within the domains of emotion (awareness) and behavior (e.g., self-efficacy, intention to follow breast cancer screening and prevention behavior recommendations) compared with standard education. Content within cognitive, emotional, and behavioral domains of a tailored message education could be used as a guideline to assess the need for and then enhance breast cancer screening and prevention behaviors in clinical and community-based settings. Although controversy remains as to whether an intervention can predict future health behavior (Rakowski et al., 1992), other research (Park et al., 2009) would support the promising nature of the current study's findings for achieving actual behavior change. Future research on tailored message education could include a one-year telephone follow-up to determine if women are following recommendations for breast cancer screening and prevention behaviors.

Table 4. Effects of Tailored Message Education About Breast Cancer Risk Appraisal (N = 64)

Variable	Tailored Message Education (n = 32) $\bar{X}$	Tailored Message Education (n = 32) SD	Standard Education (n = 32) $\bar{X}$	Standard Education (n = 32) SD	t
Cognition					
Knowledge about breast cancer and BSE	8.31	3.97	6.71	4.44	1.15
Emotion					
Awareness of personal risk of breast cancer[a]	43.7	13.63	33.13	12.03	5.21*
Emotional barriers to breast cancer screening	–2.13	2.77	–1.28	2.18	–1.35
Behavior					
Self-efficacy for BSE[a]	24.25	8.67	11.56	6.95	45.16***
Intent to perform BSE[a]	5.65	1.99	4.28	2.03	6.24*
Intent to have CBE	3.62	3.07	3	2.17	0.94
Intent to have mammography[a]	5.28	2.24	3.84	2.24	5.45*
Eating habits[a]	5.06	2.15	3.56	2.19	7.28**
Exercising[a]	4.37	1.86	2.87	1.43	12.51**

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

[a] Analysis of covariance was done with duration of exercise as the covariate.

BSE—breast self-examination; CBE—clinical breast examination

Limitations

The generalizability of the findings is limited because of the small sample size and non-random treatment assignment. Although much of the tailored message education was individualized, diet and exercise content was limited to general guidelines. Because obesity management requires lifestyle modifications, future studies of tailored message education should provide more personal prescriptions for diet and exercise to enhance outcomes for breast cancer prevention in women with obesity. Finally, the tailored message education in this study did not fully address cultural factors related to obesity, which also need to be more fully considered in future interventions.

Implications for Nursing

Despite abundant resources and currently available standard education modules, developing guidelines relevant to a potential health issue for a specific target population is challenging. This study contributes findings related to tailored approaches for breast cancer prevention and early detection for women with obesity. Beyond the issue of weight reduction, an individualized approach was necessary to connect Korean women's obesity to their potential risk of breast cancer to manage this higher-risk group of women more effectively. The outcomes of this study may be attributed to the more intensive intervention with individualized education that was appropriate for each woman and her personal characteristics in regard to knowledge, emotions, and behaviors. Individual risk estimates increase the reality of breast cancer for women and should be included in routine education or at the time of mammography. Such tailored interventions can play an important role in preventing or lowering breast cancer risk through individual awareness and empowerment to adopt appropriate health behaviors.

The emotional aspects of health behaviors can have a critical influence on breast cancer screening in obese women. Within the Korean culture, modesty, shyness, or embarrassment, in particular, may serve as barriers to breast cancer screening. Because the tailored message education failed to lower emotional barriers to performing breast cancer screening, these potential barriers need to be incorporated into a more culturally appropriate intervention strategy. However, more in-depth investigation is needed to identify relevant emotional barriers and facilitators that address the challenges faced by Korean women in meeting breast cancer screening guidelines.

Behavioral outcomes in this study, because of feasibility constraints, focused on women's intentions instead of their actual behaviors and only immediate post-intervention outcomes. Future longitudinal research should verify the extent to which intentions predict actual behaviors in this population and how long the behaviors and knowledge persist. An important consideration in such behavior change is the promotion of self-efficacy, which might be achieved by diverse strategies that target women's individualized needs.

Conclusion

The current study evaluated the use of tailored message education about breast cancer designed specifically for obese Korean women. The intervention was found to be more effective than standard education in improving women's awareness of their personal risk of breast cancer, self-efficacy for BSE, and intent to screen and prevent breast cancer.

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