RESEARCH ARTICLE

Relationship between Social Network and Stage of Adoption of Gastric Cancer Screening among the Korean Population

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Abstract

Few studies have examined the relationship between social support and stages of adoption of cancer screening. Here we investigated associations between both structural and functional aspects of social support and stages of adoption of gastric cancer screening in the general population of Korea. The study population was derived from the 2011 Korean National Cancer Screening Survey (KNCSS), an annual cross-sectional survey that uses nationally representative random sampling to investigate cancer screening rates. Data were analyzed from 3,477 randomly selected respondents aged 40-74 years. Respondents were classified according to their stage of adoption of gastric cancer screening: precontemplation (13.2%), contemplation (18.0%), action/maintenance (56.1%), relapse risk (8.5%), and relapse stage (4.1%). Respondents with larger social networks were more likely to be in the contemplation/action/maintenance, or the relapse risk/relapse stages versus the precontemplation stage (OR=1.91, 95%CI: 1.52-2.91; p for tend=0.025). Emotional and instrumental supports were not associated with any stage of adoption of gastric cancer screening. However, respondents who reported receiving sufficient informational support were more likely to be in the relapse risk/relapse stages versus the precontemplation, or the contemplation/action/maintenance stage (p for trend=0.016). Interventions involving interactions between social network members could play an important role in increasing participation in gastric cancer screening.

Keywords: Cancer screening - social network - social support - stomach cancer - stage of adoption

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Introduction

Gastric cancer is the fourth most common type of cancer (988,602 new cases, 7.8% of all new cancer cases in 2008) and the second most common cause of cancer death (737,419 deaths in 2008) worldwide (Ferlay, 2008). East Asian countries, namely China, Japan, and Korea have the highest incidence of gastric cancer in the world (Parkin et al., 2005). Although the incidence of gastric cancer in Korea has declined in recent decades, it remains the most common cancer in the country (Jung et al., 2013).

Because the prognosis of early gastric cancer is highly favorable, countries with a high prevalence of gastric cancer have focused on early diagnosis through screening. In 1960, Japan implemented its nationwide gastric cancer screening program, achieving remarkable improvement in survival rates as a result of early detection, and consequently higher cure rates (Hisamichi et al., 1988; Hisamichi, 1989; Fukao et al., 1995). In Korea, a nationwide gastric cancer screening program was started in 1999 as part of the National Cancer Screening Program (NCSP). The NCSP recommends biennial gastric cancer screening for men and women aged 40 years or older, by either upper-gastrointestinal series (UGIS) or endoscopy (Kim et al., 2011). In addition to the NCSP, opportunistic gastric cancer screening is widely available in Korea. According to the Korean National Cancer Screening Survey (KNCSS), the participation rate for opportunistic and organized gastric cancer screening has increased significantly; in 2004, 39.2% of men and women were screened, compared to 70.9% in 2012 (Suh et al., 2013).

An important goal of screening program is not only to achieve high participation rates, but also to maintain these high rates at each subsequent screening round (O'Sullivan et al., 2001; Lee et al., 2012). Therefore, the latest notable issue in early cancer detection is the extent to which an individual continues to use screening services after receiving an initial examination. In this regard, many studies have been carried out using concepts from the transtheoretical model of behavioral change (Prochaska and DiClemente, 1983; Rakowski et al., 1992; Chamot et al., 2001; Duncan et al., 2012). The transtheoretical model provides a methodological approach to characterizing people's awareness of and readiness to adopt a given health behavior (Trauth et al., 2003), and recognizes several stages of adoption of cancer screening, based on past and present screening behaviors and future screening intentions.

Previous studies have found an association between stage of adoption of cancer screening and socio-demographic factors (Wu and West, 2007; Tung et al., 2010). However, these studies have not addressed

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the psychosocial factors related to cancer screening behavior. A better understanding of the associations between psychosocial factors and screening behavior may give insight into which psychosocial factors and interventions are influential in modifying screening behavior. Social networks in particular play a critical role in the determination of diverse health-related outcomes (Berkman, 1995; House et al., 1988). Usually, people with larger social networks, and more frequent contact within these networks, adopt more preventive health care behaviors (e.g., cancer screening) and have healthier lifestyles (e.g., eat a healthy diet and abstain from tobacco) (Adami et al., 1988; Allen et al., 1999). Previous studies reported a positive association between social integration and breast and colon cancer screening (Kang and Bloom, 1993; Kinney et al., 2005). Recently, some investigators have suggested that it is not only the structural aspects of social support, such as social network size, that may influence health outcomes, but also the functional aspects of social support, such as emotional (e.g., offering reassurance that one is loved and cared for), instrumental (e.g., giving material or financial assistance), and informational (e.g., someone who has experienced something similar providing information) support. These functional aspects of social support have shown direct and buffering effects on health-related outcomes (Woloshin et al., 1997; Ren et al., 1999; Kinney et al., 2005). Such findings suggest that structural and functional aspects of social support may influence health behavior in similar or unique ways.

Overall, relatively few studies have examined the relationship between social support and cancer screening. Particularly, the relationship between structural and functional aspects of social support and the adoption of screening behaviors remains largely unknown in Asian populations. The classification of individuals according to their stage of adoption of a health-related behavior has proven useful in tailoring interventions, because people in a particular stage tend to share similar knowledge, attitudes, beliefs, and barriers relevant to the target behavior. Therefore, we used data from the KNCSS to investigate the associations between the stages of adoption of gastric cancer screening, and the structural and functional aspects of social support among Korean men and women.

Materials and Methods

Study population and measurement

The KNCSS is an annual nationwide, population-based, cross-sectional survey that has been conducted by the National Cancer Center since 2004. Cancer-free men aged 40-74 years and cancer-free women aged 30-74 years are eligible for the KNCSS. To obtain a nationally representative sample, the KNCSS study population is selected based on Resident Registration Population data using a stratified, multistage, and random sampling procedure according to geographic area, age, and sex. We obtained informed consent from all study participants. The present study used data from the 2011 KNCSS, and was approved by the Institutional Review Board of the National Cancer Center, Korea.

The 2011 KNCSS was conducted from 23 September to 15 October. Investigators from a professional research agency went door-to-door to recruit residents, and at least three attempts were made to contact a resident. A total of 11,869 people were contacted, of which 7,722 (65.1%) refused to participate, and 47 (0.4%) did not complete the interview. Interviews were completed by 4,100 (34.5%) people; we included the 3,477 aged 40-74 years in the present analyses, i.e., those in the age range for gastric cancer screening based on NCSP guidelines.

Investigators conducted face-to face interviews in respondents' homes using a structured questionnaire, which collected information about attitudes and issues relevant to their stage of adoption of gastric cancer screening. Previous experience was assessed by asking: *i*) whether the respondent had ever undergone gastric cancer screening; *ii*) which screening method was used (UGIS, endoscopy, or both); and *iii*) when the respondent underwent his/her most recent UGIS or endoscopy. Future screening intention was assessed by the following question: "Do you intend to get screened for gastric cancer within the next 2 years? (1=yes; 2=no)". Based on these questionnaire, the stages of adoption of gastric cancer screening were categorized, as recommended by Rakowski et al. (1992) by considering reported history of gastric cancer screening and intentions to be screened within 2 years, as per the schedule recommended by the NCSP (Prochaska and Velicer, 1997). To determine each respondent's stage of adoption of gastric cancer screening, this study utilized the modified five-stage process or continuum related to a person's readiness to change: *i*) precontemplation: never received gastric cancer screening and didn't plan to be screened within 2 years; *ii*) contemplation: either never received gastric cancer screening or had not received screening in the last 2 years, but was planning on being screened within 2 years; *iii*) action/maintenance: received gastric cancer screening within the last 2 years, and intended to be screened again within 2 years; *iv*) relapse risk: received gastric cancer screening within the last 2 years, but was not planning on being screened again within 2 years; and *v*) relapse: received gastric cancer screening in the past, but was off schedule and had no plans to be screened again within 2 years.

We also collected the information on the structural and functional aspects of social support. Social network size was used to measure structural aspects of social support, and assessed using a subset of items adapted from Berkman's Social Network Index (Berkman and Syme, 1979). Berkman's Social Network Index has been demonstrated as a useful tool for the categorization of levels of social ties in epidemiologic studies (Michael et al., 2002). It is composed of five parts: marital status (married or living as married, not married), number of close friends and relatives (by category of reported number); religious group membership, e.g. church, Buddhist temple (yes, no), other group membership (yes, no), and frequency of contact with each membership (by categorical response). Social network size categories (≤5, 6-7, 8-9, 10≤) were summed to create a continuous social

network size index, with scores ranging from 0-30 (with higher scores indicating a larger network).

The MacArthur Successful Aging Study survey (Seeman et al., 1994) was used to determine the functional aspects of social support from network members in the form of emotional, instrumental, and informational support (Allen et al., 1999). A composite index of perceived availability of emotional support was constructed from the following items: *i*) "How often do persons close to you make you feel loved and cared for?" and *ii*) "How often are persons close to you willing to listen to you when you need to talk about specific health problems or concerns?" The index of instrumental support was constructed from: *i*) "How often can you count on persons close to you to help you by doing things such as giving you a ride, or by taking care of other family members while you are away?" and *ii*) "How often can you count on persons close to you to help you make and keep medical appointments?" Finally, the index of informational support was constructed from: *i*) "How often do persons close to you give you advice or information if needed?" and *ii*) "How often do persons close to you give you advice or information about health problems?" Perceptions regarding the functional aspects support were rated using a 4-point scale (no or none=1, a little=2, some=3, a lot=4). Responses were summed and divided by the total number of items completed to form a composite measure for each functional aspect of social support. Possible scores ranged from 1-4, with higher scores indicating greater perceived availability of social support.

To consider potential covariates that have been associated with psychosocial factors and cancer screening behavior, data on predisposing factors including age, sex, education level, and family history of cancer were assessed. In addition, information on enabling factors such as household income level, private cancer insurance, financial burden to get screening, and existence of a usual source of health care, were gathered.

Statistical analysis

Descriptive statistics were assessed to characterize the study sample according to the stage of adoption of gastric cancer screening. We used chi-squared tests to compare the distributions of study subjects' characteristics and social support scores by the stages of adoption of gastric cancer screening. One-way analysis of variance was used to assess differences in the mean social support score across the stages of adoption.

To determine the factors related to one's stage of adoption, multinomial logistic regression was conducted. To make interpretations more understandable, we grouped participants into three groups: *i*) precontemplation; *ii*) contemplation, and action/maintenance; and *iii*) relapse risk, and relapse. In the multinomial analysis, we used the pre-contemplation stage as the reference group to compare with the other two groups: contemplation action/maintenance, and relapse risk/relapse. Further, we assessed the odds of being in relapse or relapse risk stages rather than in contemplation/action/maintenance stages. We performed multiple logistic regression analyses for the latter model. Statistical analyses were performed using SAS software version 9.2 (SAS Institute, Cary, North Carolina) and $p<0.05$ was considered statistically significant.

Results

The descriptive characteristics of the study population are presented in Table 1. The mean age of the 3,477 respondents was 57.4 years, and over 60% of the respondents were 50 years old or older. The mean social network size was 7.80 (standard deviation, SD 2.2), and the mean emotional, instrumental, and informational support indices were 3.38 (SD 0.4), 3.38 (SD 0.4), and 3.39 (SD 0.4), respectively (Table 1).

Respondents were also classified according to their stage of adoption of gastric cancer screening: 13.2% in the precontemplation stage, 18.0% in the contemplation stage, 56.1% in the action/maintenance stage, 8.5% in the relapse risk stage, and 4.1% in the relapse stage (Table 2). Age, education, family history of cancer, monthly household income, private cancer insurance, and having a usual source of care were significantly different across the stages of adoption of gastric cancer screening. Social network size was not statistically significantly different

Table 1. Characteristics of the Study Population (n=3477), KNCSS, 2011

		N	%
Sex	Male	1697	48.8
	Female	1780	51.2
Age (years)	40-49	1375	39.6
	50-59	1162	33.4
	60-74	940	27.0
Education level	Middle school	779	22.4
	High school	1833	52.7
	College or higher	865	24.9
Family history of cancer	No	2855	82.1
	Yes	622	17.9
Monthly household income (US$/month)	<2,499	1138	32.7
	2,500-4,499	1264	36.4
	≥4,500	1075	30.9
Private cancer insurance	No	707	20.3
	Yes	2770	79.7
Financial burden to get screened	Be a burden	2699	77.6
	Not a burden	778	22.4
Has usual source of care	No	2006	57.7
	Yes	1471	42.3
Social network size index		7.80*	2.2**
	I (fewest connections)	1120	32.2
	II	923	26.6
	III	1062	30.5
	IV (many connections)	372	10.7
Emotional support		3.38*	0.4**
	I (received no support)	229	6.6
	II	1024	29.5
	III	1563	44.9
	IV (received a lot of support)	661	19.0
Instrumental support		3.38*	0.4**
	I (received no support)	221	6.4
	II	1055	30.3
	III	1533	44.1
	IV (received a lot of support)	668	19.2
Informational support		3.39*	0.4**
	I (received no support)	207	5.9
	II	1025	29.5
	III	1550	44.6
	IV (received a lot of support)	695	20.0

*Mean; **Standard deviation

Table 2. Stage of Adoption of Gastric Cancer Screening by Population Characteristics, KNCSS, 2011

		Pre-contemplation		Contemplation		Action/ maintenance		Relapse risk		Relapse		p value
		N	%	N	%	N	%	N	%	N	%	
Total		460	13.2	627	18.0	1952	56.1	296	8.5	142	4.1	
Sex	Male	244	53.0	307	53.0	946	48.5	133	44.9	67	47.2	0.2550
	Female	216	47.0	320	47.0	1006	51.5	163	55.1	75	52.8	
Age (years)	40-49	218	47.4	300	47.8	698	35.7	114	38.5	45	31.7	
	50-59	121	26.3	205	32.7	706	36.2	94	31.8	36	25.3	<.0001
	60-74	121	26.3	122	19.5	548	28.1	88	29.7	61	43.0	
Education level	Middle school	117	25.4	104	16.6	426	21.8	79	26.7	53	37.3	
	High school	256	55.7	356	56.8	1007	51.6	148	50.0	66	46.5	<.0001
	College or higher	87	18.9	167	26.6	519	26.6	69	23.3	23	16.2	
Family history of cancer	No	405	88.1	526	83.9	1561	80.0	246	83.1	117	82.4	0.0009
	Yes	55	11.9	101	16.1	391	20.0	50	16.9	25	17.6	
Monthly household income	<2,499	168	36.5	190	30.3	623	31.9	99	33.5	58	40.9	
(US$/month)	2,500-4,499	176	38.3	262	41.8	657	33.7	120	40.5	49	34.5	<.0001
	≥4,500	116	25.2	175	27.9	672	34.4	77	26.0	35	24.6	
Private cancer insurance	No	146	31.7	114	18.2	342	17.5	64	21.6	41	28.9	<.0001
	Yes	314	68.3	513	81.8	1610	82.5	232	78.4	101	71.1	
Financial burden to get screened	Not a burden	94	20.4	137	21.8	462	23.7	62	20.9	23	16.2	0.1684
	Be a burden	366	79.6	490	78.2	1490	76.3	234	79.1	119	83.8	
Has usual source of care	No	280	60.9	387	61.7	1107	56.7	152	51.4	80	56.3	0.0187
	Yes	180	39.1	240	38.3	845	43.3	144	48.6	62	43.7	
Social network size index	I (fewest connections)	160	34.8	202	32.2	605	31.0	104	35.1	49	34.5	
	II	123	26.7	168	26.8	523	26.8	76	25.7	33	23.2	0.3032
	III	147	32.0	189	30.1	600	30.7	81	27.4	45	31.7	
	IV (many connections)	30	6.5	68	10.9	224	11.5	35	11.8	15	10.6	
Emotional support	I (received no support)	35	7.6	39	6.2	124	6.3	22	7.4	9	6.3	
	II	151	32.8	169	27.0	566	29.0	90	30.4	48	33.8	0.7461
	III	192	41.8	294	46.9	888	45.5	129	43.6	60	42.3	
	IV (received a lot of support)	82	17.8	125	19.9	374	19.2	55	18.6	25	17.6	
Instrumental support	I (received no support)	24	5.2	38	6.1	133	6.8	17	5.8	9	6.3	
	II	147	32.0	207	33.0	576	29.5	83	28.0	42	29.6	0.6222
	III	205	44.6	259	41.3	873	44.7	140	47.3	56	39.4	
	IV (received a lot of support)	84	18.2	123	19.6	370	19.0	56	18.9	35	24.7	
Informational support	I (received no support)	35	7.6	35	5.6	116	5.9	17	5.7	4	2.8	
	II	136	29.6	184	29.3	594	30.4	79	26.7	32	22.5	0.2666
	III	201	43.7	291	46.4	854	43.8	137	46.3	67	47.2	
	IV (received a lot of support)	88	19.1	117	18.7	388	19.9	63	21.3	39	27.5	

across the stages of adoption of gastric cancer screening.

Table 3 shows the factors associated with the stages of adoption of gastric cancer screening. Compared with those with the small social network, those with a large social network were more likely to be in the contemplation/action/maintenance stage versus the precontemplation stage (OR=1.91, 95%CI: 1.52-2.91; p for tend=0.025). Further, subjects who were female, over 50 years old, had a higher education level, a family history of cancer, private cancer insurance, and a usual source of care were more likely to be in the contemplation/action/maintenance stages versus the precontemplation stage. Similarly, subjects who were female, over 50 years old, had a family history of cancer, private cancer insurance, a usual source of care, a large social network were more likely to be in the relapse risk or relapse stages versus precontemplation stage. Those who had more informational support had an increased risk of being in the relapse risk and relapse stages versus the precontemplation stage (p for trend=0.016). Regarding the factors associated with being in relapse risk or relapse stages versus contemplation/action/maintenance stages, education level, and informational support were significantly associated. Those who had a higher education level, and had more informational support (p for trend=0.016) had an increased risk of being in the relapse risk or relapse stages versus contemplation/action/maintenance stages.

Discussion

The current study investigated the associations between both structural and functional aspects of social support and stages of adoption of gastric cancer screening in the general Korean population. Although previous studies have assessed the importance of social support in promoting participation in cancer screening (Suarez et al., 1994; Suarez et al., 2000; Kinney et al., 2005), few studies have examined the relationship between social support and stages of adoption of cancer screening. Identifying differences in the specific aspects of social support associated with these stages of adoption may provide new insights that will help healthcare professionals design future interventions tailored to the specific needs and characteristics of the target screening population.

Previous studies examining the effect of social networks on cancer screening behavior in general have generated mixed results, with some studies identifying a positive effect (Kang and Bloom, 1993; Kang et al., 1994; Suarez et al., 1994; Kinney et al., 2005), others and others observing no effect. The current study showed that respondents with a larger social network were more likely to be in the contemplation/action/maintenance, and the

Table 3. Multivariate Analysis of the Factors Associated with Each Stage of Adoption, Korea, 2011

		Multinomial logistic regression (n=3,477)				Logistic regression (n=3,017)	
		Contemplation, action/ maintenance versus precontemplation		Relapse risk or relapse versus precontemplation		Relapse risk or relapse versus contemplation, action/maintenance	
		aOR	(95% CI)	aOR	(95% CI)	aOR	(95% CI)
Sex	Male	1.00	-	1.00		1.00	
	Female	1.28	(1.04-1.58)	1.34	(1.01-1.76)	1.05	(0.85-1.30)
Age (years)	40-49	1.00	-	1.00		1.00	
	50-59	2.08	(1.61-2.69)	1.75	(1.25-2.46)	0.84	(0.64-1.09)
	60-74	2.26	(1.65-3.09)	2.34	(1.57-3.50)	1.03	(0.76-1.40)
Education level	Middle school	1.00		1.00		1.00	
	High school	1.33	(0.99-1.79)	0.93	(0.63-1.35)	0.70	(0.52-0.93)
	College or higher	2.27	(1.53-3.35)	1.41	(0.85-2.32)	0.53	(0.43-0.91)
Family history of cancer	No	1.00		1.00		1.00	
	Yes	1.66	(1.23-2.25)	1.50	(1.02-2.19)	0.91	(0.69-1.19)
Monthly household income (US$/month)	<2,499	1.00		1.00		1.00	
	2,500-4,499	0.96	(0.74-1.24)	1.14	(0.81-1.60)	1.18	(0.91-1.54)
	≥4,500	1.09	(0.81-1.47)	0.99	(0.67-1.46)	0.91	(0.67-1.22)
Private cancer insurance	None	1.00		1.00		1.00	
	Yes	2.19	(1.71-2.80)	1.77	(1.28-2.45)	0.80	(0.61-1.04)
Financial burden to get screened	Not a burden	1.00		1.00		1.00	
	Be a burden	0.90	(0.70-1.15)	1.09	(0.78-1.51)	1.22	(0.94-1.58)
Has usual source of care	No	1.00		1.00		1.00	
	Yes	1.25	(1.02-1.55)	1.47	(1.12-1.92)	1.17	(0.95-1.44)
Social network size	I (fewest connections)	1.00		1.00		1.00	
	II	1.08	(0.84-1.41)	0.94	(0.67-1.32)	0.87	(0.66-1.14)
	III	1.07	(0.83-1.38)	0.96	(0.69-1.34)	0.89	(0.69-1.16)
	IV (many connections)	1.91	(1.25-2.91)	1.92	(1.15-3.21)	1.00	(0.71-1.43)
	P for trend	0.025		0.152		0.702	
Emotional support	I (received no support)	1.00		1.00		1.00	
	II	1.07	(0.70-1.62)	0.99	(0.58-1.71)	0.93	(0.60-1.43)
	III	1.31	(0.87-1.96)	1.04	(0.61-1.78)	0.79	(0.52-1.21)
	IV (received a lot of support)	1.28	(0.82-2.01)	1.02	(0.57-1.82)	0.80	(0.50-1.26)
	P for trend	0.088		0.857		0.157	
Instrumental support	I (received no support)	1.00		1.00		1.00	
	II	0.72	(0.45-1.16)	0.74	(0.40-1.36)	1.03	(0.65-1.63)
	III	0.72	(0.45-1.14)	0.78	(0.43-1.42)	1.09	(0.70-1.70)
	IV (received a lot of support)	0.73	(0.44-1.20)	0.87	(0.46-1.65)	1.19	(0.74-1.92)
	P for trend	0.445		0.807		0.303	
Informational support	I (received no support)	1.00		1.00		1.00	
	II	1.31	(0.86-2.00)	1.32	(0.72-2.41)	1.00	(0.60-1.65)
	III	1.30	(0.86-1.95)	1.65	(0.92-2.96)	1.27	(0.78-2.07)
	IV (received a lot of support)	1.30	(0.83-2.02)	1.84	(0.99-3.42)	1.40	(0.84-2.33)
	P for trend	0.515		0.016		0.016	

*Abbreviations: aOR, adjusted odds ratio; 95% CI, 95% confidence interval

relapse risk/relapse stages versus the precontemplation stage. However, social network size was not statistically significantly associated with the relative odds of being in relapse risk or relapse stages versus contemplation/ action/ maintenance stages. These results demonstrate that larger social networks promote the adoption of preventive health behaviors. In other words, a close and frequent relationship with family members, friends, and religious congregations may have increased the opportunities to learn and accept the message that gastric cancer screening is necessary. Thus, interventions involving interactions between social network members could play an important role in increasing screening participation. Such interventions should target existing social groups, such as families and friends. Because of the existence of established social networks and communication channels, worksites also represent an important setting for these efforts.

With regard to the functional aspects of social support, emotional and instrumental supports were not associated with any of the stages of adoption of gastric cancer screening. This finding is consistent with other studies that observed a null association between perceived adequacy of emotional and instrumental support, and breast and colorectal cancer screening (Allen et al., 1999; Kinney et al., 2005). However, in the current study, contrary to our expectations, people with more informational support were more likely to be in the relapse risk or relapse stages versus the precontemplation stage, and contemplation/ action/maintenance stage (p for trend=0.016). This result implies that informational support from social network members may be negatively associated with the intention to receive future gastric cancer screening. One of the possible explanations for this result is that some information from network members may address the negative aspects of gastric cancer screening, such as false-positive results, and the discomfort of tests, and this negative information may deter people from receiving subsequent screening. Also, inaccurate knowledge such as "once people received a normal result in previous screening, no more screening is needed" could interfere with future screening intentions.

We also examined the relationships between

predisposing factors, enabling factors, and the stage of adoption of gastric cancer screening. Age was related to stage of adoption insofar as those who were aged 50-74 years were more likely to be in the contemplation/action/maintenance and the relapse risk/relapse stages versus the precontemplation stages. More highly educated men and women were more likely to be in the contemplation/action/maintenance stage versus the precontemplation stage, and less likely to be in the relapse risk/relapse stages. This may be explained by the fact that less educated men and women have difficulty accessing preventive health services and health information. This may demonstrate the need for targeted intervention of people with less education. Those who had a family history of cancer were also more likely to be in the contemplation/action/maintenance stages versus the precontemplation stage. This result is consistent with a previous study using data from the Framinghm Study, which reported that a family history of breast cancer was strongly associated with reporting a mammogram in the last 2 years (Murabito et al., 2001). With regard to enabling factors, men and women with private cancer insurance and a usual source of care were more likely to be in the contemplation/action/maintenance and the relapse risk/relapse stages versus the precontemplation stage.

The findings from this study should be interpreted within the limits imposed by its design. First, because the KNCSS is a cross-sectional study, casual mechanisms cannot be inferred. Thus, future studies with a longitudinal design should be conducted to track patterns in gastric cancer screening behavior. Second, the information on gastric cancer screening behavior was based on self-reporting, and was not independently validated; therefore, some respondents may have incorrectly reported their use of gastric cancer screening services. To minimize bias due to self-report, the questions were prefaced with a two-to-three-sentence description of the gastric cancer screening methods (UGIS and endoscopy) and pictures to help respondents recognize whether or not they had received gastric cancer screening. Furthermore, respondents were specifically asked whether UGIS or endoscopy were performed for screening purposes, or due to symptoms. Third, because of memory bias, we assessed only the most recent gastric cancer screening event, and did not collect information on the screening event that preceded the most recent one. Therefore, we couldn't distinguish between the action and maintenance stages.

Despite these limitations, this study has several important strengths. Gastric cancer is highly prevalent in Asian countries, and remains the second most common cause of death from cancer worldwide. Although the effectiveness of mass gastric cancer screening remains controversial, countries with a high incidence of gastric cancer, such as Japan and Korea, have implemented nationwide gastric cancer screening programs and have made an effort to promote cancer screening. Therefore, this study can provide guidance for the development of intervention strategies designed to promote compliance with gastric cancer screening recommendations on a population level. The current study results highlight that, in our study population, larger social networks had a positive influence on gastric cancer screening behavior. These results imply that, compared to more socially engaged men and women, those who were socially isolated were less concerned about gastric cancer screening and less motivated to receive gastric cancer screening. In addition, these finding suggest that structural, rather than functional aspects of social support, may be important in influencing gastric cancer screening behavior. The current study also identified the factors associated with different stages of adoption of gastric cancer screening using population-based data. Nevertheless, future longitudinal studies on the effects of social networks throughout one's life would also enhance our understanding of the casual mechanism by which the many facets of the social support operate in regard to cancer prevention and control.

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