RESEARCH ARTICLE

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Koreans' Awareness and Preventive Behaviors Regarding Colorectal Cancer Screening

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Abstract

Background: Koreans in the Republic of Korea had high incidence and mortality rates of colorectal cancer (CRC), late stage of CRC diagnosis, and low CRC screening. The purpose of this study was to gain a more thorough understanding of CRC awareness, preventive behaviors, and preferred strategies to improve CRC screening behaviors among Koreans. **Methods:** Individual interviews with 33 Koreans aged 50 and older were conducted using semi-structured, open-ended questions. All interview data were recorded and analyzed using direct content analysis. **Results:** To prevent CRC, all participants focused on primary prevention including healthy lifestyle more than secondary prevention such as screening. Motivators of CRC screening were (a) symptoms, (b) being scared by acquaintances with CRC, (c) being healthy for the family, (d) others' recommendations, and (f) annual fecal occult blood test (FOBT) in the National Cancer Screening Program. Barriers to CRC screening were (a) no symptom, (b) discomfort on test procedure, (c) lack of knowledge, (d) low perceived risk of developing CRC, (e) mistrust in CRC screening tests or health care providers, (f) fear of CRC diagnosis, (g) embarrassment, and (h) colonoscopy was a follow-up test in the National Cancer Screening Program. Participants suggested preferred strategies using various information delivery methods. **Conclusions:** This study suggests that we should provide accurate knowledge, emphasize importance of secondary prevention, enhance motivators and decrease barriers, and use multilevel approach incorporating preferred strategies to improve CRC screening behaviors among Koreans.

Keywords: Colorectal cancer- screening- Koreans

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Introduction

Colorectal cancer (CRC) is the second most common cancer and the third leading cause of death among Koreans in the Republic of Korea (National Cancer Information Center, 2017). In addition to high rates of CRC incidence and mortality, 73.7% (2,306 of 3,128) Koreans were diagnosed with late-stage CRC (Kweon et al., 2017), making it a serious public health concern.

Until a cure is found, prevention is one of the most effective methods to control cancer. Most cancer prevention strategies are primary or secondary. Primary cancer prevention includes a healthy lifestyle and risk avoidance such as moderate consumption of red meat and alcohol, low-fat diet rich in fiber, fruits, vegetables, exercise, and avoiding obesity and tobacco (Balaguer et al., 2018). Primary prevention cannot easily be manipulated through health interventions, so secondary prevention through screening before the onset of signs and symptoms is believed to be the most promising intervention (Vahabi, 2003). Late diagnosis of CRC among Koreans indicates that CRC screening is needed for this population to detect cancer at the earlier stage because people detect CRC early enough, death from CRC is preventable. Screening decreases CRC incidence by removing adenomatous polyps and CRC mortality by decreasing incidence and by detecting a higher proportion of cancers at earlier and more treatable stages (American Cancer Society, 2017). In this background, the Korean government conducted the National Cancer Screening Program in 2004, in which Koreans aged 50 and older are eligible to have a fecal occult blood test (FOBT) for CRC screening (National Cancer Information Center, 2018). If Koreans have positive results of FOBT, they undergo a colonoscopy or double-contrast barium enema (National Cancer Information Center, 2018). However, the 2017 national data show that only 29.4% Koreans had CRC screening in the Republic of Korea (Ministry of Health and Welfare, 2018).

Evidence using quantitative research suggests that CRC screening was significantly associated with individual socio-demographics (Kang and Son, 2017; Myong and Kim, 2012) and health beliefs (Bae et al., 2014). Koreans earning a lower household income were

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less likely to have CRC screening including flexible sigmoidoscopy or colonoscopy (Myong and Kim, 2012). Koreans with private insurance were more likely to undergo CRC screening (Kang and Son, 2017). In addition, Koreans aged 50 and older with greater levels of susceptibility to CRC and health motivation, and lower levels of severity of CRC and barriers to CRC screening were more likely to undergo a FOBT (Bae et al., 2014). Furthermore, a previous qualitative study shows that discomfort from the procedure, fear of being diagnosed with cancer, and lack of trust in the National Cancer Screening Program were associated with general cancer screening utilization (Lee et al., 2014).

Previous studies have not investigated well enough to explain the low rate of CRC screening among Koreans despite high rates of CRC incidence and mortality, late CRC diagnosis, and the Korean National Cancer Screening program enforcement for decades. Of the reviewed studies, very few offered an in-depth understanding of Koreans' CRC awareness, preventive behaviors, motivators and barriers related to CRC screening. No qualitative studies specifically investigated CRC and CRC screening such as FOBT or colonoscopy. Because CRC screening is different from general or other cancer screenings, it is necessary to investigate how Koreans understand CRC and CRC screening, how they try to prevent CRC, and why they do or do not undergo CRC screening. The purpose of this study was therefore to gain a more thorough understanding of CRC awareness, preventive behaviors, and strategies to improve CRC screening behaviors among Koreans. By taking this approach, we obtained Koreans' in-depth understanding of CRC, their actual decision-making on CRC screening, and feasible interventions to improve CRC screening behaviors.

Materials and Methods

Study design and sample

This study used a descriptive qualitative study design using face-to-face individual interviews. The sample consisted of Koreans living in Korea and aged 50 and older, which is CRC screening criteria of the National Cancer Screening Program in the Republic of Korea (National Cancer Information Center, 2018).

Procedure

After obtaining institutional review board approval from a University, Koreans were recruited using convenience sampling from community centers and churches in a city to find Koreans who were eligible for this study. Recruitment continued until new themes did not emerge from the interviews. Three researchers who are experts in cancer-related research reviewed data set and determined data saturation. Data saturation was reached when we gathered data to the point of data redundancy, when nothing new was being added (Lincoln and Guba, 1985). We reached data saturation at a sample of 33 Koreans. Before the interview, participants were asked to sign a consent form and fill out a brief background questionnaire about their socio-demographic information and CRC screening utilization. Semi-structured interview guide was developed based on Kallio et al., guidelines (2016). Kallio et al., (2016) suggested the development of a semi-structured interview guide include tasks: (a) identifying the prerequisites (e.g., phenomenon) for using interviews, (b) reviewing previous knowledge, (c) formulating the preliminary semi-structured interview guide, and (d) testing the interview guide. The open-ended, semi-structured interview questions included "what do you think of CRC?" "what do you do to prevent CRC?"; "Have you had a CRC screening test? What would you say about your experience on CRC screening test?"; "What do you think many Koreans have not had CRC screening?"; "What do you think will help Koreans to have regular CRC screening?"

The principal investigator (PI) moderated and recorded the interviews while taking notes on the participants' comments. The PI asked open-ended questions and probes to elicit information about participants' awareness and preventive behaviors regarding CRC and CRC screening. Cross-member validation of the findings (information from one informant was validated by asking another) was also used. Thirty-three Koreans interviewed for 30 minutes to 1 hour in community centers and churches.

Data analysis

Research assistants transcribed the recorded individual interviews verbatim. Directed content analysis focusing on credibility was used to analyze transcribed texts (Bengtsson, 2016; Hsieh and Shannon, 2005). Three researchers who are experts in cancer-related research independently coded participants' responses to reflect maximized description and avoid interpretation of the phenomena (Sandelowski, 2000). Themes were emerged by phrases and words that the participants frequently mentioned during their interviews (Boyatzis, 1998). The coding and categorization of responses were finalized after three researchers reached consensus. Descriptive statistics were calculated for socio-demographic information and CRC screening utilization of the participants in this study.

Rigor of the Study

Validation and credibility of this study were established by triangulating different data sources, writing with detailed and thick description, cross-member checking, and external audits. In triangulation, we used several sources to provide collaborating evidence on a theme, keeping detailed fieldnotes, using a high-quality recording, and transcribing the tape (Silverman, 2005). In member checking, the researcher solicited participants' opinions of the findings and interpretations by talking written narrative back to participants in member-checking procedures, which is the most critical technique for establishing credibility (Lincoln and Guba, 1985). Three external audits who were experts in qualitative research and/or cancer screening research examined both the research process and findings of the interviews, and assessed their accuracy (Miles and Huberman, 1994).

Ethical consideration

Ethical approval was granted by an Institutional Review Board at a university. When participants were

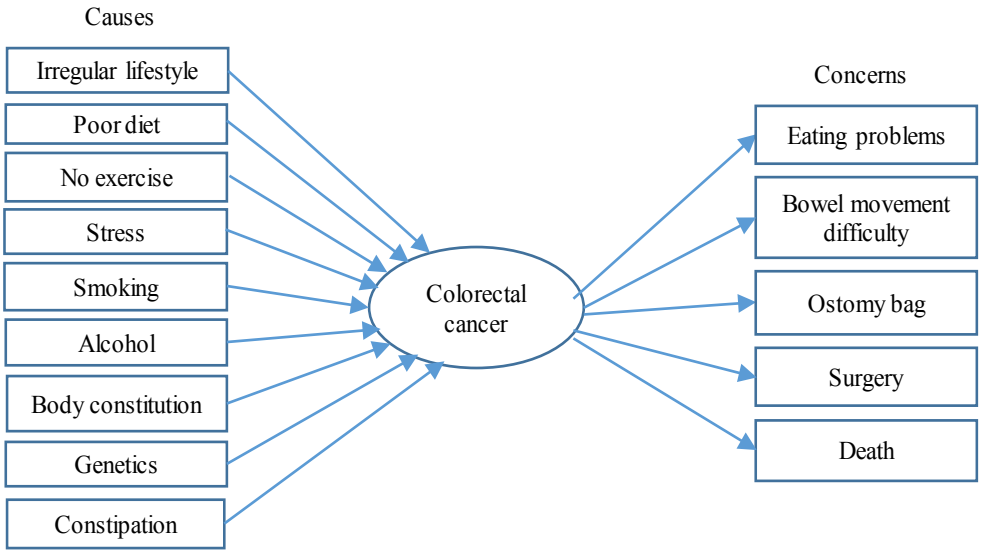

Figure 1. Causes and Concerns Related to Colorectal Cancer

interviewed in a city, informed consent was obtained by explaining the participants about the purpose and procedures of this study, protection of privacy and confidentiality, and the PI's contact numbers. Participants understood their freedom to refuse to answer any questions and withdraw from the interview at any time. Confidentiality was maintained by securely protecting all information related to this study.

Table 1. General Characteristics of Participants (n=33)

	n	(%)
Age		
50-64	19	(51.5)
65 and older	14	(48.5)
Gender		
Male	11	(33.3)
Female	22	(66.7)
Marital Status		
Currently married	23	(69.7)
Widowed	9	(27.3)
Divorced	1	(3)
Education		
High school diploma or less	25	(75.8
Higher than high school diploma	8	(24.2
Employment		
Employed full-time	21	(63.6
Not employed	12	(36.4
Health Insurance		
National health insurance	32	(97)
Medical Aid program	1	(3)
Annual household income		
≤ $30,000	21	(63.6)
> $30,000	12	(36.4)

M, mean; SD, standard deviation

Results

Sample characteristics

Characteristics of the participants in individual interviews are displayed in Table 1. Notably, 66.7% of participants were female, 75.8% had no more than a high school diploma, and 97% had national health insurance. CRC screening experiences in their lifetime and with recommended timeframe are shown in Table 2.

Awareness of CRC causes and concerns

The content analysis of the data showed that all participants were aware of CRC and they believed that CRC was associated with an irregular lifestyle, diet, exercise, stress, smoking, alcohol, body constitution, genetics, and constipation (Figure 1). Irregular lifestyle and diet including greasy or salty food, heavy consumption of meat, and overeating were more likely related to CRC. They also believed that stress influenced every disease including CRC.

Many participants said that having CRC was a destiny because of the body constitution and genes of people with CRC. They believed that cancer was hereditary. A middle-aged woman said:

It seems that there is a body constitution when it comes to it is fate to get CRC. I also think that the meaning of the fate is body constitution or gene. One of my friends

Table 2. CRC Screening Experience (n=33)

	Lifetime screening rate[a]	Screening rate with recommendation[b]
	n (%)	n (%)
Colorectal cancer screening		
FOBT	30 (90.9)	11 (33.3)
Colonoscopy	22 (66.7)	18 (54.5)

CRC, colorectal cancer; FOBT, fecal occult blood test; [a], Lifetime Screening rate: had ever had CRC screening in lifetime; [b], Screening recommendation timeframe: FOBT every year, colonoscopy every 5-10 years

Table 3. CRC Preventive Behaviors, Motivators of and Barriers to CRC Screening

Theme	Representative interview quotations
CRC preventive behaviors	
Focusing on primary prevention	If you eat a lot of meat, you could get CRC. So, I tried to eat meat less. I am also keeping exercising for my health.
Motivators of CRC screening	
Symptoms	I went to the hospital with my stomach hurting. The doctor told me to get a colon cancer test. So I did.
Being scared by acquaintances with CRC	My friend was died of CRC, so when I got sick a little, I went to the hospital. I had colonoscopy frequently.
Being healthy for the family	I have to be healthy to take care for the kids. I do not want to burden my child, so I do things to prevent cancer
Others' recommendations	I had CRC screening because a friend recommended and she wanted me to do CRC screening with her.
Annual FOBT in the National Cancer Screening Program	The National Health Insurance Service mailed me information to have FOBT and I did. After FOBT, I've been told to run a colonoscopy because I had blood in the stool. I went in for a colonoscopy and had polyps removed.
Barriers to CRC screening	
No symptoms	I did not need the test because I had no symptoms, no problems with intestines. If I'm sick, I would go to hospital to check it out.
Discomfort on CRC screening test procedure	For colonoscopy, I ate laxatives and it was hard to get in and out of the bathroom for all night.
Lack of knowledge	I never heard of medical term of FOBT and did not know the purpose of the stool test.
Low perceived risk of developing CRC	My husband died of CRC but I did not think I should check my health more often. I was different from him. My husband drank a lot of liquor but I did not smoke and drink, and my father, mother, and siblings are healthy, so I'm not going to get CRC.
Mistrust in CRC screening tests or health care providers	I cannot trust the CRC screening test provided by the National Cancer Screening Program. I need to do in-depth medical examination to make sure it's the right diagnosis. But FOBT is just a basic stuff.
Fear of CRC diagnosis	Because of fear of test results, people do not get cancer tests.
Embarrassment by showing stools, naked buttocks or anus	I'm embarrassed to have a stool test, especially bring stools to the hospital. I am worried that some privacy is violated by showing the buttocks and anus during colonoscopy. They covered my butt by clothes, but there was a shame because I had holes in my hips.
Colonoscopy was a follow-up test in the National Cancer Screening Program	A stool test was too simple. I wish the government provided colonoscopy as a primary test even if colonoscopy was provided in once every few years and we should pay some expenses for colonoscopy. Polyps do not appear in the stool.

CRC, colorectal cancer; FOBT, fecal occult blood test

was a CRC patient and had treatment, but she had another cervical cancer in a few years. So I thought it was a fate for her to get CRC. She got cancer because of her body constitution to get cancer.

Many participants believed that constipation or holding stool in their colon for long periods caused cancer. An elderly man said:

Constipated people are getting colon cancer. If the digestive system is abnormal, you have constipation. Stools do not come out right away, stick together, hard, and might be risky to people. Stools that stay in the intestine cause cancer in the wall.

The participants mentioned that if they had CRC, they would be concerned about eating (e.g., I really cannot eat properly) and difficulties with their bowel movements, having a ostomy bag, facing surgery, and at worst, death.

CRC preventive behaviors

To prevent CRC, all participants focused on primary prevention, including a healthy diet, exercise, no smoking, no alcohol, no stress, and keeping a peaceful mind more than on secondary prevention such as screening (Table 3). Participants believed that CRC could be prevented by their efforts such as healthy lifestyle. They did not consider CRC screening as preventive behavior; CRC screening was a part of treatment after onset of symptoms. Being healthy was very important to participants in this study, thus, they made efforts to eat well and remain physically active.

Another interesting perspective on cancer was that their primary preventive behaviors could change their fate to get CRC. Some participants said:

I don't know how long my life is determined from birth. I need to make some efforts to live longer. I can live long if I have my own efforts. I think dying can be delayed if I try. For example, if you have a gene and you become a cancer patient later on, you might be able to slow it down when you try.

Table 4. Preferred Strategies to Improve CRC Screening

Theme	Representative interview quotations
Various modes of information delivery	
Mass media	An effective way to improve colon cancer screening seems to be more helpful on TV or radio. There will be a lot of publicity.
Campaign	I think it would be a good idea to make a campaign acknowledging that CRC can be screened and prevented. For example, I've just seen pink ribbons for breast cancer. I accepted it naturally without resistance.
Video	The most effective way to create a program that will improve your check-up is to show a video. It would be more effective if the video shows me an actual sick person who tell us to do the test sooner.
Smartphone	I would like to use smartphone if I need educational materials for CRC screening. Because educational materials would not be removed from the smartphone, it is easy for me to see them whenever I want.
Educational type preference	
Group approach	When several people receive education, I can ask questions and share opinions with one another. Nowadays, I can learn through my smartphone, but that is me alone. But if people are gathered, they can talk with each other saying "this is my case" and "what is your case like?"
Enhancing the health care system to improve CRC screening	
Colonoscopy as a primary test option in the National Cancer Screening Program	Colonoscopy is an opportunistic test, so I'm postponing it. I think it is imperative that everyone should be required to undergo the test. To do this, the National Cancer Screening Progam should include colonoscopy as a primary test so that we will be able to continue to benefit from a regulatory system.

CRC, colorectal cancer

Motivators of and barriers to CRC screening

Motivators of CRC screening among participants in this study were (a) symptoms, (b) being scared by acquaintances with CRC, (c) being healthy for the family, (d) others' recommendations on CRC screening, and (e) annual FOBT in the National Cancer Screening Program (Table 3). The participants in this study underwent CRC screening when they experienced symptoms such as diarrhea, abdominal pain, or blood in their stools. Many participants knew someone who had CRC (e.g., spouses, friends, co-workers, or members of their church) and had CRC screening tests because they became scared. Some participants mentioned that they had CRC screening because they knew the importance of being healthy for their family. Another motivator of CRC screening was the recommendation of a doctor, spouse, a friend, or an acquaintance. Finally, the National Cancer Screening Program motivated them to have FOBT for CRC screening. The National Cancer Screening Program has been conducted in Korea, thus, systemically, the National Health Insurance Service have the obligation to inform Koreans aged 50 and older who are eligible to have CRC screening.

This study found that barriers to CRC screening were (a) no symptoms, (b) discomfort with the CRC screening test procedure, (c) lack of knowledge, (d) low perceived risk of developing CRC, (e) mistrust in CRC screening tests or health care providers, (f) fear of CRC diagnosis, (g) being embarrassed to show stools, naked hip or anal, and (h) colonoscopy was a follow-up test in the National Cancer Screening Program (Table 3). Many participants said that CRC screening was not a priority; they assumed that the absence of symptoms meant that they were healthy. Some participants had discomfort with the CRC screening test procedure such as collecting stools for FOBT, drinking liquids before colonoscopy, and having diarrhea for colonoscopy. Many participants showed lack of knowledge on CRC screening. Although they heard of bringing a stool sample to a hospital when they had health screening, they did not know what test should be done with stools because health care providers did not explain in detail about a stool test. They were also unfamiliar with medical terms such as FOBT: of the 33 participants, only one knew what it meant; she had heard it in a hospital. Furthermore, participants in this study did not know how a colonoscopy was done.

Another barrier to CRC screening was many participants did not think that they were at risk of CRC. They said "I am different from someone who has CRC" because they had a different lifestyle and no history of cancer in their immediate family. They believed that they did not get CRC because they were never constipated and ate lots of vegetables instead of greasy food. Some participants had mistrust in CRC screening test or health care providers because the National Cancer Screening Program provided a simple FOBT. They also believed that there were misdiagnoses because a doctor had to check the health status of so many people in a short time.

Some participants mentioned that they avoided CRC screening tests because they feared a CRC diagnosis. Many participants reported being embarrassed by giving a stool sample to hospital staff or exposing their buttocks and anus for a colonoscopy. Some female participants wanted their colonoscopy performed by a female doctor. Many participants hoped that the National Cancer Screening Program provided colonoscopy as a primary

CRC test. However, colonoscopy was a follow-up test for CRC after a positive FOBT results in the National Cancer Screening Program, which was a reason that they did not have colonoscopy.

Preferred strategies to improve CRC screening behaviors

All participants proposed strategies to improve CRC screening behaviors; these included various modes of information delivery (i.e., mass media, campaign, video, smartphone), educational type preference (i.e., group approach), and the health care system enhancement to improve CRC screening (Table 4). In terms of the health care system, some participants insisted that colonoscopy be a primary test, not a follow-up test after a positive FOBT results, of the National Cancer Screening Program so that they could have regular colonoscopies at low cost.

Discussion

This study revealed Koreans' awareness of CRC causes and concerns, importance of primary prevention, motivators of and barriers to CRC screening, and their preferred strategies to improve CRC screening behaviors. Findings from the study have important implications for research and practice. First, this study found body constitution as a cause of CRC and an emphasis on primary prevention, indicating that traditional Korean medicine and beliefs about CRC were embedded in participants. Participants' belief in body constitution as a cause CRC was newly found in this study. The theory of constitution is derived from Sasang constitutional medicine, a major branch of traditional Korean medicine, which originated in traditional Chinese Medicine (Lee et al., 2013). Sasang constitutional medicine emphasizes the importance of heredity rather than disease and classifies people according to physical and psychological traits (Lee et al., 2013). Traditional Korean medicine corrects an unsound body constitution and strengthens the immune system using herbal medicine, acupuncture, massage, exercise, and dietary therapy (Lin et al., 2017; National Center for Complementary and Integrative Health, 2017).

This study found that Koreans preferred primary prevention through healthy lifestyle to avoid CRC causes and did not make much use of secondary prevention through CRC screening. Participants in this study strongly believed that a healthy lifestyle with diet and exercise, and avoiding smoking and alcohol protected them from CRC. To them, CRC screening was necessary if they had symptoms. Similar beliefs were found in previous studies of Korean Americans (Lee and Lee, 2013) and Koreans (Lee and Lee, 2018). The focus on primary prevention may be influenced by traditional Korean medicine that enhances the immune system and treats disease with herbal medicine, exercise, and diet. On the other hand, many participants considered Western medicine such as secondary prevention through screening as a CRC treatment process after having symptoms.

Second, this study revealed that participants blamed constipation for CRC. They also showed lack of knowledge about FOBT and colonoscopy. This implies a prevalence of misconceptions and insufficient knowledge about CRC and CRC screening. There is little evidence that constipation causes CRC (Choe et al., 2006; Power et al., 2013). Power et al.'s (2013) systematic review and meta-analysis of observational studies found that prospective cross-sectional surveys and cohort studies demonstrate no increase in prevalence of CRC in individuals with constipation. However, Chinese immigrants in the US had a similar CRC causal pathway of constipation (Choe et al., 2006). Chinese immigrants thought that an unbalanced diet with toxins caused constipation, resulting in CRC (Choe et al., 2006). This may be an Eastern belief about diet and internal organ function shared by Koreans and Chinese.

Lastly, factors influencing CRC screening behaviors (motivators and barriers) and preferred strategies to improve CRC screening can be categorized at the individual, interpersonal, and community levels. Individual motivators can be physical (symptoms) or emotional (being scared). At the interpersonal level, the motivators can be social (being healthy for the family and taking the recommendation of others). At the community level, motivators can be systematic (the annual FOBT in the National Cancer Screening Program). Barriers can be physical, (no symptoms and discomfort), cognitive (lack of knowledge, low perceived risk of developing CRC, mistrust), or emotional (fear and embarrassment) at the individual level, and systematic (colonoscopy as a follow-up test in the National Cancer Screening Program) at the community level.

Notably, emotional factors were associated with CRC screening in the participants in this study. Both male and female participants were embarrassed to show their bodies, particularly sensitive body parts, to other people. Similar findings were found in studies: fear of a cancer diagnosis (Klabunde et al., 2005) and embarrassment (Consedine et al., 2011), especially when the physician is of a different gender, predict lower CRC screening. For example, Consedine et al., (2011) found that 245 European American, African American, and immigrant Jamaican men and women aged 45 and 70 years living in New York reported fecal and rectal embarrassment prefer physicians of their own gender. These factors should be discussed to increase compliance with CRC screening.

Regarding low perceived risk of CRC, the participants were unrealistically overoptimistic about not being vulnerable to CRC because they did not have first-degree relatives with CRC and had healthy lifestyles even though their spouses and close friends died of CRC. Similar optimism was found in previous studies with Koreans (Lee and Lee, 2018) and Korean Americans (Lee and Lee, 2013). Unrealistic optimism and low perceived risk of CRC seem to be cultural beliefs based on the Korean proverb "what I said may come true," thus, participants wanted to believe that positive thinking could protect their health (Lee and Lee, 2013; Lee and Lee, 2018).

This study showed that mistrust in FOBT or doctors because FOBT is a simple test and doctors had to see too many patients in a short time. Studies with Koreans (Lee and Lee, 2018; Suh et al., 2013) identified mistrust in the test or in health care providers as a barrier to cancer screening. Like Koreans, African Americans mistrusted

the quality of care they received from the health care system when it came to CRC screening (Griffith et al., 2012). Trust is essential to participation in preventive health programs, thus, providing accurate information on the purpose, procedures, results of CRC screening tests, roles of doctors, process of the National Cancer Screening Program in the health care system could help people to trust medical tests and health care providers.

Few studies have addressed about preferred strategies to improve CRC screening among Koreans. The key suggestions on interventions for CRC screening were (a) individual knowledge and beliefs by implementing various modes of information delivery such as mass media, campaign, video, or smartphone, (b) interpersonal interaction using group approach which was an educational type preference, and (c) systematic factors such as enhancing the health care system. The participants preferred group approach because Koreans had a collectivist culture (Hurh, 1998; Kang and Crogan, 2008; Ko et al., 2003; Lee and Lee, 2013; Lee and Lee, 2018), (Lee and Lee, 2018). Furthermore, social factors (being healthy for the family and others' recommendation on CRC screening) motivated participants in this study to have CRC screening. Group intervention can change Korean's health and health behavior. As the participants suggested, a multilevel approach might improve CRC preventive behaviors among Koreans.

Generalizability of this descriptive qualitative study may be limited to Koreans living in a regional area using voluntary, convenience sampling method. Furthermore, cross-sectional data using individual interviews cannot establish causal relationships between factors and CRC screening behaviors. Further research for the national investigation with large sample with Koreans can help eliminate these limitations.

Based on our findings, we recommend several strategies for future practice and research. First, it is important to provide accurate knowledge on CRC causes and CRC screening methods, which can help restore trust in CRC screening tests. Second, secondary prevention should be emphasized in addition to primary prevention. Participants' consideration of secondary prevention through CRC screening may be one reason for late diagnosis of cancer and the high morbidity rate. Accurate knowledge of primary and secondary preventions should be provided to enhance primary preventive behaviors and lead to secondary preventive behaviors. Finally, a multilevel approach to enhance motivators and decrease barriers using preferred strategies suggested by Korean participants in this study can be useful in improving CRC screening.

In conclusion, this study enabled us to understand Koreans' CRC awareness, preventive behaviors, and feasible interventions to increase CRC screeing utilization. This study suggests that we should pay more attention to providing accurate knowledge, emphasizing importance of secondary prevention, enhancing motivators of and decreasing barriers to CRC screening behaviors among Koreans. Multilevel approach using preferred strategies to improve individual, interpersonal, and systematic factors could improve CRC screening utilizations among Koreans.

Conflict of interest statement

None.

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