Korean Journal of Health Education and Promotion
Vol.3, No.1, 2001, pp. 83-98

Health education-communication approaches in health examinations for risk behavior modification

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CONTENTS

Ⅰ. Introduction

A modern approach to health examinations broadens their role from focusing on early detection and accurate diagnosis to further inclusion of disease prevention and health promotion. Since accumulated effects of lifestyle factors such as cigarette smoking and physical inactivity are known to be associated with the development of chronic diseases, assessment of those factors and providing guidance to healthy behavior must be components of a health examination. The National Health Insurance of Korea provides free periodic health examinations to its beneficiaries, but they are not well utilized and lack follow-up care. On the other hand, private health examinations, which require out-of-pocket payment, are more popular and comprehensive with the inclusion of preventive follow-ups. For instance, while participation in the Nationa Health Insurance health examination (excluding government employees and school teachers) remained (Korea National Health Insurance Corporation, 1999). the number of participants in private hospital-based health examinations increased along with the development of diverse health examination programs (Table 1).

Although private health examinations are popularly utilized, relatively little efforts have

Table 1. Attendance to the SMC Health Examination

Year	Number of Participants	Number of Health Examination Programs
1995	10,133	3
1996	18,484	8
1997	16,714	10
1998	20,776	12
1999	21,181	14

Source: Center for Health Promotion, Samsung Medical Center, Seoul, Korea (1996, 1997, 1998, 1999, 2000)

been made for health behavior modification during and after a health examination as compared to established system of referral and medical treatment linked to health examinations. Thus, effectiveness of health examinations in terms of health behavior modification has been scarcely investigated. This study was designed to assess the preventive and health promotional effect of health examinations regarding cardiovascular disease (CVD), the leading threat among chronic diseases, by focusing on risk health behavior modification, and to make constructive suggestions to maximize the effect.

II. Materials and Method

DATA COLLECTION: The health examination programs of the Samsung Medical Center (SMC) in Seoul were chosen for this study not only because they were developed to target chronic diseases such as CVD, but also because they were selected by the Korea Institute for Health and Social Affairs as a model case of health examination that included preventive and health promotional components (Kim et al, 1997). Demographics and behavior data were excerpted from the SMC health questionnaire results while other clinical data such as blood pressure, blood cholesterol level, and Body Mass Index (BMI) were obtained from the health examination results. Computerized data of all the participants in Program A (the most comprehensive program in the SMC) and B (basic health examination program) who had health examinations in 1996 and January through June of 1997 were used in this study (See Table 2 for the program details). The participants chose and went through the programs either voluntarily or as a worksite health promotion effort supported by their employers. Exclusion criteria were: (1) already having CVD or related conditions (hypertension, hyperlipidemia, stroke, diabetes, and/or ischemic heart disease); (2) taking medication for high blood pressure and/or diabetes; (3) having records missing in outcome in either

Table 2. Health Examination Programs

Program A (advanced)

Closer examination with more medical examination and counseling than Program B

In addition to Program B

- Sigmoidoscopy
- Bone density scan
- More blood panel
  : Peripheral blood smear, Alkaline phosphatase, Fe, TIBC, T3, T4, IgE, CA19-9, PAP
- Chest X ray LAT
- More gynecologic examinations (for women) : transvaginal sonography, colposcopy
- Sports medicine assessment
- Dental examination (intensive)
- Intensive counseling: stress management, sports medicine, diet (intensive)
- Follow-up (if necessary)

Program B (basic)

- Height, weight, vision, hearing, BMI, Blood pressure
- Lung function: FEV1, FEF 25-75%, PEF, PFT
- Intraocular pressure and eyeground examination
- Chest X ray PA
- Electrocardiograph
- Abdominal ultrasonogram
- Blood and urine analyses
  : blood type, WBC, RBC, Hb, Hct, Platelet, total protein, albumin, globulin, AST, ALT, -GT, total Bilirubin, HBsAg, HBsAb, HBcAb, HCVAb, glucose, HbAlc, BUN, Creatinine, P, Ca, Na, K, Cl, total CO2, Ferritin, VDRL, TPHA, RA, HIVAb, TSH, AFP, CEA, CA125, PSA
- Stool analysis
- Endoscopy or UGIS
- Dental examination (basic)
- Gynecologic examinations (for females)
  : pelvic examination, PAP smear, mammogram
- Health questionnaire and individual counseling (medical and diet (basic))

Source: Center for Health Promotion, Samsung Medical Center, Seoul, Korea (1997)

year; and (4) not being Korean nationals.

Among the outcome variables, smoking status was measured at three levels: current, and ex, and never smokers as ex-smokers being those who did not smoke for the past 6 months. Exercise also had three levels of none, irregular, and regular. Regular exercisers were those who exercised more than 3 times a week. Obesity was defined as having BMI (=weight in kilogram divided by (height in meter)^2) of 25 or greater. The measurement level of other variables is shown in Table 3.

Table 3. Program A vs B in the Health Examination Group

	Program A			Program B			χ^2 p-value
	n	(%)	*Valid %*	n	(%)	*Valid %*	
Total cases	480	(53.8%)		413	(46.2%)		
Receiver Variables							
Demographics							
Age*	mean = 49.05 (s.d = 6.58)			mean = 47.79 (s.d.= 7.15)			**0.006**
Gender*							**0.000**
Female	98	(20.4%)		270	(65.4%)		
Male	382	(79.6%)		143	(34.6%)		
Area							0.757
Seoul	363	(75.6%)		316	(76.5%)		
Other	117	(24.4%)		97	(23.5%)		
Education							0.199
College≤	342	(71.3%)	72.6%	314	(76.0%)	76.4%	
College >	129	(26.9%)	27.4%	97	(23.5%)	23.6%	
No Data	9	(1.9%)		2	(0.5%)		
Family History							0.112
No	288	(60.0%)		226	(54.7%)		
Yes	192	(40.0%)		187	(45.3%)		
Reason for Health Examination*							**0.002**
Health Problem	146	(30.4%)	32.2%	89	(21.5%)	22.6%	
Routine Checkup	307	(64.0%)	67.8%	304	(73.6%)	77.4%	
No Data	27	(5.6%)		20	(4.8%)		
Examination Experience							0.823
No	37	(7.7%)	7.9%	30	(7.3%)	7.5%	
Yes	431	(89.8%)	92.1%	370	(89.6%)	92.5%	
No Data	12	(2.5%)		13	(3.1%)		
Message Variables							
Result Category*							**0.000**
Normal	10	(2.1%)	3.8%	31	(7.5%)	12.4%	
Observation	96	(20.0%)	36.4%	87	(21.1%)	34.8%	
Follow-up	47	(9.8%)	17.8%	0	(0.0%)	0.0%	
Referral	111	(23.1%)	42.0%	132	(32.0%)	52.8%	
No Data	216	(45.0%)		163	(39.5%)		
Identified Health Problems*							**0.000**
No	18	(3.8%)	19.4%	32	(7.7%)	45.1%	
Yes	75	(15.6%)	80.6%	39	(9.4%)	54.9%	
No Data	387	(80.6%)		343	(82.8%)		
Behavior Recommendations							0.071
No	95	(19.8%)	56.2%	96	(23.2%)	66.2%	
Yes	74	(15.4%)	43.8%	49	(11.9%)	33.8%	
No Data	311	(64.8%)		268	(64.9%)		

	Program A			Program B			χ^2 p-value
	n	(%)	*Valid %*	n	(%)	*Valid %*	
Channel Variables							
Interval							0.817
Over	225	(46.9%)	85.2%	214	(51.8%)	85.9%	
Within	39	(8.1%)	14.8%	35	(8.5%)	14.1%	
No Data	216	(45.0%)		164	(39.7%)		
# of Counseling Sessions*							**0.000**
1	222	(46.3%)	84.1%	249	(60.3%)	99.6%	
2	38	(7.9%)	14.4%	0	(0.0%)	0.0%	
3	4	(0.8%)	1.5%	1	(0.2%)	0.4%	
No Data	216	(45.0%)		163	(39.5%)		
Outcome Variables							
Smoking 96*							**0.000**
Never	147	(30.6%)		246	(59.6%)		
Ex	153	(31.9%)		103	(24.9%)		
Current	180	(37.5%)		64	(15.5%)		
Smoking 97*							**0.000**
Never	141	(29.4%)		242	(58.6%)		
Ex	167	(34.8%)		109	(26.4%)		
Current	172	(35.8%)		62	(15.0%)		
Exercise 96*							**0.000**
None	82	(17.1%)	17.9%	113	(27.4%)	29.4%	
Irregular	233	(48.5%)	51.0%	137	(33.2%)	35.6%	
Regular	142	(29.6%)	31.1%	135	(32.7%)	35.1%	
No Data	23	(4.8%)		28	(6.8%)		
Exercise 97*							**0.000**
None	75	(15.6%)	16.0%	106	(25.7%)	26.7%	
Irregular	242	(50.4%)	51.6%	138	(33.4%)	34.8%	
Regular	152	(31.7%)	32.4%	153	(37.0%)	38.5%	
No Data	11	(2.3%)		16	(3.9%)		
Obesity 96*							**0.002**
No	357	(74.4%)		342	(82.8%)		
Yes	123	(25.6%)		71	(17.2%)		
Obesity 97*							**0.001**
No	360	(75.0%)		348	(84.3%)		
Yes	120	(25.0%)		65	(15.7%)		

Note: (1) Valid % refers to the percentages computed after discarding missing data.
(2) Variables with an asterisk and bold-printed p-values have significant differences between men and women at α=0.05

STUDY DESIGN: Although more recent data were available, 1996-1997 data were used to protect the internal validity of the study that might have been possibly threatened by the economic crisis that affected Asia in the late 1990s. In this quasi-experimental design, those who had health examinations in 1996 and revisited in 1997, either Program A or B, answered the same questionnaire in both years. The comparison group consisted of those who had a SMC health examination for the first time in 1997, to whom the questionnaires were administered before the health examination procedure.

CONCEPTUAL MODEL: This study borrowed the concept of the Persuasive Communication (McGuire, 1984) variables to understand the mechanism of the health examination as health communication. Figure 1 illustrates the conceptual model constructed for the study. According to the Persuasive Communication, successful communication helps people not only to understand the message but also to believe it, and thereby to be motivated to act (McGuire, 1984). Although the Persuasive Communication is ideally understood with all five areas of variables, which are source, receiver, channel, message, and outcome, the present study limited its focus on Source-Outcome association (printed in bold in Figure 1) due to practical constraints such as availability of adequate data. So far, several studies have investigated the importance of 'Receiver' and 'Message' variables in the Persuasive Communication (Simons-Morton, Donohew, and Crump, 1997; Bakker, 1999; Friedman et al, 1994). However, in the SMC health examination where participants are relatively similar in socio-demographic characteristics and where health information is disseminated in a similar format, how different sources of message influence the outcome is the point of interest. Thus, present study focused on the 'Source-Outcome' relationship.

ANALYSIS: At the descriptive level, frequency distributions, means, and standard deviations were computed. Chi-square statistics were used for comparison of categorical variables, and two sample t-test was used for continuous variables. McNemar chi-square analysis was employed to examine behavior changes between 1996 and 1997. Predictors of health behavior status were identified through forward stepwise selection in logistic regression modeling.

Ⅲ. Results

DESCRIPTIVE RESULTS: Among 1,488 participants who had health examinations in both 1996 and 1997, 893 people (60.0%), herein the Health Examination Group, met the inclusion criteria. Average age was 48.47 years

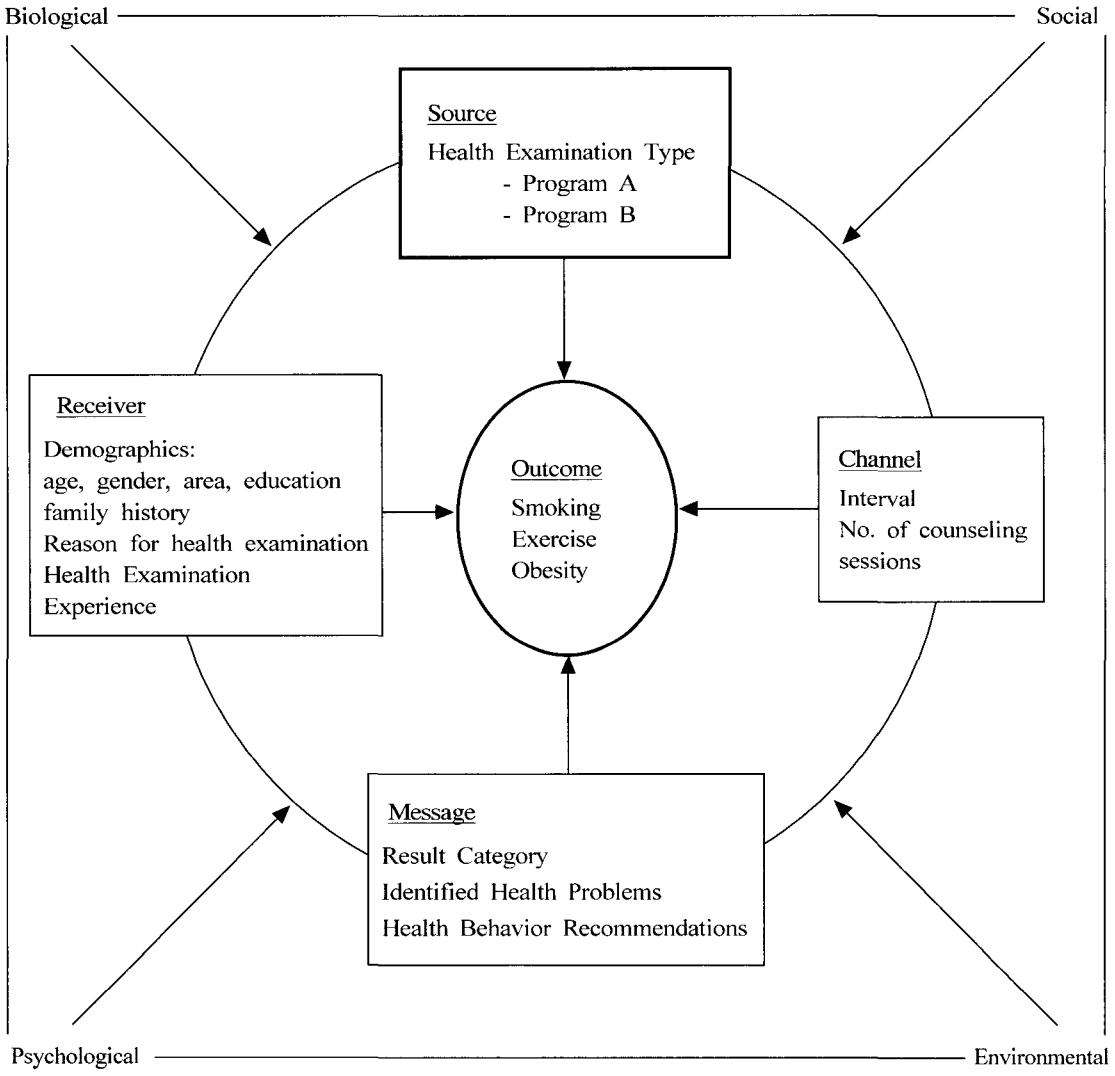

Figure 1. Conceptual Model

(s.d.=6.87) and male:female ratio was 1.0:0.7. About 54% (53.8%) of the participants chose the Program A over B. Majority of them had college level or higher education (74.4%) and lived in Seoul (76.0%). Less than half of the participants had family history of CVD (42.4%) and 92.3% had a previous experience of having a health examination. Seventy two percent (72.2%) answered that they had the health examination as a routine checkup, not for any particular symptoms or health concerns. In terms of CVD-related risk behaviors, smoking prevalence was around 40% (44.0% in 1996 and 42.9% in 1997). About 20% (23.2% in 1996

and 20.9% in 1997) of the participants did not exercise at all. Prevalence of obesity ranged from 21.7% in 1996 to 20.7% in 1997.

Those who were excluded from the Health Examination Group consisted of more men (p=0.000), older people (2.61 years, p=0.000), and obese people (p=0.000). They were excluded because they had a large amount of missing data (up to 82.2%) due to unsettled data system for certain data fields at the time of data collection.

BASELINE COMPARISON : For the Comparison Group, 2,789 people (74.8%) met the criteria out of 3,729. The Health Examination Group was older (2.79 years, p=0.000), more educated (p=0.000), lived in Seoul (p=0.000), had previous experience with health examinations (p=0.000), and had the current health examination as a routine (p=0.000). When adjusted for the differences, two groups showed similar behavior patterns which supported that the time difference between the measurements of two groups might not have influenced their behaviors.

PROGRAM A VS B : Program A participants were 1.26 years older (p=0.006), included more men (p=0.000), and had the health examinations for perceived health problems (p=0.002) than Program B participants (Table 3). Although some differences were found among the Message and Channel variables, a large amount of missing data prevented further interpretations. In terms of health behaviors, Program A participants smoked less (p=0.000), exercised more (p=0.000), and were more obese (p=0.001~0.002).

Behavior change occurred in neither of the health examination programs (Table 4). The health examination type was not predictive of health behavior patterns either. The significant predictors of health behavior status included gender, age, education level and previous experience of health examinations (Table 5).

GENDER DIFFERENCES : Since gender was the strongest predictor of behavior patterns in this study, further comparison was made between gender. Men were older (2.58 years, p=0.000), more educated (p=0.000), and more

Table 4. Behavior Change by Health Examination Type

	Program A		Program B	
	McNemar χ^2	p-value	McNemar χ^2	p-value
Smoking	2.133 (df=1)	0.200	0.500 (df=1)	0.727
Exercise	5.702 (df=3)*	0.127	2.968 (df=3)*	0.397
Obesity	0.273 (df=1)	0.602	1.286 (df=1)	0.257

Note *: Test of Symmetry

Table 5. Results of Logistic Regression Analyses

Terms	B	S.E.	Wald	df	p-value	OR	95%CI for OR
Smoking 1996							
Gender	-3.605	0.350	106.164	1	0.000	0.027	[0.014, 0.054]
Age	-0.047	0.013	12.345	1	0.000	0.954	[0.930, 0.980]
Education	0.469	0.239	3.849	1	0.050	1.598	[1.000, 2.553]
Experience	-0.943	0.428	4.850	1	0.028	0.390	[0.168, 0.901]
Constant	2.942	0.742	15.741	1	0.000		
Smoking 1997							
Gender	-3.538	0.357	98.010	1	0.000	0.029	[0.014, 0.059]
Age	-0.042	0.013	10.119	1	0.001	0.959	[0.934, 0.984]
Experience	-1.141	0.431	7.000	1	0.008	0.320	[0.137, 0.744]
Constant	2.927	0.741	15.610	1	0.000		
Exercise 1996							
Gender	0.896	0.190	22.146	1	0.000	2.249	[1.686, 3.555]
Age	-0.103	0.016	42.270	1	0.000	0.902	[0.874, 0.930]
Education	0.502	0.207	5.868	1	0.015	1.652	[1.101, 2.481]
Constant	3.032	0.749	16.368	1	0.000		
Exercise 1997							
Gender	0.966	0.191	25.468	1	0.000	2.629	[1.806, 3.826]
Age	-0.084	0.015	29.052	1	0.000	0.920	[0.892, 0.948]
Education	0.512	0.205	6.226	1	0.013	1.668	[1.116, 2.494]
Constant	1.978	0.738	7.188	1	0.007		
Obesity 1996							
Gender	-1.391	0.217	41.011	1	0.000	0.249	[0.162, 0.381]
Education	0.795	0.210	14.358	1	0.000	2.215	[1.468, 3.342]
Constant	-1.091	0.110	98.799	1	0.000		
Obesity 1997							
Gender	-1.441	0.227	40.407	1	0.000	0.237	[0.152, 0.369]
Education	0.595	0.217	7.507	1	0.006	1.814	[1.185, 2.777]
Constant	-1.116	0.111	101.452	1	0.000		

Table 6. Health Behavior Status by Gender

	Men			Women			χ^2 p-value
	n	(%)	*Valid %*	n	(%)	*Valid %*	
Total cases	525	(58.8%)		368	(41.2%)		
Receiver Variables							
Demographics							
Age*	mean = 49.53 (s.d = 7.13)			mean = 46.95 (s.d.= 6.19)			**0.000**
Education							**0.000**
College≤	432	(82.3%)	83.2%	224	(60.9%)	61.7%	
College >	87	(16.6%)	16.8%	139	(37.8%)	38.3%	
No Data	6	(1.1%)		5	(1.4%)		
Outcome Variables							
Smoking 96*							**0.000**
Never	85	(16.2%)		308	(83.7%)		
Ex	207	(39.4%)		49	(13.3%)		
Current	233	(44.4%)		11	(3.0%)		
Smoking 97*							**0.000**
Never	91	(17.3%)		292	(79.3%)		
Ex	210	(40.0%)		66	(17.9%)		
Current	224	(42.7%)		10	(2.7%)		
Exercise 96*							**0.000**
None	75	(14.3%)	15.0%	120	(32.6%)	35.1%	
Irregular	271	(51.6%)	54.2%	99	(26.9%)	28.9%	
Regular	154	(29.3%)	30.8%	123	(33.4%)	36.0%	
No Data	25	(4.8%)		26	(7.1%)		
Exercise 97*							**0.000**
None	68	(13.0%)	13.2%	113	(30.7%)	32.1%	
Irregular	276	(52.6%)	53.7%	104	(28.3%)	29.5%	
Regular	170	(32.4%)	28.9%	135	(36.7%)	38.4%	
No Data	11	(2.1%)		16	(4.3%)		
Obesity 96*							**0.000**
No	370	(70.5%)		329	(89.4%)		
Yes	155	(29.5%)		39	(10.6%)		
Obesity 97*							**0.000**
No	375	(71.4%)		333	(90.5%)		
Yes	150	(28.6%)		35	(9.5%)		

Note: (1) Valid % refers to the percentages computed after discarding missing data.
(2) Variables with an asterisk and bold-printed p-values have significant differences between men and women at α =0.05

obese (p=0.000). Men also smoked more (p=0.000) and exercised more than women (p=0.000, Table 6). As previously demonstrated in Table 4, men chose Program A more than women did (p=0.000).

Ⅳ. Discussion

BEHAVIOR CHANGE : Change did not occur in any behaviors and any health examination programs in this study. Several other studies also observed no changes after health examinations especially in smoking (Family Heart Study Group, 1994; Hanlon et al, 1995; OXCHECK, 1995). Mixed results were found in other studies in physical inactivity and obesity status change (Family Heart Study Group, 1994; Hanlon et al, 1995).

The study participants demonstrated different behavior patterns from Korean average (Table 7): they smoked less, exercised more, and were more obese than Korean average. Although there still were room for improvement, the study participants had relatively less to improve in terms of smoking and exercise compared to Korean average. On the other hand, they needed more attention to weight management. Health education strategies for them, thus, should be altered from the general guidelines considering their different level of behavior as well as socio-demographic characteristics: highly educated, presumably high in socio-economic status, and experienced with health examinations. Fundamental principles still apply such as capturing the teachable moments, focusing on "how to change" as well as "why change," providing repeated reinforcement with multiple exposure to intervention, understanding of the population, and stimulation of "felt need".

Increased number of follow-ups and repeated reinforcement are especially important for the health examination programs in this study for the following reasons. Although different types of health examination programs were available

Table 7. Comparison of Health Behaviors

Prevalence	Present Study (1997)	Korean Average (1998-1999)*	Asian/Pacific Islanders in the U.S.
Smoking	Men 44.0% Women 3.0%	Men 67.6% Women 6.7%	Men 17.9%** Women 9.9%**
Exercise	79.1%	26.3%	57.3%***
Obesity	Men 28.6% Women 9.5%	Men 22.6% Women 23.0%	Men 35.2%*** Women 25.2%***

* Source: Ministry of Health and Welfare, Korea (2000)
** Source: American Heart Association: CDC/NCHS, NHIS (1998)
*** Source: American Heart Association: CDC/NCHS, NHIS (1997)

in this study that were tailored to meet the different level of needs and that were chosen by the participants themselves, what could be more individually customized was the frequency and intensity of counseling and education. Secondly, follow-ups offered in the Program A were limited to a small number of people within certain health issues. It is recommended to broaden the follow-up to non-clinical, behavioral issues. One-year interval may be too long for behavior to change and be maintained without any feedback when most of health examinations are performed annually.

***GENDER SPECIFIC STRATEGIES*:** Gender, age, and education are commonly found factors associated with health promoting behaviors (Kim et al, 1991; Redland and Stuifbergen, 1993). In this study, gender stood out as the strongest predictor of health behavior among the three: men smoked more, exercised more, and were more obese than women. This gender difference needs to be taken into account in both health examination programs and health education. Although this study did not find health behavior change after a health examination, a few health examination studies reported that gender and age were significant factors that were associated with health behavior change (OXCHECK, 1995; Fukunaga et al, 1997; Lee et al, 1998).

***SOURCE-OUTCOME RELATIONSHIP*:** This study failed to establish Source-Outcome association because health behavior did not change in any of the health examination programs. The health examination type was not predictive of health behavior either. Although the choice of the health examination type differed by gender, gender and health examination type interaction was insignificant. The insignificance of the Source variables might be in association with one-time nature of health counseling, limited number of follow-ups, and elimination of Message and Channel variables from the analyses due to the volume of missing data existed in those fields.

***SOCIAL SUPPORT*:** For a health examination to be effective to the fullest, social support must be provided while the health examination carries out the task at its best. Cohen and Syme (1985) defined social support as 'both tangible and intangible resources derived from an individual's web of social ties.' More specifically, social support refers to the relationship of emotional support, instrumental support, informational support, and appraisal support (House, 1981). Alliances with community organizations, collaboration with hospital services, application of incentive programs, and participation of family, friends, and co-workers are examples of social-ecological support system that will maximize the effect of a health examination.

LIMITATIONS: Based on a secondary data set of human participants, this study faced a few challenges. By employing a quasi-experimental design, the study participants were not randomly assigned to groups. The participants voluntarily participated in the health examinations, thus their motivation, health consciousness and program affordability might be threats to internal validity and generalizability. The study instrument was not scientifically tested, and the information gathered though it relied on self-report. However, as a retrospective study based on a secondary data set, this study did not have control over these potential biases. A missing data issue, which was the greatest concern of the study, resulted from the fact that the data system building was still in process at the time of data collection. Thus, earlier data in the Message and Channel fields had not been computerized yet, which forced dropping of the Message and Channel data from some analyses.

FUTURE STUDIES: Figure 2 illustrates a suggested conceptual model for future studies of health examinations in the Persuasive Communication framework. It incorporates psychological factors, which have received less attention than demographic characteristics in health examinations, in the already established Receiver-Outcome relationship. On the standpoint of health behavior modification, consideration and understanding of psychological factors such as knowledge, attitudes, capabilities, perception, and belief are as important as understanding of demographic characteristics. In the same model, the Message and Channel variables are understood in relation with the Source upon which the Message and Channel depend in health examinations. This suggestion is supported by a few health communication studies that emphasized the Source-Receiver relationship (Cialdini, 1993; Salovey et al, 1999), and the understanding of Source-Receiver-Message in health risk communication (Aspinwall, 1999).

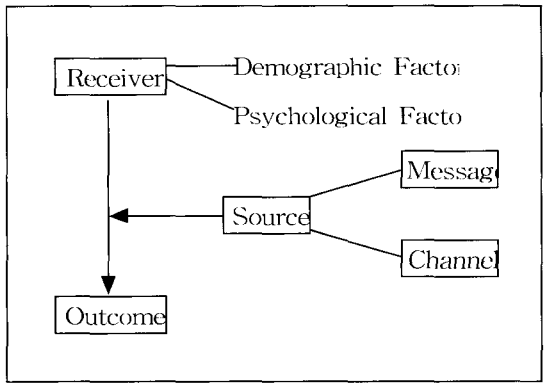

Figure 2. Suggested Conceptual Model

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ABSTRACT

Although periodic health examination has been one of the most common practices of preventive medicine, its effect on modification of risk behavior has been seldom assessed. Thus, this study attempted to demonstrate the influence of a health examination on modification of cardiovascular disease related health risk behaviors such as smoking, physical inactivity, and obesity. Data of 893 adults were derived from two types of a popular and highly acclaimed health examination program. With a conceptual model constructed using Persuasive Communication variables, McNemar tests examined Source-Outcome association, hypothesizing that different health examination programs would yield different levels of behavior change in smoking, physical inactivity, and obesity. No significant behavior change was found in any of the two health examination programs. Instead, previously established Receiver-Outcome relationship was reconfirmed by logistic regression modeling where gender was the most prominent predictor of all three behaviors. Men were more likely to be current smokers (OR=0.029), exercisers (OR=2.629), and obese (OR=0.237). The importance of follow-ups after health examination is highly stressed as well as that of gender-specific health education strategies. This study recommends applying the social-ecological approaches in health examination, which emphasizes the support and collaboration at individual, family, organizations, community, and policy level to improve health. Long term and qualitative evaluation of health examination may provide more foundation for increasing the effectiveness of health education and communication in health examinations.

Key Words : Health Examination, Risk Behavior Modification, Persuasive Communication, Health Education, Health Communication