

## RESEARCH ARTICLE

# Effects of Attitude, Social Influence, and Self-Efficacy Model Factors on Regular Mammography Performance in Life-Transition Aged Women in Korea

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## Abstract

**Background:** This study analyzed predictors of regular mammography performance in Korea. In addition, we determined factors affecting regular mammography performance in life-transition aged women by applying an attitude, social influence, and self-efficacy (ASE) model. **Materials and Methods:** Data were collected from women aged over 40 years residing in province J in Korea. The 178 enrolled subjects provided informed voluntary consent prior to completing a structural questionnaire. **Results:** The overall regular mammography performance rate of the subjects was 41.6%. Older age, city residency, high income and part-time job were associated with a high regular mammography performance. Among women who had undergone more breast self-examinations (BSE) or more doctors' physical examinations (PE), there were higher regular mammography performance rates. All three ASE model factors were significantly associated with regular mammography performance. Women with a high level of positive ASE values had a significantly high regular mammography performance rate. Within the ASE model, self-efficacy and social influence were particularly important. Logistic regression analysis explained 34.7% of regular mammography performance and PE experience ( $\beta=4.645$ ,  $p=.003$ ), part-time job ( $\beta=4.010$ ,  $p=.050$ ), self-efficacy ( $\beta=1.820$ ,  $p=.026$ ) and social influence ( $\beta=1.509$ ,  $p=.038$ ) were significant factors. **Conclusions:** Promotional strategies that could improve self-efficacy, reinforce social influence and reduce geographical, time and financial barriers are needed to increase the regular mammography performance rate in life-transition aged.

**Keywords:** Mammography - attitude - social influence - self-efficacy

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## Introduction

In Korea, breast cancer is the second commonest cancer in women and has the second highest rate of increase (6.1% per year) after thyroid cancer (National Cancer Information Center [NCIC], 2014). However, the breast cancer survival rate in Korea has increased consistently due to the increasing availability of early diagnostics and improvements in standardized therapies (Korean Breast Cancer Society [KBCS], 2013). Breast self-examination is safe, without cost, and has the potential to help women find breast cancer symptoms earlier than other currently available methods; moreover, it is practicable for widespread use (Huguley and Brown, 1981).

The American Cancer Society guidelines for breast cancer screening recommended regular annual mammography for women over 40 years old (Smith et al., 2003). In Korea, the National Health Examination Law (NHEL) enacted in 2008, promotes early diagnosis through a principal initiative of early detection of health-related risk factors and diseases. According to the NHEL,

a medical health examination is to be performed at the life transition ages of 40 and 66 years. In addition, breast cancer examination via biennial mammography is recommended for women older than 40 years (KBCS, 2013).

In 2012 in Korea, among the 3,232,417 women over 40 years old that were examined, 5069 (0.16%) suspected cases of breast cancer were detected. The incidence of suspected cases increased with age group (5th decade; 0.13%, 7th decade; 0.17%, and 9th decade; 0.27%) (National Health Insurance Service [NHIS], 2013).

Since enactment of the NHEL, the mammography performance rate has increased from 35.7% to 56.2% in women over 40 years old (KBCS, 2013). Regardless, this increase is not a marked improvement from the mammography performance rates before enactment of the NHEL, which ranged from 22.6% to 56.2% (Lee et al., 2005; Kim et al., 2006; KCA, 2007, 2013).

The mammography performance rate has not increased as notably as the indications of effectiveness and efficacy of early breast cancer detection. In a meta-analysis study reported by Armstrong et al. (2007) there were 7%–23%

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reductions in breast cancer mortality rates associated with the use of screening mammography in women 40–49 years old. Therefore, there is a need to create more interest in women undergoing regular mammography.

There have been studies into assessing attitudes or beliefs as factors that would encourage regular mammography performance as a preventive health behavior. These studies used a health belief model with data that were adjusted for attitudes, beliefs and other factors (Champion et al., 1999; Janz et al., 1997; Thompson et al., 1997). One study examined self-efficacy as an important factor (McCaul et al., 1993). However, the analysis in these studies treated attitude, belief and self-efficacy individually. Recently, a more comprehensive and systemic approach, the ASE model, has been used in such analyses. The ASE model is a behavioral, intent-oriented model that has been reported to be able to determine diverse health preventive behaviors related to early detection of testicular tumor, the intention to smoke and to reduce urinary incontinence via patients' pelvic exercise (Alewijnse et al., 2001; Brubaker and Wickersham, 1990; Lechner et al., 2002; Victoir et al., 2006). The ASE model has been reported to be associated with breast cancer in job women in comparison between mammography experience ever more than once and mammography experience never (Kim and Lee, 2013). This study showed that self-efficacy and social influence were important predictors of mammography performance in job women. Therefore, there is a need to create more interest in women undergoing regular mammography.

It has been reported that 93% of breast cancer patients are over the age of 35 years. Moreover breast cancer incidence increases with age (NHIS, 2013). Thus, participating in a regular mammography program is important, particularly in women over the life-transition age of 40 years. To encourage regular systemic mammography performance among such women, we undertook an ASE model-based analysis of predictors of regular mammography performance in life-transition aged women. Based on our study results, we hoped to develop intervention methods that would increase the rate of regular mammography performance.

This study includes life-transition aged women over the age of 40 years. The ASE factors related to mammography were analyzed by using an ASE model to determine which socio-demographic, health-related and women's health-related factors affect the mammography performance rate. Specifically, we investigated: *i*). Rates of regular mammography performance, BSE, and doctor's PE; *ii*). Influence of socio-demographic, health-related and women's health-related factors on regular mammography performance rate; *iii*). Effects of ASE model factors on regular mammography performance rates; and *iv*). Predictors that affect regular mammography performance.

## Materials and Methods

### *Design, sample and ethical considerations*

We undertook a descriptive analysis of the predictors for regular mammography performance in women over the life-transition age of 40 years residing in the province

J in Korea. Of the 281 subjects that provided voluntary informed consent, 178 (63.3%) were over the age of 40 years and were enrolled in the study. The structural questionnaire used in the study was approved by the institutional review board of K university (201302-301001). Subsequent to study approval, subject surveys took place between 16 May 2013 and 9 June 2013. The study sample size was selected based on Cohen's power analysis. The required sample size was 103 to achieve a significance level ( $\alpha$ ) = 0.5, a medium regression analysis effect of 0.15 and an official approval (1- $\beta$ ) of 0.08.

### *Tool*

In this study with women over the age of 40 years, the regular mammography performance was defined as undergoing mammography every one or two years and the others less than these were defined as irregular or non-mammography performance. The factors assessed in the study included general characteristics and ASE model factors. The general characteristics consisted of socio-demographic, health-related, and women's health related factors that previously have been reported to be associated with breast cancer incidence (Kim and Lee, 2013). The socio-demographic factors included age, residency, educational state, marital state, monthly income, and job-related factors. The health-related factors included general health status, salt consumption, soybean consumption, amount of regular exercise, presence of chronic disease, and previous X-ray radiation therapy experience. Women's health-related factors included previous pregnancy or breast feeding, menopause status, and use of hormonal drugs such as undergoing hormonal replacement therapy (HRT).

The ASE model was previously described by Lechner et al. (2002). Within the ASE model assessment, attitudes toward mammography performance were measured by using a modified questionnaire described by Kim and Lee (2007). The reliance of this questionnaire as determined by Cronbach's  $\alpha$  was 0.78. Social influence as determined by Cronbach's  $\alpha$  including social norm, recognized behavior of others (modeling), and social support was 0.83. Social norm was measured by applying what your parents, relatives, or friends think about you having mammography. Modeling was measured by determining whether others support your undergoing mammography. Social support was determined by recording how many persons you know who have undergone mammography. Self-efficacy was measured by using a 5 point scaled 4 part questionnaire that was modified from Lee et al. (2005); the reliance of that questionnaire based on its Cronbach's  $\alpha$  value was 0.88.

### *Data analysis*

The data were analyzed by using the SPSS/Win 21.0 program, and the analyses included the use of the  $\chi^2$ -test, ANOVA, Spearman's correlation, and logistic regression.

## Results

### *Relations between BSE and doctor's PE on regular mammography performance*

The regular mammography performance rate of the subjects was 41.6%, whereas the regular mammography performance rate among women performing BSE was 48.5% and among women undergoing doctors' PE was 64.6%. The regular mammography performance rate was significantly higher in women performing BSE than in women not performing BSE. Similarly, the rate was significantly higher in women undergoing PE than in women not undergoing PE (Table 1).

*Influence of socio-demographic, health-related and women's health-related factors on regular mammography performance rate*

Among the socio-demographic factors, there were significantly higher regular mammography performance rates in older women, women living in a city, women with a higher monthly income and women with a part-time job (Table 2). Among the women's health-related factors, there were significantly higher regular mammography performance rates in menopausal women and those undergoing HRT after menopause, whereas among health-related factors, there were significantly higher regular mammography performance rates in women consuming

soybeans, women getting regular exercise and women who have undergone X-ray radiation therapy.

*Effects of ASE model factors on regular mammography performance rate*

All three components of the ASE model had a significant effect on the regular mammography performance rate in women over the age of 40 years (Table 3). Attitude toward mammography was significantly higher among women in the regular mammography performance group ( $3.9 \pm 1.32$ ) than in the no or irregular performance group ( $3.5 \pm 1.26$ ).

**Table 1. Rates of Regular Mammography Performance, BSE, and Doctor's PE (N=178)**

Variable	Category	Irregular or none N(%)	Regular N(%)	$\chi^2$ (q)
Total (%)		104 (58.4)	74 (41.6)	
Experience of Self breast exam				4.890 (.027)
	No	51 (68.0)	24 (32.0)	
	Yes	53 (51.5)	50 (48.5)	
Experience of physician exam				31.486 (<.001)
	No	73 (77.7)	21 (22.3)	
	Yes	28 (35.4)	51 (64.6)	

**Table 2. Influence of Socio-demographic, Health-related and Women's Health-related Factors on Regular Mammography Performance Rate (N=178)**

Variable		Total (N)	Irregular or none N(%) / M±SD	Regular N(%) / M±SD	χ <sup>2</sup> (q) / T (q)
Socio-demographic factors					
Age (years)	41~50	129	82 (63.6)	47 (36.4)	5.10 (0.025)
	51~	49	22 (44.9)	27 (55.1)	
Residence	City	127	64 (50.4)	63 (49.6)	10.17 (<0.001)
	Rural	48	37 (77.1)	11 (22.9)	
Monthly income (10,000won)	< 299	91	62 (68.1)	29 (31.9)	7.12 (0.008)
	300 ≤	83	40 (48.2)	43 (51.8)	
Education	High school	102	64 (62.7)	38 (37.3)	2.13 (0.144)
	≥College	68	35 (51.5)	33 (48.5)	
Marital status	Single	5	4 (80.0)	1 (20.0)	1.03 (0.310)
	Married	166	95 (57.2)	71 (42.8)	
Occupation type*	Full time <sup>a</sup>	72	48 (66.7)	24 (33.3)	6.80 (0.033) b>a,c
	Part time <sup>b</sup>	33	14 (42.4)	19 (57.6)	
	No <sup>c</sup>	30	21 (70.0)	9 (30.0)	
Women health related factors					
Menopause	No	118	79 (66.9)	39 (33.1)	11.18 (<0.001)
	Yes	57	23 (40.4)	34 (59.6)	
Experience of pregnancy	No	7	4 (57.1)	3 (42.9)	0.00 (0.954)
	Yes	170	99 (58.2)	71 (41.8)	
Experience of breast feeding	No	25	17 (68.0)	8 (32.0)	1.26 (0.261)
	Yes	150	84 (56.0)	66 (44.0)	
Hormone drug	No	42	22 (52.4)	20 (47.6)	7.41 (0.007)
	Yes	12	1 (8.3)	11 (91.7)	
Health behavior related factors					
soy bean food	No	104	70 (67.3)	34 (32.7)	7.61 (0.006)
	Yes	73	34 (46.6)	39 (53.4)	
Regular exercise	No	74	51 (68.9)	23 (31.1)	5.74 (0.017)
	Yes	104	53 (51.0)	51 (49.0)	
X-ray experience	No	126	79 (62.7)	47 (37.3)	4.10 (0.043)
	Yes	50	23 (46.0)	27 (54.0)	
Health status	No	123	73 (59.3)	50 (40.7)	0.22 (0.637)
	Yes	54	30 (55.6)	24 (44.4)	
Salty taste	No	156	88 (56.4)	68 (43.6)	2.11 (0.146)
	Yes	22	16 (72.7)	6 (27.3)	
Chronic disease	No	152	92 (60.5)	60 (39.5)	1.89 (0.169)
	Yes	26	12 (46.2)	14 (53.8)	

Social influences on mammography were significantly higher in the regular mammography performance group ( $3.5 \pm 1.30$ ) than in the no or irregular performance group ( $2.4 \pm 1.27$ ). Moreover, all social influence sub-factors (i.e., social norm, modeling and social support) were significantly higher in the regular mammography group than in the no or irregular mammography group. Self-efficacy toward mammography was significantly higher in the regular mammography performance group ( $3.8 \pm 1.26$ ) than in the no or irregular performance group ( $3.0 \pm 1.00$ ).

#### *Relationships between regular mammography performance and ASE model factors*

There were significant positive relationships between regular mammography performance and each of the three ASE model components: attitude ( $r=0.188$ ,  $q<.001$ ), social influence ( $r=0.419$ ,  $q<.001$ ), self-efficacy ( $r=0.422$ ,  $q<.001$ ) (Table 4). The more positive the women's attitude, the greater the social influence, or the higher self-efficacy level, the higher the regular mammography performance rate (Table 4).

#### *Predictors of regular mammography performance*

Results of the logistic regression analysis of the predictors that may affect regular mammography performance are presented in Table 5. The regression results for ASE and other significant showed that the

**Table 3. Effects of ASE Model Factors on Regular Mammography Performance rates (N=178)**

	Total	Irregular or none	Regular	T (q)
	M $\pm$ SD	M $\pm$ SD	M $\pm$ SD	
Attitude	3.7 $\pm$ 1.24	3.5 $\pm$ 1.26	3.9 $\pm$ 1.32	1.97 (.050)
Social Influence	2.9 $\pm$ 1.37	2.4 $\pm$ 1.27	3.5 $\pm$ 1.30	6.09 (<.001)
Social norm	2.9 $\pm$ 1.36	2.4 $\pm$ 1.27	3.6 $\pm$ 1.23	6.44 (<.001)
Modeling	2.6 $\pm$ 1.27	2.1 $\pm$ 1.09	3.3 $\pm$ 1.16	6.88 (<.001)
Social support	2.7 $\pm$ 1.16	2.2 $\pm$ 0.94	3.2 $\pm$ 1.15	6.66 (<.001)
Self-efficacy	3.5 $\pm$ 1.15	3.0 $\pm$ 1.00	3.8 $\pm$ 1.26	4.88 (<.001)

**Table 4. The Relationship between Regular Mammography Performance and Attitude, Social Influence, Self-efficacy**

	Regulation of mammography	Attitude	Social Influence	Social Efficacy
Regulation of mammography	1	0.188 (<.001)	0.419 (<.001)	0.422 (<.001)
Attitude		1	0.339 (<.001)	0.594 (<.001)
Social Influence			1	0.350 (<.001)
Social Efficacy				1

**Table 5. Predictors that Affect Regular Mammography Performance**

Variable	Category	Exp( $\beta$ ) (q)	95% CI
Occupation type-part time	No	4.010 (.050)	1.001-16.061
Social influence		1.509 (.038)	1.024-2.224
Self-efficacy		1.820 (.026)	1.073-3.087
Experience of physician exam	No	4.645 (.003)	1.711-12.610

ASE model factors were significant predictors and they explained 34.7% of the variation in regular mammography performance. Among those predictors, previous PE by a doctor ( $\beta=4.645$ ,  $q=.003$ ), part time employment ( $\beta=4.010$ ,  $q=.050$ ), self-efficacy ( $\beta=1.820$ ,  $q=.026$ ) and social influence ( $\beta=1.509$ ,  $q=.038$ ) were shown to be significantly associated with regular mammography performance. The regular mammography performance rates were 4.6 times, 4.0 times, 1.8 times and 1.5 times greater in women with previous doctor's PE, part time occupation, self-efficacy and social influences than in women lacking such factors.

## **Discussion**

This study analyzed ASE model factors on regular mammography performance of women over the life-transition age of 40 years. The regular mammography performance rate in the subjects in this study was 41.6%. This was slightly lower than the 44.7% - 48.2% of the age from forties to sixties women undergoing mammography within 2 years, reported from a nation-wide survey (KBCS, 2013). However, this was higher than the 24% reported from a study of Chinese and Korean Chinese women who are married (Gang et al., 2013).

Among the socio-demographic factors, older age, city residency, part time occupation and high income were associated with a high regular mammography performance rate. Mammography was undertaken by 55.1% of women over the sixties, but by only 36.4% in women with the fifties. This suggests that regular mammography performance of women with the fifties should be encouraged, because breast cancer incidence of women with the fifties has been higher than that of women over the sixties (KBCS, 2013). Recently, it was suggested that the recommendation of national cancer examination under age of 50 years should be selective than mandatory (Bae, 2014). However, in Korea the higher incidence of breast cancer but the less regular mammography performance rate of women with the fifties than that of women over the sixties, therefore those the fifties women should be encouraged and managed by age specific tailored recommendation.

Regular mammography performance rate was higher in women with city residency than in those with a rural residency, indicating that ease of access to hospitals is a factor affecting mammography performance. The high income group in our study exhibited a higher mammography performance than that in the low income group and this result is consistent with those reported by Fredman et al. (1999), Maxwell et al. (1997), In (2004) and Kim & Lee (2007). There was a low mammography performance rate in the low income and minority race groups among urban public hospital visitors in the United States (Thompson et al., 1997). In Korea, low income women may not undergo mammography because of insufficient funds (KCA, 2007). Even though low-income women are financially supported by a cancer examination stipend for mammography of 38,280 Korean Won including film cost, scanning and reading fee (NHIS, 2014), limited hospital access may be a greater problems



in them.

Among the job-related factors, women with a part time occupation rather than a full time occupation exhibited high regular mammography performance. This may be due to part time employees having the funds and the time to attend mammography clinics. Among full time employees, time flexibility may be an important factor to induce high job stress and a barrier to obtaining a health examination (Kim et al., 2009; Kim et al., 2011). It was reported that the women less than high school graduates has showed less regular mammography performance as 0.4 times (Gang et al., 2013). However this study showed no significant differences of regular mammography performance between education levels. Because this study subjects were above the career of college students, further study for general women with various levels of education will be needed.

Among the women's health-related factors, presence of menopause or HRT was associated with high regular mammography performance. This results support those reported by Kim et al. (2006). Menopause is an important phase in women's health and is promoted as the life phase in which to increase health examination awareness. The study of Gang et al. (2013) predicted 3.1 times of familiarity to mammography. In our study, 91.7% of the women undergoing HRT also underwent regular mammography, indicating a high awareness of the importance of mammography for menopausal women undergoing HRT.

Among the health-related factors, regular mammography was common in women who consumed soybeans, got regular exercise, and had undergone X-ray radiation. The soybean results support those previously reported as 3.2-fold by Kim and Lee (2007). Our results showing that regular exercise was associated with a high regular mammography performance rate supported the results in other studies of industrial nurses (Lee et al., 2005) and of outpatient women (Kim et al., 2006). The association between radiation therapy and mammography performance supported in the study of outpatient women (Kim and Lee, 2007) may indicate that sensitivity or anxiety toward potential diseases may increase the propensity to undergo health examination.

The ASE factors were significantly associated with regular mammography performance in our study. And ASE factors have been reported to affect health behavior in previous studies. The importance of ASE factors was suggested in adjusted ASE models investigating testicular self-examination and breast feeding performance (Lechner et al., 2002; Gijsbers et al., 2008).

This study showed that social norms, modeling and social supports of social influences were significant and among these, social norms had more relationship to mammography performance than others. It suggests that the effect of social norms would be applied to encourage breast examination and mammography. Although a study into the early detection of testicular cancer emphasized the importance of social influence modeling (Lechner et al., 2002), in our study all social influences (i.e., social norm, modeling, and social support) were significantly associated with regular mammography performance.

In contrast to the subjects' ages in our study, the young subjects in the testicular self-examination study were under 20 years old suggesting that modeling may be more important in that age group because of a lack of knowledge and awareness in young. Social influence and self-efficacy were significant factors associated with mammography performance in job women (Kim and Lee, 2013) and with the assertive behavior of non-smoking college students exposed to secondhand smoke (Choo and Kim, 2011). Moreover, social influence was an important factor affecting on the smoking cessation intentions of adolescents (Seo and Kim, 2013). And these factors on health behavior have been emerged again.

Our logistic regression analyses revealed that the significant factors affecting regular mammography performance were doctor's PE, part time occupation, self-efficacy and social influence. The mammography performance rates were 4.6 times and 4.0 times greater in women with previous doctor's PE and part time occupation than in women lacking such factors. Self-efficacy and social influence increased the rate of participation in regular mammography by 1.8-fold and 1.5-fold, respectively. The importance of self-efficacy was noted in a previous study of outpatients in which self-efficacy produced a 4.2-fold increase in regular mammography performance (Kim et al., 2006) and of job women in which self-efficacy produced a 3.4-fold increase in regular mammography performance (Kim and Lee, 2013). Thus, a strategy to promote self-efficacy is needed. Because social influence was also a significant predictive factor, the application of ASE models in investigations of mammography performance is important. ASE model applications to smoking prevention, testicular cancer self-examination and regular mammography are very significant trials. In previous studies, the subjects of mammography performance were general women, outpatient women or job women. Otherwise in this study the subjects were specified to the women over the life-transition age of 40 years.

Our univariable analysis showed that age, occupation type (full time, or part time work), area of residence (city, rural) and income level affect regular mammography performance. The less these barriers exist, the more mammography would be performed. These results suggest the importance of having time, funds and hospital access to participate in regular mammography. The results of this descriptive research study into predictors for regular mammography performance in women over the life-transition age of 40 years showed a variety of significant factors. To elucidate these factors further and to develop strategies to enhance the regular mammography performance rate, a comprehensive nation-wide study is needed. This study applied an ASE model to determine factors affecting regular mammography performance in life-transition aged women over the age of 40 years.

In conclusion, the first: a strategy to promote age group specific mammography performance especially at the fifties women who have showed the highest breast cancer incidence in Korea is needed. The second: all three ASE factors were significantly associated with regular mammography performance. Women with more positive

attitudes, much social influence, or high self-efficacy had higher regular mammography performance rates. Therefore active development of program to promote high self-efficacy, much social influence, active modeling resources and usable social support system is needed. The third: doctor's PE is strongly influent factor. It should be encouraged to educate and ensure the importance of regular mammography performance when doctor's PE was committed in the clinic. The last: city residency or part time occupation had high regular mammography.

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