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# Pre- and Postintervention Differences in Acculturation, Knowledge, Beliefs, and Stages of Readiness for Mammograms Among Korean American Women

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**T**he number of Americans with Korean ancestry in the United States is about 1.3 million, representing 0.4% of the total U.S. population. Of that population, 75% are foreign-born, 58% are women, and 42% are women aged 35 years or older (U.S. Census Bureau, 2006). Breast cancer is the most frequently diagnosed cancer among Korean American women (McCracken et al., 2007), and those diagnosed present with larger tumor size and more advanced-stage breast cancer than Caucasian women (89% versus 70%) (Hedeem, White, & Taylor, 1999), implying that Korean American women adhere less to recommended breast cancer screening guidelines. Korean American women also have higher breast cancer incidence rates than women in their native country (16.9 versus 10.9 per 100,000) (Gomez et al., 2003); however, reasons for this are unknown. Some evidence suggests that breast cancer risk among Asian women increases after at least 10 years of living in the United States (Deapen, Liu, Perkins, Bernstein, & Ross, 2002; Ziegler et al., 1993), but solid evidence related to risk factors, such as Western diet, genetics, or environment, has yet to be discerned. Because early detection through routine screening contributes to a decrease in breast cancer mortality, the particularly low rates of adherence to recommended breast cancer screening guidelines among Korean American women are disconcerting.

Reports on mammography screening use among Korean American women suggest that more than 50% have had a mammogram at some point in their lifetime but that recommended mammography screening guidelines have not been followed: 33%–39% had a mammogram in the past year, 53%–59% had mammograms within the preceding two years, and 78% had at least one mammogram in their lifetime (Centers for Disease Control and Prevention [CDC], 2004; Juon, Kim, Shankar, & Han, 2004; Kandula, Wen, Jacobs, & Lauderdale, 2006; Lee, Fogg, & Sadler, 2006;

**Purpose/Objectives:** To assess differences in acculturation, knowledge, beliefs, and stages of readiness for mammograms from pre- to postintervention among Korean American women aged 40 years or older.

**Design:** Prospective, repeated measures, quasi-experimental.

**Setting:** A Korean American senior center in the midwestern United States.

**Sample:** 300 Korean American women aged 40 years or older with no breast cancer diagnoses and who were non-adherent with mammography screening.

**Methods:** Following completion of the preintervention questionnaire, the women attended a 45-minute interactive breast cancer early screening education session (GO EARLY) organized according to stages of readiness for mammography use (i.e., not thinking about having one, thinking about having one, and had one in the past). Postintervention data were collected six weeks following the educational session.

**Main Research Variables:** Acculturation, knowledge, beliefs (perceived risk, pros, cons, fear, self-efficacy, modesty, fatalism), and stages of readiness for mammography use.

**Findings:** At preintervention stages of readiness, women thinking about having a mammogram (contemplators) had significantly lower knowledge scores and higher cons to mammography use than women who had mammograms in the past (relapsers). Women not thinking about having a mammogram (precontemplators) had significantly lower self-efficacy for having a mammogram and higher cons than relapsers. The GO EARLY session was most effective in increasing knowledge, decreasing perceived cons, and increasing perceived self-efficacy. No statistically significant intervention effect was noted on upward shift in stage of readiness for mammography use postintervention.

**Conclusions:** The GO EARLY intervention, the first study to assess stages of readiness for mammography use among Korean American women, was feasible and culturally sensitive and can be replicated in various Korean American communities.

**Implications for Nursing:** Culturally appropriate educational programs can serve to change women's perceptions and knowledge, and such changes may lead to changes in health behavior.

McCracken et al., 2007; Sarna, Tae, Kim, Brecht, & Maxwell, 2001; Swan, Breen, Coates, Rimer, & Lee, 2003). A challenge exists to design and implement culturally sensitive and theory-based mammography-promotion interventions for many Korean American women who do not have recommended periodic screening mammograms. The purpose of this study was to test GO EARLY, a culturally relevant, stage-based, targeted intervention specifically designed to promote mammography use among nonadherent Korean American women aged 40 years or older.

## Literature Review

Low mammography use among Korean American women is largely related to lower socioeconomic status and acculturation (Juon, Choi, & Kim, 2000; Juon et al., 2004; Juon, Seo, & Kim, 2002; Kim & Sarna, 2004; Maxwell, Bastani, & Warda, 2000; Moskowitz, Kazinets, Wong, & Tager, 2007; Sadler, Ryujin, Ko, & Nguyen, 2001; Sarna et al., 2001). Korean cultural beliefs (which appear to continue after immigration) also affect mammography use (Ham, 2006; Juon, Choi, Klassen, & Roter, 2006; Lee et al., 2006; Moskowitz et al.; Shin, Kim, Juon, Kim, & Kim, 2000). Koreans usually seek health care only for symptoms or delay seeking treatment until they cannot tolerate symptoms any longer (Kendall, 1988; Kim, 1972; Par & Cho, 1995). Preventive practices, such as cancer screening, are not the norm for Koreans (Lee, Sobal, & Frongillo, 2000; Olsen & Frank-Stromborg, 1993; Sohn & Harada, 2005). Korean women also are socially prohibited from discussing female bodily experiences (Chang, 1983; Park, 1987), and (as a result of ethnic homogeneity) Korean American women often share knowledge, traditional beliefs, and attitudes about well-being that are reinforced by close ties with Korean friends, neighbors, and church affiliates (Hurh & Kim, 1984; Lee et al., 2000; Min, 1992; Shin et al.).

The few health education interventions for Korean American women have been deemed effective as a result of fewer social, cultural, and linguistic cons and a more natural, supportive, and comfortable environment (Juon et al., 2006; Kim & Sarna, 2004; Moskowitz et al., 2007; Sadler et al., 2001; Wismer et al., 2001). Although investigators have focused on a few variables identified as significant predictors in past research (acculturation, knowledge, perceived risk, pros, and cons) (Juon et al., 2006; Kim & Sarna; Lee et al., 2006; Moskowitz et al.; Sarna et al., 2001), none of the studies included integrated theoretical models incorporating beliefs and stages of health behavior change.

Pros of mammography use have been positively related and perceived cons have been negatively associated with mammography use or adherence to recommended guidelines among Korean American women (Han, William, & Harrison, 2000; Juon et al., 2004; Sadler et al., 2001; Yu, Hong, & Seetoo, 2003). In particular, a low level of perceived risk or susceptibility of breast cancer has been shown to be critical for understanding why Korean American women do not get mammograms (Han et al.; Maxwell et al., 2000). Self-efficacy was positively related to mammography use in other racial groups, but has not been studied among Korean American women (Ham, 2006; Menon, Champion, et al., 2007; Russell, Monahan, Wagle, & Champion, 2007; Tolma, Reininger, Evans, & Ureda, 2006). The influence of modesty on breast cancer screening is consistent: Korean American women who were uncomfortable about their breasts being touched by a healthcare provider were less likely to obtain mammography (Han et al.; Juon et al., 2002; Lew et al., 2003; Maxwell et al.; Sadler et al.; Yu et al.). Korean American women who had a Korean physician had significantly lower rates of breast cancer screening in the previous two years compared to women who had a non-Korean physician (Lew et al.). Although modesty, fear, anxiety, and fatalism were identified as influencing factors for mammography behavior in general (Champion et al., 2004; Considine, Magai, & Neugut, 2004; Mayo, Ureda, & Parker, 2001; Phillips, Cohen, & Moses, 1999; Powe, 1995; Tang, Solomon, & McCracken, 2000), such factors have not been examined within the context of stages of readiness for mammography use.

## Korean American Women's Breast Cancer Screening Model

The conceptual model for this study (see Figure 1) was based on the Transtheoretical Model of Change (TTM). The TTM emphasizes that adopting a health behavior, such as having a mammogram, usually occurs as a progression of decisional stages of change that may be cyclical rather than dichotomous (Prochaska & Velicer, 1997). The action of having a mammogram progresses in a series of stages from precontemplation (having no intention to have a mammogram), to contemplation (thinking about

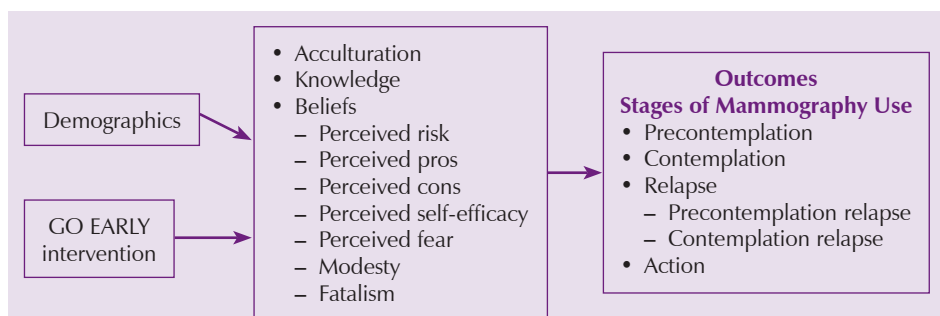


Figure 1. Breast Cancer Screening Model for Korean American Women

having a mammogram), to preparation (making a plan or preparing as necessary for having a mammogram), to action (having a mammogram), and maintenance (having an annual mammogram as recommended) (Prochaska & Velicer). Movement from one stage to the next can be predicted by changes in beliefs, such as pros, cons, self-efficacy, and knowledge (Menon, Champion, et al., 2007; Prochaska, Redding, & Evers, 2002).

This model has been used extensively in designing interventions to promote changes for various health promotion behaviors (i.e., exercise, nutrition, mammography, and smoking cessation) (Champion, Ray, Heilman, & Springston, 2000; Juniper, Oman, Hamm, & Kerby, 2004; Kobetz, Vatalaro, Moore, & Earp, 2005; Menon, Belue, Skinner, Rothwell, & Champion, 2007; Menon, Champion, et al., 2007; Rakowski et al., 1998; Velicer, Prochaska, & Redding, 2006). The stages of change provided the structural framework for measuring the outcome variable (stages of readiness for mammography use), and the knowledge and beliefs variables were focused on in the intervention to affect change in behavior (Champion et al., 2000, 2003, 2007; Menon et al., 2003; Menon, Champion, et al., 2007; Rakowski et al.).

Several studies have found that women in different stages have significantly different perceptions about breast cancer and mammography use: Women in the precontemplation stage have low perceptions of risk, pros, and self-efficacy and high perceptions of cons to mammography (Menon, Champion, et al., 2007); women in the contemplation stage have low perceptions of pros and self-efficacy and high perceptions of risk and cons

(Menon, Champion, et al., 2007); and women in the action stage have high perceptions of pros and self-efficacy and low perceptions of cons (Russell et al., 2007; Spencer, Pagell, & Adams, 2005). The findings suggest that a woman's decision to have a mammogram screening is influenced by a combination of beliefs and her stage of readiness for mammography, implying that an effective mammography promotion intervention must be targeted to specific beliefs within each stage of readiness to facilitate incremental changes in a woman's readiness to have a mammogram by manipulating her perceptions or beliefs. However, the TTM does not include a cultural component and has not been tested with Korean American women. Recognizing the importance of culture, the authors integrated variables described in the literature as cons or cultural cons—acculturation, perceived modesty, and perceived fatalism—into this study (Champion et al., 2004; Consedine et al., 2004; Han et al., 2000; Juon et al., 2002; Lew et al., 2003; Maxwell et al., 2000; Mayo et al., 2001; Phillips et al., 1999; Powe, 1995; Sadler et al., 2001; Tolma et al., 2006; Yu et al., 2003). The authors believe that the three variables take into account traditional Korean health and illness beliefs, values about virtues of women, and views of life events in general. The intervention content (see Table 1) focused on changing beliefs and knowledge such that they may encourage a woman to move from a lower stage to a higher stage (e.g., from precontemplation to contemplation to action). Although the authors realize that women may move back in stage as well, this study was not designed to assess longer-term changes in stage.

**Table 1. GO EARLY Components**

Intervention Group	Constructs	Content
<b>Precontemplators:</b> have never had a mammogram and are not thinking about having one in the next six months	Knowledge, perceived cons, fears, modesty, fatalism, and acculturation Emphasis on perceived pros, perceived risk, and perceived self-efficacy	Provide generic information (breast cancer facts and figures, risk factors, treatments, screening rates for Korean American women, and recommended screening guidelines). Emphasize the positive outcomes of regular mammography (cure with early detection) and build confidence to complete all steps. Watch video (Korean American survivor testimonial of having a mammogram).
<b>Contemplators:</b> have never had a mammogram but are thinking about having one in the next six months	Knowledge, perceived pros, risk, modesty, fatalism, and acculturation Emphasis on perceived cons, fears, and self-efficacy	Provide generic information. Address positive outcomes of regular mammography (cure with early detection). Emphasize decreasing specific cons and strengthen confidence to complete all steps of having a mammogram (self-efficacy). Watch video.
<b>Relapsers:</b> have had at least one mammogram in the past but are not on schedule now	Knowledge, perceived pros, susceptibility, self-efficacy, fear, modesty, fatalism, and acculturation Emphasis on specific cons	Provide generic information. Address positive outcomes of regular mammography (cure with early detection), risk, and confidence to complete all steps. Emphasize specific cons and strategies to avoid them based on issues identified by the group. Watch video.

## Research Objectives

The objectives of this study were to describe differences in sociodemographic characteristics, acculturation, knowledge, and beliefs by preintervention stages of readiness for mammography use (precontemplation, contemplation, and relapse) and by postintervention stages of readiness (precontemplation, contemplation, relapse, and action) and assess changes in acculturation, knowledge, and beliefs between stages of readiness for mammography use from pre- to postintervention (education). The authors combined the two relapse groups (precontemplation and contemplation) into one relapse group rather than separate them. The underlying assumption was that women in the relapse group need education to reduce specific cons to having the mammography again; these specific cons could be similar across relapse groups but may be different from the issues faced by women who have never had a mammogram.

## Methods

### Study Design

The authors conducted a prospective, repeated-measures, quasi-experimental study to test a culturally relevant, stage-based educational program called GO EARLY, specifically designed to promote mammography use among nonadherent Korean American women aged 40 years or older. Women were grouped according to their baseline stage of mammography use assessed during study enrollment: Group I (precontemplators [never had a mammogram and not thinking about having one]), Group II (contemplators [never had a mammogram but thinking about having one]), and Group III (relapsers [last mammogram was more than 12 months ago]).

### Setting and Sample

Study eligibility criteria included being a Korean American woman aged 40 years or older, not having had a mammogram in the past 12 months, no personal history of breast cancer, and being able to speak, read, and write Korean. The authors based age criteria on guidelines for breast cancer screening from the American Cancer Society (2008).

The study was conducted in collaboration with the Korean American Senior Center (KASC), a nonprofit community service organization located in Chicago's Korean American community. KASC's mission is to help meet the needs of non-English speaking Korean American families for obtaining and sustaining a sense of dignity and improving quality of life of ethnic minority immigrants in the United States. The KASC annually serves 4,000 Korean American families.

A convenience sample of 315 Korean American women aged 40 years or older was enrolled. With 5%

attrition during the six-week postintervention period, 300 women remained in the study. Attrition was a result of subjects visiting Korea for an indefinite time ( $n = 3$ ); hospitalized or too ill ( $n = 3$ ); refused because of ineligibility for free screening mammogram with their high income ( $n = 2$ ); relocated with no forwarding address or phone number ( $n = 4$ ); and personal issues ( $n = 3$ ).

Two trained and certified bilingual (English and Korean) Korean American community workers recruited study participants in person or by phone contact. The study was advertised through announcements via media outlets (Korean American newspapers and radio); flyers; announcements via Sunday services in Korean American churches, Korean American community events or forums, and KASC-sponsored events or forums; and word of mouth. It took about six months to recruit and enroll the 315 women in the study.

### Study Protocol

The University of Illinois institutional review board approved the study protocol (see Figure 2), and Korean language documents (a flyer, educational content, informed consent, an interviewer training manual, questionnaires, and the eligibility criteria form) were translated using a modified committee translation method to avoid the pitfalls of single-person translation (Prieto, 1992).

If a woman was willing to participate, the trained community navigator asked her to sign two copies of a Korean-language informed consent form. One copy was retained in the participant's file and the other copy was given to the participant. Then, the participant was checked for her eligibility and was asked three questions (determining stage of mammography use) to assign her into one of three educational groups (precontemplation, contemplation, or relapse). Each participant was given a reminder card with the date and time of her designated GO EARLY educational session. Each participant attended only one educational session arranged by stage group. On the day of each designated educational session, participants completed the preintervention questionnaire and attended the educational session. Six weeks after the completion of the educational session, each participant returned to KASC to complete a postintervention questionnaire in person.

- Recruit participants.
- Obtain informed consent.
- Check eligibility criteria.
- Check state of readiness for mammography use.
- Reminder card for designated GO EARLY session.
- Complete preintervention questionnaire.
- Attend GO EARLY session.
- Complete postintervention questionnaire (in person) six weeks after education.

**Figure 2. Study Protocol**

Each participant received a \$40 stipend (\$20 for each survey completion), a Korean-language breast self-examination leaflet, a summary of the educational content, and a mammography leaflet used during the educational session.

## GO EARLY Intervention

The GO EARLY educational program was a 45-minute, stage-based, semi-structured, interactive session on breast cancer and early screening knowledge and beliefs offered to three groups of Korean American women (precontemplators, contemplators, and relapsers). The principal investigator (PI), who is a Korean American woman, facilitated the education sessions in the conference room at the KASC. GO EARLY content was translated into Korean and each presentation was formulated to appeal to Korean American women. Each stage-based educational session was supplemented by Microsoft® PowerPoint® slides to illustrate certain topics with culturally appropriate graphics. All three groups received the same information about breast cancer facts and figures, risk factors, treatments, screening rates for Korean American women, and recommended screening guidelines. In each group, participants also watched a video testimonial from a Korean American breast cancer survivor. In addition to this generic information, each stage group received more specific information on particular beliefs to promote an upward shift in the stage of readiness for mammography use. For precontemplators, emphasis was placed on the positive outcomes of regular mammography use (i.e., breast cancer can be cured with early detection) and emphasized strategies to increase confidence to follow through on all necessary steps for a mammogram. For contemplators, emphasis was placed on decreasing specific cons and increasing self-efficacy. For relapsers, specific cons and strategies to minimize or avoid those cons based on issues identified by the group were discussed. The interactive component of the intervention included participants being asked for common cons and cultural beliefs. Rather than single out an individual and her beliefs, participants were asked to identify beliefs in the context of commonly heard issues in the community, and then the PI discussed these beliefs with the group.

## Measures

The questionnaires were translated into Korean by committee members (the Korean- and English-speaking PI, a research assistant, and community workers) using the modified committee translation method to produce consensus (Prieto, 1992). The **preintervention questionnaire** consisted of 117 questions, and the **postintervention survey** had 110 items (excluding demographics and

including four questions of postintervention stage of readiness for mammography use). Questionnaire items used in this study were developed previously and tested for reliability and validity (Champion, 1999; Champion et al., 2002; Champion & Menon, 1997; Champion & Scott, 1997). All beliefs (perceived risk, pros, cons, fear, and self-efficacy) were measured using a three-point Likert-type scale (1 [disagree], 2 [not sure], and 3 [agree]) to more easily quantify each point on the scale for Korean American women, particularly the older women. Total belief scores were the sum of all items in that subscale. Sociodemographic data (12 items) were obtained, including age, education, marital status, hours of work per week, household size, health insurance, family physician, length of U.S. residency, and annual income. Knowledge (17 items) was assessed by asking questions about factual information possessed by a woman related to breast cancer risk, causes, treatment, cure, mammography, and recommended screening guidelines (Cronbach alpha = 0.75). Perceived susceptibility (five items) assessed perceived risk of developing breast cancer (Cronbach alpha = 0.93). Perceived pros (five items) assessed perceived positive outcomes of having a mammogram (Cronbach alpha = 0.79). Perceived cons (17 items) assessed perceived obstacles to having a mammogram (Cronbach alpha = 0.86). Perceived self-efficacy (10 items) assessed perceived confidence in the woman's ability to follow the steps of having a mammogram (Cronbach alpha = 0.87). Perceived fear (10 items) assessed physical responses of anxiety and fear to thinking about breast cancer or the possibility of getting breast cancer (Cronbach alpha = 0.91). Acculturation (16 items) was measured by the **Suinn-Lew Asian Self-Identity Acculturation Scale** (Suinn, Khoo, & Ahuna, 1995), designed to assess the changes in social and cultural views that take place as a result of continuous interaction with other cultures different from one's own (Cronbach alpha = 0.91). Perceived modesty (eight items) assessed perceived subjective degree of shyness or feeling of embarrassment in obtaining mammogram by a modesty subscale (Cronbach alpha = 0.88) (Tang et al., 2000). Perceived fatalism (15 items) assessed perceived degree of pessimism about breast cancer using the **Powe Fatalism Inventory (PFI)**. The PFI measures four distinct factors: pessimism, death from cancer is inevitable, fear, and predeterminism (Cronbach alpha = 0.89) (Powe, 1995).

Stages of readiness for mammography adoption questions were derived from the National Cancer Institute Breast Cancer Screening Consortium's definitions of stages of mammography use (Stoddard et al., 1998). The definitions are

- Precontemplation: Never had a mammogram and not thinking about having one in the next six months.
- Contemplation: Never had a mammogram but thinking about having one in the next six months.

**Table 2. Participant Characteristics**

Characteristic	n	%
<b>Age (years)</b>		
$\bar{X} = 65, SD = 11$	–	–
40–49	33	11
50–59	46	15
60–69	92	31
70–79	104	35
80 or older	25	8
<b>Marital status</b>		
Married	159	53
Widowed	105	35
Divorced or separated	28	9
Never married	8	3
<b>Education</b>		
Less than high school	115	38
High school	108	36
Some college	26	9
College or higher	51	17
<b>U.S. residency (years)</b>		
1–10	60	20
11–20	113	38
21 or more	127	42
<b>Employed</b>		
Full-time	48	16
Part-time	48	16
Retired	137	45
Never worked	67	23
<b>Household size</b>		
1	161	54
2	83	28
3–4	41	13
5 or more	15	5
<b>Household income (\$)</b>		
Less than 10,000	157	52
10,000–24,999	78	26
25,000–39,999	25	8
40,000–54,999	14	5
56,000 or more	26	9
<b>Health insurance</b>		
Yes	204	68
No	96	32
<b>Type of health insurance</b>		
Private or health maintenance organization	47	16
Medicare	82	27
Medicaid	67	22
Other	8	3
None	96	32
<b>Primary care provider</b>		
Yes	231	77
No	69	23
<b>Ethnicity of provider</b>		
Korean	288	96
Other	12	4
<b>Specialty (N = 288)</b>		
Internist	236	82
General or family practice	46	16
Korean or Chinese medicine	3	1
Obstetrics and gynecology	3	1
<b>Provider was selected because (N = 288)</b>		
Speaks Korean	162	56
Personally known	17	6
Convenience	63	22
Referral	46	16
<b>N = 300</b>		

- Relapse: Last mammogram was over a year ago and not thinking about having one in the next six months, or thinking about having one in the next six months.
- Action: Last mammogram was within the six weeks after education for this study.

## Statistical Analysis

Data were analyzed using SPSS® 15.0. Descriptive statistics were used to assess the distribution of socio-demographic characteristics, acculturation, knowledge, beliefs, and stages of readiness for mammography use. The authors used one-way analysis of variance, post-hoc comparisons, paired t test, and chi-square to assess changes in knowledge and beliefs from pre- to postintervention.

## Results

The first objective of this study was to describe differences in sociodemographic characteristics, acculturation, knowledge, and beliefs by preintervention stages of readiness for mammography use (precontemplation, contemplation, and relapse) and postintervention stages of readiness (precontemplation, contemplation, relapse, and action).

## Participant Characteristics

Participant characteristics are detailed in Table 2. The mean age was 65 years (SD = 11), ranging in age from 40–89 years; 53% were married; 36% reported having graduated high school, and 26% had some college or higher education; 80% had been residing in the United States longer than 10 years; 32% were employed outside of the home; 54% were living alone; 52% had an annual household income of less than \$10,000; 68% had health insurance; 77% reported having a primary care physician; and 96% had a Korean American physician as a primary care provider.

## Preintervention Stages of Readiness for Mammography Use

For preintervention stages of mammography use, 21 (7%) were precontemplators, 38 (13%) were contemplators, and 241 (80%) were relapsers. Demographics by preintervention stages are summarized in Table 3. No significant differences existed in level of education, marital status, and number of live-in family members among stages. Women in the precontemplation stage were significantly younger than women in the relapse stage ( $F = 4.03, p < 0.05$ ). Significantly, more women in the precontemplation stage were working outside of the home ( $\chi^2 = 14.02, p < 0.001$ ), and significantly fewer women had health insurance ( $\chi^2 = 12.66,$

**Table 3. Demographics by Stage of Readiness at Baseline**

Characteristic	Precontemplation (N = 21)		Contemplation (N = 38)		Relapse (N = 241)		$\chi^2$
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	
Age (years)	60.3	10.5	62.9	12.8	66.2	10.6	F = 4.03
Characteristic	n	%	n	%	n	%	$\chi^2$
<b>Age (years)</b>							—
40–50	3	14	10	27	22	9	
51–60	9	43	3	6	41	17	
61–70	4	19	11	30	82	34	
71–80	5	24	14	37	82	34	
81 or older	—	—	—	—	14	6	
<b>Marital status</b>							—
Married	14	67	24	63	121	50	
Widowed	4	19	12	32	89	37	
Divorced or separated	1	4	2	5	24	10	
Never married	2	10	—	—	7	3	
<b>Education</b>							—
Less than high school	10	45	13	36	89	37	
High school	8	40	14	37	87	36	
Some college	1	5	3	8	22	9	
College or higher	2	10	8	19	43	18	
<b>U.S. residency (years)**</b>							15.76
Less than 10	10	45	12	32	39	16	
10 or more	11	55	26	68	202	84	
<b>Employed**</b>							14.02
Full- or part-time	15	72	14	38	67	28	
Retired	4	19	14	38	116	48	
Never worked	2	9	10	24	58	24	
<b>Household size</b>							
1–2	14	67	29	76	200	83	
3–4	5	24	6	16	31	13	
5 or more	2	9	3	8	10	4	
<b>Income (\$)</b>							21.87
Less than 10,000	9	42	18	49	135	56	
10,000 or more	12	58	20	51	106	44	
<b>Insurance*</b>							12.66
Yes	7	33	28	74	169	70	
No	14	67	10	26	72	30	
<b>Type of insurance</b>							
Private or health maintenance organization	—	—	5	13	51	21	
Medicare	12	57	14	37	80	33	
Medicaid	—	—	8	21	67	28	
Other	3	14	1	3	5	2	
None	6	29	10	26	38	16	
<b>Primary care physician**</b>							21.84
Yes	8	38	26	68	195	81	
No	13	62	12	32	46	19	

N = 300

\* p < 0.01; \*\* p < 0.001

p < 0.01) and a regular doctor ( $\chi^2 = 21.84$ , p < 0.001) than did women in the contemplation and relapse stages. Compared to women in the precontemplation and contemplation stages, a significantly higher number of women in the relapse stage had resided in the United States longer than 10 years ( $\chi^2 = 15.76$ , p < 0.001) and had annual income of less than \$10,000 ( $\chi^2 = 21.87$ , p < 0.01).

### Postintervention Stage of Readiness for Mammography Use

No significant intervention effects were noted on stages of readiness for mammography use. The stage movement from pre- to postintervention revealed that 8 of 21 women (38%) moved from the precontemplation to the contemplation stage, 1 of 38 women (3%) moved from the contemplation stage to the action stage, 14 of

38 women (37%) remained as contemplators, 23 of 38 women (61%) moved back from the contemplation to the precontemplation stage, and 12 of 241 women (5%) moved from the relapse to the action stage.

The results are congruent with the TTM, which postulates that behavior adoption stages are cyclical rather than linear (Prochaska & Velicer, 1997). At postintervention, 35 (12%) were precontemplators, 22 (7%) were contemplators, 229 (77%) were relapsers, and 13 (4%)

were in the action stage. Demographics by postintervention stages are summarized in Table 4.

### Reliability of Belief Subscales

Internal consistency reliability of measurement subscales for acculturation and beliefs (pre- and post-intervention) are detailed in Table 5. All subscales except perceived pros and modesty had Cronbach alphas greater than 0.70 based on standardized items.

**Table 4. Demographics by Postintervention Stages of Readiness**

Characteristic	Precontemplation (N = 35)		Contemplation (N = 22)		Relapse (N = 229)		Action (N = 13)		$\chi^2$
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	
Age (years)	64	12.2	62	12.4	66	10.3	63	13.5	
Characteristic	n	%	n	%	n	%	n	%	$\chi^2$
<b>Age (years)</b>									—
40–50	5	15	5	24	21	9	3	23	
51–60	9	25	4	19	37	16	1	8	
61–70	7	20	7	28	82	36	5	38	
71–80	12	35	5	24	80	35	3	23	
81 or older	2	5	1	5	9	4	1	8	
<b>Marital status</b>									—
Married	18	53	12	55	119	52	8	62	
Widowed	11	31	7	32	82	36	5	38	
Divorced or separated	3	8	2	9	23	10	—	—	
Never married	3	8	1	4	5	2	—	—	
<b>Education</b>									—
Less than high school	15	44	9	41	85	37	2	17	
High school	14	39	9	41	80	35	8	58	
Some college	4	10	—	—	23	10	—	—	
College or higher	2	7	4	18	41	18	3	25	
<b>U.S. residency (years)*</b>									17.792
Less than 10	14	41	8	36	34	15	2	15	
10 or more	21	59	14	64	195	85	11	85	
<b>Employed*</b>									8.021
Full- or part-time	15	42	11	50	64	28	6	46	
Retired	13	37	7	32	110	48	4	31	
Never worked	7	21	4	18	55	24	3	23	
<b>Household size</b>									—
1	15	43	11	50	126	55	8	62	
2	11	31	4	18	69	30	1	8	
More than 2	9	26	7	32	34	15	4	30	
<b>Income (\$)</b>									—
Less than 10,000	21	61	9	40	133	58	7	54	
10,000 or more	14	39	13	60	96	42	6	46	
<b>Health insurance</b>									—
Yes	19	55	14	64	163	71	10	77	
No	16	45	8	36	66	29	3	23	
<b>Type of insurance</b>									—
Private	—	—	6	27	23	10	6	43	
Health maintenance organization	2	5	—	—	21	9	—	—	
Medicare or Medicaid	19	55	9	41	147	64	7	57	
Other	3	9	3	13	2	1	—	—	
None	11	31	4	19	36	16	—	—	
<b>Primary care physician*</b>									16.097
Yes	21	60	12	55	188	82	10	77	
No	14	40	10	45	41	18	3	23	

N = 299 (One participant failed to provide postintervention information.)

\* p < 0.001



## Differences in Acculturation, Knowledge, and Beliefs Among Preintervention Stages of Mammography Use

Mean scores of acculturation, knowledge, and beliefs among preintervention stages of mammography use are summarized in Table 6. Women in the contemplation stage had significantly lower knowledge scores than women in the relapse stage ( $F = 2.996, p < 0.05$ ). Women in the precontemplation stage had significantly higher cons scores compared to women in the contemplation and relapse stages ( $F = 15.263, p < 0.01$ ). Also, women in the contemplation stage had significantly higher cons scores than women in the relapse stage. Women in the precontemplation stage also had significantly lower self-efficacy scores than women in the relapse stage ( $F = 2.68, p < 0.01$ ).

## Differences in Acculturation, Knowledge, and Beliefs Among Postintervention Stages of Readiness for Mammography Use

Mean scores of acculturation, knowledge, and beliefs among the postintervention stages of readiness for mammography use are summarized in Table 7. Women in the precontemplation stage had significantly higher cons scores than women in all other stages ( $F = 4.325, p < 0.01$ ). Also, women in the contemplation stage had significantly higher cons than women in the relapse stage. Women in the precontemplation stage also had significantly lower self-efficacy scores than women in all other stages ( $F = 4.709, p < 0.05$ ).

## Changes in Acculturation, Knowledge, and Beliefs From Pre- to Posteducation

The second objective was to assess changes in acculturation, knowledge, and beliefs among stages of readiness for mammography use from pre- to post-intervention (education).

Significant differences by stage are detailed in Table 7. Mean scores for acculturation, knowledge, and self-efficacy increased significantly from pre- to post-intervention. Overall, increases were common for women in the relapse stage. Mean scores for perceived risk, cons, fear, modesty, and fatalism decreased significantly from pre- to postintervention. Women in the relapse stage had more decreases for all beliefs. Mean acculturation scores increased significantly by 0.3 points ( $p < 0.05$ ). Women in the relapse stage had significantly increased mean scores (0.4 point increase) ( $p < 0.05$ ). Mean knowledge scores increased significantly by 1.4 points ( $p < 0.01$ ). This was true for women in all three stages: precontemplation (2.4 point increase), contemplation (3 point increase), and relapse (1.1 point increase). Women in the precontemplation stage had a significantly decreased mean score for perceived risk or susceptibility (0.9 point decrease).

**Table 5. Internal Consistency Reliability**

Scale	Cronbach Alpha Based on Standardized Items	
	Preintervention	Postintervention
Acculturation	0.73	0.74
Perceived risk	0.85	0.87
Perceived pros	0.61	0.65
Perceived cons	0.86	0.9
Perceived fear	0.92	0.93
Perceived self-efficacy	0.83	0.83
Modesty	0.64	0.6
Fatalism	0.85	0.87

Mean scores for perceived cons decreased significantly by 2.7 points ( $p < 0.01$ ). Women in the precontemplation stage had significantly decreased mean cons (6.7 point decrease); cons for women in the contemplation stage decreased by 4.7 points; and for women in the relapse stage, cons decreased by 2 points.

Mean scores for perceived self-efficacy scores increased significantly by 0.9 points ( $p < 0.01$ ). Women in the contemplation stage had significantly increased self-efficacy (1.9 points), and for women in the relapse stage, self-efficacy increased by 0.7 points. Mean scores for perceived fear decreased significantly by 1.4 points ( $p < 0.01$ ). Women in the relapse stage had significantly decreased fear by 1.5 points.

Mean scores for perceived modesty significantly decreased by 0.7 points ( $p < 0.01$ ). Women in the relapse stage had significantly decreased modesty by 0.4 points. Mean scores for fatalism decreased significantly by 0.6 points ( $p < 0.01$ ), true for women in all three stages: precontemplation (1.8 point decrease), contemplation (1 point decrease), and relapse (0.4 point decrease).

## Discussion

For preintervention stages of readiness for mammography use, given the lower screening rates among Korean American women, a surprising majority in this study were in the relapse stage (80%). Two-thirds of study participants had a mammogram at least once at some point in their lifetime, but the recommended annual mammography guidelines were not followed (CDC, 2004; Kandula et al., 2006; Lee et al., 2006; McCracken et al., 2007). This sporadic mammography use could be partly attributed to obtaining screening mammography by chance. These relapsers might have had mammograms in the past by chance when mammography services, particularly free mobile mammography services, were available to them. Although no specific evidence exists to support this, the data collectors reported that the majority of women in the relapse group mentioned having mammograms only when the free

**Table 6. Acculturation, Knowledge, and Beliefs by Pre- and Postintervention Stages**

Scale	Total (N = 299) <sup>a</sup>		Precontemplation (N = 35)		Contemplation (N = 22)		Relapse (N = 229)		Action (N = 13)		F
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	
<b>Acculturation</b>											
Preintervention	28.6	4.3	28.9	3.9	27.8	4.5	28.7	4.3	–	–	–
Postintervention	28.9	4.4	28.3	4.8	29.3	4.6	28.9	4.3	30.3	4.3	–
<b>Knowledge*</b>											
Preintervention	7.7	3	7.1	2.5	6.7	2.9*	7.9	3	–	–	2.996
Postintervention	9.1	3.1	8.4	2.9	9.3	3.4	9.2	3.1	9.9	3	–
<b>Susceptibility</b>											
Preintervention	7	2.3	7.3	2.2	6.9	2.2	7	2.4	–	–	–
Postintervention	6.9	2.3	7	2.3	6.5	1.8	6.9	2.4	6.6	2.4	–
<b>Pros</b>											
Preintervention	13.8	1.6	14	1.5	14.1	1.3	13.7	1.6	–	–	–
Postintervention	13.8	1.6	13.8	1.2	14.2	1.1	13.7	1.8	13.9	1.4	–
<b>Cons**</b>											
Preintervention	27.9	7.7	35.3	7**	31	8.6**	26.7	7.1	–	–	15.263
Postintervention	25.2	7.9	28.9	8.1**	24.6	8.4*	24.8	7.8	21.1	4	4.325
<b>Self-efficacy**</b>											
Preintervention	26.1	4	23.7	4.8**	25.7	3.7	26.4	4	–	–	2.68
Postintervention	27	3.6	25.1	3.9*	28.1	2.2	27.2	3.6	27.7	2.6	–
<b>Fear</b>											
Preintervention	19.6	6.7	19.7	6	19.6	7.3	19.5	6.8	–	–	–
Postintervention	18.2	6.9	19.1	6.2	20.4	7	17.8	7	19.5	7.3	–
<b>Modesty</b>											
Preintervention	14.4	3.7	13.7	5	14.7	3.8	14.4	3.5	–	–	–
Postintervention	13.7	3.4	13.4	4	13.5	3.6	13.8	3.3	14	4.2	–
<b>Fatalism</b>											
Preintervention	2.7	3.1	3.7	3.5	2.8	3.3	2.5	3	–	–	–
Postintervention	2.1	2.9	2.7	3.5	1.1	1.7	2.1	2.9	1.2	1.8	–

\*  $p < 0.05$ ; \*\*  $p < 0.01$

<sup>a</sup>One participant failed to provide postintervention information.

mobile mammography van was available for them through the community center (anecdotal note).

A lack of intervention effect was noted concerning moving Korean American women upward in the stage of readiness for mammography use (77% of study participants remained in the relapse stage). This could be partly attributed to insufficient time for older Korean American women to follow through the necessary steps to complete a mammogram within six weeks of the postintervention data collection period (such as arrangement for transportation, rearranging daily schedule, making appointment for mammogram prescription, and scheduling mammogram). Other reasons may have included cost and lack of health insurance or access to care. To control for these issues, the authors referred women (during the educational program) to the Illinois Breast and Cervical Cancer Program (IBCCP), which provides free mammograms and assistance with Medicaid applications if diagnostic follow-up is necessary. In addition, 23 women moved back from the contemplation to the precontemplation stage postintervention. No significant differences of characteristics between women who remained in the contemplation stage and women who moved backward to the precontemplation stage

except that women who moved back to the precontemplation stage reported cons of being too busy, afraid to find something wrong, or having more important things to do. Therefore, this could be situational regression of behavior changes among these women. The authors strongly advocate that additional longitudinal study is warranted to assess incremental changes of stage of readiness and necessary time frame for older Korean American women to complete a mammogram as well as the magnitude or weight of the cons to screenings.

For the most part, no significant demographic differences were noted in postintervention stages of readiness for mammography use, except that more women in the relapse and action stages had resided in the United States for more than 10 years. The findings are similar to other studies with Korean American women (Juon et al., 2002, 2004, 2006; Kim & Sarna, 2004; Lee et al., 2006; Lew et al., 2003; Maxwell et al., 2000; Moskowitz et al., 2007; Sadler et al., 2001; Sarna et al., 2001). The existing studies that assessed the length of U.S. residency and mammography rates for Korean American women were not stage based. The authors' findings indicated that women who have never had a mammogram had resided in the United States for fewer than 10 years.

The measurement scales for belief subscales were modified from five-point Likert-type to a three-point scale, based on the PI's previous experience with Korean American study participants. The majority of Korean American study participants have had difficulty with the five-point Likert scale. Recognizing that this may impact psychometrics of the subscales, the authors analyzed Cronbach alphas based on standardized items for internal consistency reliability for pre- and postintervention questionnaire (Osburn, 2000). The internal consistency reliability was satisfactory on both surveys with Korean American women.

The GO EARLY educational program was effective in increasing knowledge of breast cancer and breast cancer screening, increasing perceived self-efficacy and decreasing perceived cons and fatalism for all study participants. The education was culturally sensitive because it was delivered by the PI, who is a Korean American immigrant woman herself and who could easily relate to study participants' cultural beliefs; additional cultural competency was ensured by using the Korean language and culturally relevant pictures and graphics for Korean American women. The increase in acculturation scores from pre- to postintervention, however, was unexpected and warrants additional study. Although the authors did not expect anyone to increase their level of acculturation within the six-week time frame, the authors were interested to see any changes or differences of cultural beliefs because the educational content included discussion about Korean traditional beliefs (health and illness concepts, virtues of women, and views of life events in general) related to breast cancer and the importance of early screening. The increased mean scores for acculturation after education raised questions, and additional analysis and study is warranted.

The education also was effective in modifying the other perceptions of breast cancer and mammography use (perceived risk, fear, fatalism, and modesty). The results supported the theoretical predictions from the TTM. Precontemplators and contemplators had higher perceptions of perceived cons and lower perceptions of self-efficacy for having a mammogram, as reported in other studies (Champion & Skinner, 2003; Menon, Champion, et al., 2007; Skinner, Arfken, & Sykes, 1998; Skinner, Champion, Gonin, & Hanna, 1997).

Perceived pros for mammography, however, did not significantly distinguish among stages for this study,

**Table 7. Changes in Acculturation, Knowledge, and Beliefs Between Baseline Stages Pre- to Postintervention**

Stage	Total (N = 300)		Precontemplation (N = 21)		Contemplation (N = 38)		Relapse (N = 241)	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Acculturation	28.9	4.4*	30.3	3.8	27.4	4.6	29.1	4.3*
Knowledge	9.1	3.1**	9.5	1.7**	9.7	2.9**	9	3.2**
Susceptibility	6.9	2.3	6.4	2*	6.9	2.3	6.9	2.3
Pros	13.8	1.6	13.8	1.2	13.9	1.1	13.8	1.7
Cons	25.2	7.9**	28.6	7.4**	26.3	9.7**	24.7	7.5**
Self-efficacy	27	3.6**	25.4	3.4	27.6	2.8**	27.1	3.7**
Fear	18.2	6.9**	20.9	6.9	17.8	6.3	18	7**
Modesty	13.7	3.4**	14	5.2	14.2	3.5	13.6	3.2**
Fatalism	2.1	2.9**	1.9	2.2**	1.8	2.3**	2.1	3**

\*  $p < 0.05$ ; \*\*  $p < 0.01$

which was a finding inconsistent with previous studies (Champion & Skinner, 2003; Menon, Champion, et al., 2007).

## Conclusion

This was the first study to assess stages of readiness for mammography use and to test a stage-based targeted breast cancer screening intervention specifically designed to increase mammography use among non-adherent Korean American women. The GO EARLY intervention was feasible and culturally sensitive to Korean American women (Korean language, feedback from target sample, graphics, and appropriate use of Korean vernacular), and can be replicated in various Korean American communities. In addition, except for acculturation, the authors were able to show changes in beliefs from pre- to postintervention, as predicted by the TTM. Considering that the TTM is based on changing beliefs and knowledge to move women up the stage continuum (for example, increase pros and decrease cons to move a woman from the precontemplation to the contemplation or to the action stage), the authors believe the intervention was successful in changing beliefs. Each woman's decision to use mammography is influenced by a combination of her perceptions of breast cancer and early screening and her stage of readiness to have a mammogram, as well as system-related issues (e.g., getting timely appointments, access to care). In future research, the authors hope to incorporate aspects of the healthcare environment to assess the combined effect of beliefs and environment.

## Implications for Nursing

Each woman's decision to use available mammography service is influenced by a combination of her

perceptions of breast cancer and screening and her stage of readiness to have a mammogram. Culturally appropriate educational programs can serve to change women's perceptions and knowledge but also may need to include components related to navigating the healthcare system to lead to changes in health behavior. The key to success for mammography promotion intervention (educational), specifically for ethnic minority women, includes ways to have fewer social, cultural, and linguistic cons and a more natural, supportive, interactive, and comfortable learning environment.

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