RESEARCH ARTICLE

Predictors of Progress in the Stage of Adoption of Breast Cancer Screening for Korean Women

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Abstract

Background: It has been proven that an individuals health behavior is determined through a series of processes. This study aimed to assess the stages of adoption of breast cancer screening, and to identify the factors relating to progress through these stages. Materials and Methods: There were 202 female participants aged 20-59 years who were living in Chungbuk, South Korea. They were informed of the study purpose and agreed to participate. Data were collected from October 2010 to January 2011 by assessing the breast cancer screening stage, health beliefs, socio-demographic factors, and other facilitating factors. The participant current stage of adoption of breast cancer screening was classified using the Precaution Adoption Process Model (PAPM), and the various PAPM stages were compared with each other to identify factors likely to determine progress between stages. The data were analyzed using the χ2-test, ANOVA, Duncan test, and multiple logistic regression. Results: Approximately half of all participants were not on-schedule for breast self-examination and mammography (unaware, 9.4% and 11.4%, unengaged, 8.4% and 5.0%, undecided, 20.3% and 17.8%, decided not to act, 1.5% and 1.0%, decided to act, 13.4% and 15.3%, respectively). The factors likely to determine the progress from one stage to another were age, marital status, exposure to media information about breast cancer, self-efficacy, and perceived severity. Conclusions: These results suggest that it is necessary to develop a tailored message for breast cancer screening behavior.

Keywords: Breast cancer - breast self-examination - mammography - stage of adoption

Introduction

Breast cancer is the second most common type of cancer in Korea, following thyroid cancer, and accounts for 15.4% of all female cancers. In 1996, there were 3,801 cases of breast cancer in Korea, compared to 16,398 cases in 2010, a four-fold increase in 15 years (Korean Breast Cancer Society, 2013). Compared to the West where there are more postmenopausal than premenopausal breast cancer patients, patients that are in the age group of 40-50 years in Korea have the highest rate of breast cancer, and premenopausal breast cancer rate has reached approximately 50% (Korean Breast Cancer Society, 2013). In addition, women in the 20-30 age group had the highest breast cancer incidence rate when examining the cumulative new patient ratio of each age group (National Health Insurance Corporation, 2009). The incidence of breast cancer in young women under 35 years is higher in Korea than in the West, their survival rates are lower, and their recurrence rates are higher than the 40-50 age group (Kim et al., 2007). Breast cancer is therefore an increasingly major health concern, not only for women in the 40-50 age group, but also for those aged 20-30 years.

In order to have a good prognosis, it is very important to discover and treat breast cancer at an early stage, where

the survival rate is approximately 98.4% (Korean Breast Cancer Society, 2013). Indeed, the survival rate decreases with an increase in breast cancer severity. According to the breast cancer screening recommendations of the Korean Breast Cancer Society (2013), after age 30 years, monthly breast self-examination (BSE) is recommended; after age 35, clinical examination by a doctor every 2 years is recommended; and after age 40, clinical examination and mammography every 1-2 years is recommended. The diagnosis by BSE is low in sensitivity compared to the other examination methods and has not been found to contribute to reduction in mortality.

Nevertheless, BSE is easy, simple, highly accessible, can help detect breast cancer in the period between regular check-ups, and increases interest in the screening of breast cancer given, because young women tend to avoid clinical examination by physicians. In addition clinical examinations are also low in sensitivity when used as a single method. However, when combined with mammography, clinical examinations are known to improve the breast cancer detection rate slightly although much research remains to be done (Suh and Kim, 2010). Mammography is the only method that has been proven effective for the early detection of breast cancer in large-scale clinical trials (Nattinger, 2010). Therefore, BSE

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and mammography are the most appropriate methods for early detection of breast cancer in asymptomatic people. Breast cancer screening behaviors such as BSE and mammography are influenced by sociod-emographic factors such as age, marital status, education level, and income level (Ergin et al., 2012; Jerome-D'Emilia, 2014). These behaviors also influenced by beliefs towards sensibility, severity, helpfulness, barriers and self-efficacy factors (Baysal and Polat, 2012; Jerome-D'Emilia, 2014), and facilitating factors such as family history of breast cancer, screening recommendations by an acquaintance or a health care provider, and the utilization of mass media (Han and Chung, 2006; Ergin et al., 2012). Previous studies reported on how subjective beliefs, attitudes, and abilities of individuals impact breast cancer screening behavior. However, there are limitations to determining the psychological readiness of individuals, such as their awareness, attitudes, and intentions to practice breast cancer screening. Thus, a study that uses a stage model of behavioral changes to systematically assess the phases of changes in breast cancer screening behavior, and is further able to develop an appropriate intervention strategy based on the characteristics of each phase, is necessary. The Precaution Adoption Process Model (PAPM) is based on the principle that individuals' health behavior happens through a series of processes, and on a theory of behavioral change that suggests that people make decisions, such as adopting new preventive measures or stopping risky behaviors, deliberately (Weinstein et al., 2008). In particular, this theory focuses on explaining an individual's process of making decisions of health behavior in the psychological sense. As such, it examines whether it is the lack of recognition of the problem, a lack of attention and personal recognition, or a decision to not change the behavior as the reason for ignoring changes in an consider an individual's health behavior. Thus, it is appropriate to apply this theory to behavioral changes associated with health risks and low awareness of health behavior (Blalock et al., 1996). This theory is different from other existing theories in that it suggests that people in different stages have qualitatively different behaviors, and that the closer an individual is to action, the bigger the difference between necessary intervention and information (Weinstein et al., 2008). Therefore, this theory is appropriate to explain health behaviors such as acts of breast cancer screening, the way in which individuals are led to make a decision to take action and the way in which they then transfer those decisions into actions. The PAPM has been mainly used in studies such as those aiming to prevent osteoporosis (Blalock et al., 1996) and radon testing in homes (Weinstein et al., 1998). Recently, several studies have reported on the factors affecting the practical levels of screening cancer using this model (Costanza et al., 2005; Kye et al., 2006), but studies that take into account BSE and the whole process of mammography, such as screening intentions, action and the impacting factors, are lacking. Breast cancer screening is a preventive health behavior, and whether individuals undertake it is influenced by their socio-demographic factors, their health beliefs, and other associated factors (Baysal and Polat, 2012; Ergin et al., 2012; Han and

Chung, 2006; Jerome-D'Emilia, 2014). Following each phase of change in breast cancer screening behavior to investigate these factors will be very useful as a way to improve the screening rates for early detection of breast cancer, because it identifies the obstacles to the adoption of breast cancer screening.

Hence, this study aims to provide a basis for the systematic intervention strategies to enhance breast cancer screening behaviors, by identifying the correlation between the stage of adoption of screening and health beliefs, self-efficacy, and facilitating factors. This study especially apply the PAPM targeting to women in the 20-30 years age group which the incidence of breast cancer has been gradually increasing, and the targeting women in 40-50 years age group which shows a high incidence of breast cancer as compared to other age groups.

Materials and Methods

Study design and participant

This study used a cross-sectional, descriptive design. A total of 202 women aged 20-59 years with no history of breast disease, no current pregnancy or breast-feeding were recruited from two urban areas in Chungbuk, South Korea, between October 2010 and January 2011. All respondents were recruited from the university, health promotion centers, community education centers, or churches. All participants were informed on the purpose of the study and that participation was voluntary and anonymous. Persons who agreed to take part in the survey were provided with a self-administered, structured questionnaire that took 15 to 20 minutes to complete.

Measures

PAPM stage of adoption of breast cancer screening: we developed a unique algorithm for assessing PAPM stage of adoption of breast cancer screening relative to the Korean Breast Cancer Society (2013) preferred guidelines, which refer to the prior PAPM stage of adoption scale (Kye, 2009). Each respondent's answer was classified into one of the seven stages: (1) Unaware (had never heard about BSE or mammography), (2) Unengaged (not thinking about getting screened), (3) Undecided (thinking about getting screened), (4) Decided not to act (decided not to perform BSE or mammography in the future), (5) Decided to act(decided to perform BSE or mammography in the future but was not up- to date), (6) Action (had a BSE within the last 6 months or a mammography within the last 2 years), (7) Maintenance (had a BSE regularly once a month within the last 6 months or at least two mammogram within the last 4 years).

Health beliefs: the health beliefs scale, developed by Champion in 1984 and revised in 1993, 1995, 1999, and 2005 was used to determine the BSE and mammography beliefs of women (Champion, 1984; 1993; 1995; 1999; Champion et al., 2005). Validity and reliability for the Korean version of the scale was done by three separate studies (Chong, 2000 unpublished; Lee et al., 2002; Kye, 2009). This self-completed scale consisted of 8 parts and 45 items. These were susceptibility (5 items), seriousness (7 items), benefits of BSE (4 items), barriers

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of BSE (6 items), self-efficacy of BSE (7 items), benefits of mammography (4 items), barriers of mammography (5 items), and self-efficacy of mammography (7 items). Each item had a score ranging from 1 to 5: strongly disagree (1 point), disagree (2 points), neutral (3 points), agree (4 points), and strongly agree (5 points). Each subscale was evaluated separately, and was not combined in a single total score. In previous studies, this scale showed reliability coefficients ranging between 0.71-0.92. In the current study, the Cronbach's alpha values ranged between 0.75-0.94.

Socio-demographic and facilitating factors: the survey contained standard questions regarding age, marital or partner status, level of education, and monthly household income. Questions about the respondents' facilitating factors for breast cancer screening behavior included family history of breast cancer, search experience and exposure to mass media information about the hazards of and precautions to take against breast cancer, and whether the recommendation for breast cancer screening had been given by an acquaintance or a health professional.

Statistical analysis

Frequency analysis and descriptive statistics were applied to the demographic characteristics, health beliefs and the stage of breast cancer screening behavior. Chi-square and one-way ANOVA tests were performed to assess differences in the stages of adoption, while a post-hoc analysis (Duncan test) was used to determine at which stages mean differences existed. A multiple logistic regression analysis was used to assess the factors determining progress between stages. Analyses were performed using SPSS statistical software.

Results

General characteristics of the study participants (Table 1)

The mean age was 39.4 years (standard deviation, 10.2; range, 20-59; median, 39.5). In our study participants, 69.8% were married or living with a partner. In addition, the majority of respondents had completed college and 64.4% had a monthly household income equivalent to more than US $ 3,000. Family history of breast cancer was reported by 32.7% of respondents. Furthermore, 58.4% of respondents had received a provider recommendation for breast cancer screening, and 77.7% had been exposed to mass media information about the hazards of and precautions to take against breast cancer.

PAPM stage of adoption of breast cancer screening (Table 2)

PAPM stages of BSE and mammography behavioral changes were defined for all 202 respondents, of whom, respectively, 47% and 49.5% of participants had performed a BSE within the last 6 months, or had undertaken mammography within the last 2 years. Of the remaining respondents without any prior experience with BSE and mammography, 9.4% and 11.4% were in stage 1 (unaware), 8.4% and 5.0% were in stage 2 (unengaged), 20.3% and 17.8% were in stage 3 (deciding), 1.5% and 1.0% of participants were in stage 4 (decided

no), and 13.4% and 15.3% were in stage 5 (decided yes), respectively.

Classification of socio-demographic factors, facilitating factors and health beliefs by stage of adoption of BSE and mammography (Tables 3 and 4)

There was no association between the level of education, or the monthly household income with the stage of adoption of BSE. There was, however, a non-significant association between family history of breast cancer and both BSE and mammography. Respondents in stage 1 (unaware) and stage 3 (undecided) were on average younger than respondents in the other stages of adoption of mammography. Respondents in stage 6 (action) and stage 7 (maintenance) were more likely to be married or living with a partner than those in the other stages of adoption of BSE and mammography. Moreover, those in stages 6 and 7 were also better educated than respondents in the other stages of adoption of mammography. Having

Table 1. Characteristics of Participants and Beliefs on Breast Screening (n=202)

Characteristics	n	%
Age		
20–39	101	50
40–59	101	50
Marital status		
Not married (or not living with partner)	61	30.2
Married (living with partner)	141	69.8
Education		
≤High school	48	23.8
≥College	154	76.2
Monthly household income		
<$2,000	27	13.4
$2,000- to <$3,000	45	22.3
≥$3,000	130	64.3
Provider recommendation		
No	84	41.6
Yes	118	58.4
Breast cancer family history		
No	136	67.3
Yes	66	32.7
Exposure to media		
No	45	22.3
Yes	157	77.7
Information search		
No	148	73.3
Yes	54	26.7

*n: number of respondents

Table 2. The PAPM Stages of Breast Cancer Screening (n=202)

	BSE		Mammography	
	n	%	n	%
Stage 1: Unaware	19	9.4	23	11.4
Stage 2: Unengaged	17	8.4	10	5
Stage 3: Undecided	41	20.3	36	17.8
Stage 4: Decided not to Act	3	1.5	2	1
Stage 5: Decided to Act	27	13.4	31	15.3
Stage 6: Action	82	40.6	28	13.9
Stage 7: Maintenance	13	6.4	72	35.6

*BSE: Breast self-examination; n: number of respondents

the recommendation of a provider (acquaintance or health professional) for breast cancer screening was most strongly associated with stage 6 (action) adoption of BSE, and stage 7 (maintenance) adoption of mammography and occurred substantially less among those in stage 1 (unaware) and stage 2 (unengaged) of both BSE and mammography adoption. The proportion of subjects reporting that they had been exposed to mass media related breast cancer awareness was highest in those in stage 6 (action) or stage 7 (maintenance).

The differences in health beliefs according to the stages of adoption of BSE were statistically significant (p < .05). However, there was no statistical significance in susceptibility, or severity with the different stages of adoption of mammography. The respondents had low perceived susceptibility and severity in stage 2 (unengaged) than in stage 7 (maintenance) adoption of BSE, whereas they had highly perceived self-efficacy in stage 7 (maintenance) than in the pre-action adoption stages of BSE or mammography. Increasing the perceived benefits to BSE was associated with the more advanced stages of adoption.

Factors affecting the progress of breast cancer screening stages (Table 5)

A multiple logistic regression analysis was used to determine the most important predictors of progress in the stage of adoption of breast cancer screening. We found five factors that were significantly associated with the stage of adoption of BSE or mammography: age, marital status, exposure to mass media information related to the hazards of and precautions against breast cancer, perceived severity, and self-efficacy. We compared those who had been thinking about getting screened (stage 3) to those who had not been thinking about getting screened (stage 2). As the stage of adoption of BSE progressed from stage 2 to stage 3, a higher perceived severity was found to be significantly associated with stage 3 (odds ratio [OR], 1.29; 95% confidence interval [CI]: 1.06-1.55). We then compared those who had a BSE within 6 months but were not in the maintenance stage (stage 6) to those who had decided to perform BSE in the future but were not up- to date (stage 5). As the stage of adoption

Table 3. Characteristics of Participants and Beliefs on Breast Cancer Screening Stages for BSE (n=202)

Variable	Stage 1 n (%) or M±SD	Stage 2 n (%) or M±SD	Stage 3 n (%) or M±SD	Stage 4 n (%) or M±SD	Stage 5 n (%) or M±SD	Stage 6 n (%) or M±SD	Stage 7 n (%) or M±SD	χ^2 or F	p (Duncan test†)
Age									
20–39	12 (11.9)	9 (8.9)	27 (26.7)	0 (0.0)	17 (16.8)	32 (31.7)	4 (4.0)	16.19	0.013
40–59	7 (6.9)	8 (7.9)	14 (13.9)	3 (3.0)	10 (9.9)	50 (49.5)	9 (8.9)		
Marital status									
Not married	9 (6.0)	12 (8.1)	27 (18.1)	3 (2.0)	16 (10.7)	70 (47.0)	12 (8.1)	19.39	0.002*
Married	10 (18.9)	5 (9.4)	14 (26.4)	0 (0.0)	11 (20.8)	12 (22.6)	1 (1.9)		
Education									
≤ High school	3 (6.2)	4 (8.3)	7 (14.6)	2 (4.2)	6 (12.5)	23 (47.9)	3 (6.2)	5.22	0.501*
≥ College	16 (10.4)	13 (8.4)	34 (22.1)	1 (0.6)	21 (13.6)	59 (38.3)	10 (6.5)		
Monthly household income									
<$2,000	2 (7.4)	2 (7.4)	7 (25.9)	1 (3.7)	4 (14.8)	9 (33.3)	2 (7.4)		0.887*
$2,000- to <$3,000	3 (6.7)	2 (4.4)	11 (24.4)	0 (0.0)	8 (17.8)	18 (40.0)	3 (6.7)		
≥$3,000	14 (10.8)	13 (10.0)	23 (17.7)	2 (1.5)	15 (11.5)	55 (42.3)	8 (6.2)		
Provider recommendation									
No	11 (13.1)	11 (13.1)	22 (26.2)	1 (1.2)	14 (16.7)	22 (26.2)	3 (3.6)	18.72	0.005
Yes	8 (6.8)	6 (5.1)	19 (16.1)	2 (1.7)	13 (11.0)	60 (50.8)	10 (8.5)		
Breast cancer family history									
No	14 (10.3)	12 (8.8)	33 (24.3)	2 (1.5)	20 (14.7)	47 (34.6)	8 (5.9)	8.22	0.206*
Yes	5 (7.6)	5 (7.6)	8 (12.1)	1 (1.5)	7 (10.6)	35 (53.0)	5 (7.6)		
Exposure to media									
No	12 (26.7)	3 (6.7)	12 (26.7)	0 (0.0)	5 (11.1)	11 (24.4)	2 (4.4)	20.7	0.001*
Yes	7 (4.5)	14 (8.9)	29 (18.5)	3 (1.9)	22 (14.0)	71 (45.2)	11 (7.0)		
Information search									
No	16 (10.8)	15 (10.1)	36 (24.3)	3 (2.0)	19 (12.8)	51 (34.5)	8 (5.4)	14.90	0.021*
Yes	3 (5.6)	2 (3.7)	5 (9.3)	0 (0.0)	8 (14.8)	31 (57.4)	5 (9.3)		
Susceptibility	1.86±0.70	1.51±0.46	1.96±0.61	1.60±0.53	1.93±0.7	1.86±0.81	2.42±0.75	2.	0.029 (2<1,5,6<7)
Severity	2.71±0.74	2.26±0.60	3.06±0.70	2.71±0.80	2.79±0.9	2.96±0.80	3.34±0.74	3.71	0.002 (2<1,5<3,6,7)
Benefit	3.70±0.64	3.53±0.36	3.81±0.48	3.00±0.66	4.00±0.5	3.89±0.39	4.08±0.46	3.24	0.005 (2<1<3,5,6,7)
Barriers	2.26±0.77	2.25±0.44	2.22±0.54	2.22±0.48	1.75±0.5	1.81±0.39	1.83±0.66	4.44	<0.001 (5,6,7<1,2,3)
Self-efficacy	2.39±0.62	2.53±0.55	2.53±0.64	2.52±0.81	2.47±0.4	2.89±0.65	3.19±0.65	4.59	<0.001 (1,5<2,3<6,7)

*Fisher's exact test; Stage 1 (unaware); Stage 2 (unengaged); Stage 3 (undecided)); Stage 4 (decided not to act); Stage 5 (decided to act); Stage 6 (action); Stage 7 (maintenance); †1: Stage 1, 2: Stage 2, 3: Stage 3, 4: Stage 4, 5: Stage 5, 6: Stage 6, 7: Stage 7; BSE: Breast self-examination; n: number of respondents; M: mean; SD: standard deviation

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Table 4. Characteristics of Participants and Health Beliefs on Breast Cancer Screening Stages for Mammography (n=202)

Variable	Stage 1 n (%) or M±SD	Stage 2 n (%) or M±SD	Stage 3 n (%) or M±SD	Stage 4 n (%) or M±SD	Stage 5 n (%) or M±SD	Stage 6 n (%) or M±SD	Stage 7 n (%) or M±SD	χ² or F	p (Duncan test†)
Age								62.3	<0.001
20–39	23 (22.8)	8 (7.9)	24 (23.8)	0 (0.0)	21 (20.8)	9 (8.9)	16 (15.8)		
40–59	0 (0.0)	2 (2.0)	12 (11.9)	2 (2.0)	10 (9.9)	19 (18.8)	56 (55.4)		
Marital status								55.66	<0.001*
Not married	19 (35.8)	4 (7.5)	13 (24.5)	0 (0.0)	9 (17.0)	3 (5.7)	5 (9.4)		
Married	4 (2.7)	6 (4.0)	23 (15.4)	2 (1.3)	22 (14.8)	25 (16.8)	67 (45.0)		
Education								14.37	0.018*
≤High school	5 (10.4)	3 (6.2)	4 (8.3)	2 (4.2)	4 (8.3)	11 (22.9)	19 (39.6)		
≥College	18 (11.7)	7 (4.5)	32 (20.8)	0 (0.0)	27 (17.5)	17 (11.0)	53 (34.4)		
Monthly household income								21.84	0.039*
<$2,000	8 (29.6)	2 (7.4)	5 (18.5)	1 (3.7)	2 (7.4)	2 (7.4)	7 (25.9)		
$2,000- to <$3,000	4 (8.9)	1 (2.2)	13 (28.9)	0 (0.0)	8 (17.8)	4 (8.9)	15 (33.3)		
≥$3,000	11 (8.5)	7 (5.4)	18 (13.8)	1 (0.8)	21 (16.2)	22 (16.9)	50 (38.5)		
Provider recommendation								37.31	<0.001*
No	20 (23.8)	6 (7.1)	16 (19.0)	0 (0.0)	16 (19.0)	11 (13.1)	15 (17.9)		
Yes	3 (2.5)	4 (3.4)	20 (16.9)	2 (1.7)	15 (12.7)	17 (14.4)	57 (48.3)		
Breast cancer family history								7.07	0.299*
No	17 (12.5)	8 (5.9)	28 (20.6)	2 (1.5)	22 (16.2)	15 (11.0)	44 (32.4)		
Yes	6 (9.1)	2 (3.0)	8 (12.1)	0 (0.0)	9 (13.6)	13 (19.7)	28 (42.4)		
Exposure to media								19.05	0.002*
No	14 (31.1)	1 (2.2)	7 (15.6)	0 (0.0)	6 (13.3)	6 (13.3)	11 (24.4)		
Yes	9 (5.7)	9 (5.7)	29 (18.5)	2 (1.3)	25 (15.9)	22 (14.0)	61 (38.9)		
Information search								7.69	0.241*
No	21 (14.2)	8 (5.4)	26 (17.6)	2 (1.4)	19 (12.8)	22 (14.9)	50 (33.8)		
Yes	2 (3.7)	2 (3.7)	10 (18.5)	0 (0.0)	12 (22.2)	6 (11.1)	22 (40.7)		
Susceptibility	2.00±0.77	1.94±0.94	1.82±0.61	1.50±0.71	1.87±0.63	1.87±0.60	1.92±0.75	0.3	0.938
Severity	2.99±0.59	2.46±0.77	2.82±0.78	2.64±1.11	2.79±0.71	3.04±0.76	2.97±0.81	1.08	0.376
Benefit	3.97±0.53	3.88±0.49	4.01±0.49	3.50±0.35	4.19±0.51	4.11±0.61	4.26±0.59	2.12	0.053
Barriers	2.71±0.75	2.42±0.66	2.66±0.68	2.60±1.70	2.28±0.72	2.18±0.95	2.23±0.74	2.41	0.029
Self-efficacy	3.45±0.57	3.93±0.73	3.71±0.56	3.71±0.40	3.90±0.46	3.98±0.52	4.01±0.55	3.84	0.001 (1<2,3,5,6<7)

*Fisher's exact test; Stage 1 (unaware); Stage 2 (unengaged); Stage 3 (undecided)); Stage 4 (decided not to act); Stage 5 (decided to act); Stage 6 (action); Stage 7 (maintenance); †1: Stage 1, 2: Stage 2, 3: Stage 3, 4: Stage 4, 5: Stage 5, 6: Stage 6, 7: Stage 7; BSE: Breast self-examination; n: number of respondents; M: mean; SD: standard deviation

Table 5. Predictors of Breast Cancer Screening Stages for BSE & Mammography (n=202)

Variables	BSE		Mammography	
	Stage 3 (n=41) versus Stage 2 (n=17)† OR (95% CI)	Stage 6 (n=82) versus Stage 5 (n=27)‡ OR (95% CI)	Stage 2 (n=10) versus Stage 1 (n=23)§ OR (95% CI)	Stage 6 (n=28) versus Stage 5 (n=31) OR (95% CI)
Age				
20–39		1		1
40–59		1.98 (0.66-5.94)		3.60 (1.16-11.18)
Marital status				
Not married				
Married		2.21 (0.70-6.90)	13.91 (1.33-145.48)	
Education				
≤High school				1
≥College				0.31 (0.08-1.22)
Provider recommendation				
No		1		
Yes		2.45 (0.91-6.64)		
Exposure to media				
No			1	
Yes			25.65 (1.66-395.77)	
Susceptibility	1.20 (0.91-1.58)			
Severity	1.29 (1.06-1.55)			
Benefit	1.46 (0.92-2.31)			
Self-efficacy		1.18 (1.05-1.34)		

Stage 1 (unaware); Stage 2 (unengaged); Stage 3 (undecided); Stage 4 (decided not to act); Stage 5 (decided to act); Stage 6 (action); Stage 7 (maintenance); †Stage 2 (0), stage 3 (1); ‡Stage 5 (0), stage 6 (1); §Stage 1 (0), stage 2 (1), Stage 5 (0), stage 6 (1); BSE: Breast self-examination; n: number of respondents; OR: odds ratio; CI: confidence interval

of BSE progressed from stage 5 to stage 6, a higher self-efficacy was significantly associated with stage 6 (OR, 1.18; 95% CI: 1.05-1.34). When we explored the factors that distinguish those who had not been thinking about getting screened (stage 2) from those who had never heard about mammography (stage 1), we again found that the progress in the stage of adoption of mammography from stage 1 to stage 2 was significantly associated with being married or living with partner. Knowledge about mass media information related to the hazards of and precautions against breast cancer was also associated with progression to stage 2. In addition, we found that being older was significantly associated with progression from stage 5 to stage 6 adoption of mammography.

Discussion

In this study, we identified predictors of the progress of PAPM stages of adoption for the psychological readiness of individuals such as awareness, attitudes and intentions to practicing breast cancer screening behavior in a primary care population typical of a community.

We assessed the stages of adoption of BSE and mammography in the study population. A little less than half of the respondents reported on-schedule screening for BSE and mammography, while 53% and 50.5% did not, respectively (unaware, 9.4%, 11.4%; unengaged, 8.4%, 5.0%; undecided, 20.3%, 17.8%; decided no, 1.5%, 1.0%; decided yes, 13.4%, 15.3%, respectively). The rate of breast cancer screening was similar to that reported in other population-based studies (Han and Chung, 2006; Ministry of health and welfare, 2013). However, in this study, women who had never undergone breast cancer screening made up more than half of the participants, and had different screening intentions. These results suggest the importance of a differentiated approach in considering adoption stages.

Age was an important factor in separating individuals who made the decision to be screened from those who actually went ahead with the screening (in action). Those who were aged 20-30 years were more likely to be in stage 1 and 2 (for the adoption of mammography), while those who were aged 40-50 years were more likely to be in stage 6 and 7. This is consistent with previous studies (Lee et al., 2010; Samah and Ahmadian, 2012) showing that older women were more likely to exhibit breast health-related behaviors than younger women. This may be explained by the fact that women over 40 years old have access to preventive breast health care, through breast cancer screening during life in transition provided by the National Health Insurance Corporation (2009). Unmarried women were more likely to be in stages 1 and 2, while married women were more likely to be in stages 6 and 7. These results are consistent with previous studies, confirming that married women had more experience with early breast cancer screening than single women (Doganer et al., 2014), and that spousal support is an important facilitating factor in performing regular BSE (Dahlui et al., 2012). However, the incidence of breast cancer in individuals of age 30 and lower in Korea is steadily increasing. Based on our findings, young

women are less likely to have the awareness and attention to engage in breast cancer screening behavior. We propose that young women be actively engaged in breast cancer screening, and be guided on screening behavior. Among the facilitating factors, exposure to mass media messages related to the hazards of and precautions against breast cancer was the most important factor in progressing to stage 2 from stage 1 (adoption of mammography). This was consistent with previous reports by Weinstein et al. (2008). In this study, those who had never heard about mammography accounted for over 11% of participants; thus, it seems necessary to take actions towards developing highly effective methods by using the mass media to raise, awareness on breast cancer screening, in order to change health behavior. Furthermore, among those who had been thinking about getting screened (stage 3), having a provider recommendation or the exposure to media messages about breast cancer was more likely to be reported compared to those who had never heard about screening (stage 1) or had not been thinking about getting screened (stage 2). Thus, our data suggest that recommendation by an acquaintance or a health professional, or mass media messages may be helpful in getting individuals to think about being screened.

With regard to the prediction of health beliefs, our study showed that perceived severity can predict progression of the stage of adoption of breast cancer screening and was an important predictor in progressing to stage 3 from stage 2 (for the adoption of BSE). Within those who had been thinking about performing BSE (stage 3), severity was more likely to be perceived compared to those who had not been thinking about performing BSE (stage 2). Additionally, the perceived severity of BSE was significantly higher in the undecided, action, and maintenance stages than in the unengaged stage. These results are similar to the findings of Erbil and Bolukbas (2014), who reported that a higher perceived severity leads to preventive breast cancer behavior. However, our findings are not consistent with those of Weinstein et al (2008), which demonstrated that beliefs such as susceptibility, severity, effectiveness, and difficulty were important predictive factors that determined progress between stage 3 and stage 4 or stage 5. Notably, however, in our study, the characteristics of stage 4 were not properly reflected, because there were not enough women in this group for meaningful analysis. We propose that a future study be conducted that includes sufficient numbers of participants for all the stages.

Self-efficacy was an important predictor in progressing from 5 to stage 6 (both BSE and mammography), and was significantly higher in the maintenance stage compared to other stages. This finding is consistent with other studies, which noted that a higher self-efficacy is observed with increasing stage of breast cancer screening adoption (Russell et al., 2007). Another study reported that self-efficacy of cancer screening is an important predictor in the progression from stage 5 to stages 6 and 7 (Kye et al., 2006). Breast cancer screening is not a one-time or intermittent activity, but rather is health behavior that must be consistently maintained. Park et al. (2009) reported that the degree of self-efficacy decreases with time. Sustaining

self-efficacy is the key to continuous breast cancer screening practice. Thus, we suggest that people who are in the lower stages of practical action should be motivated to continue breast cancer screening. The strengthening of self-efficacy can be achieved through specific, accurate information transmission and continuous education to enable the correct understanding about the effectiveness of breast cancer screening.

In this study, PAPM stage analysis was limited because there were very few individuals who firmly decided not to be screened (stage 4). They are a particularly difficult group, who tend to dispute or ignore information that challenges their decision not to act, but they are also an important group to understand. Therefore, future studies should address the issues involved. Additionally, our findings were consistent with only some of the data of Weinstein et al. (2008). Nonetheless, our study may be useful for several reasons. First, this is the first study that applies PAPM to understanding breast cancer screening behaviors (for the adoption of BSE and mammography) for the Korean population in a community setting. Second, our study allows practitioners to respond while considering each individual's characteristics and stages of breast cancer screening adoption.

In conclusion, our results demonstrate that variables such as age, marital status, exposure to media about breast cancer, self-efficacy, and perceived severity are factors affecting the progress of PAPM stage of breast cancer screening (BSE and mammography). Our findings may be helpful for the development of intervention strategies to improve Korean women's breast cancer screening practices, such as using an appropriate media utility to spread a tailored message, or using self-efficacy enhancement programs for encouraging the sustained action of breast cancer screening.

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