



## Factors associated with adherence to fecal occult blood testing for colorectal cancer screening among adults in the Republic of Korea



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### A B S T R A C T

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**Purpose:** Repeated participation in fecal occult blood testing (FOBT) is one of the major factors affecting the long-term success of population-based colorectal cancer screening programs. The aim of this study is to explore strong factors linked to repeated participation in FOBT in the prior decade (2002–2011) among adults using the Health Belief Model (HBM) after controlling for other covariates.

**Methods:** Data were obtained from South Korean adults, aged 50 years and over, who visited a national health screening center within a magnet hospital ( $N = 237$ ). A pilot test was conducted to investigate the internal consistency of the HBM instruments and the clarity of survey questions. Sample characteristics and rates of adherence to FOBT screening were examined using means and frequencies. Important factors associated with adherence to FOBT were examined using multivariate logistic regression analysis.

**Results:** About 44% of the respondents were adherent to FOBT screening over the prior decade. Four out of the six HBM-driven factors (perceived susceptibility, severity, and barriers, and health motivation) were statistically significant. Those with greater levels of susceptibility and health motivation and lower levels of severity and barriers were more likely to adhere to FOBT.

**Conclusions:** Health professionals should focus more on the four modifiable HBM-related factors to encourage adults to adhere to FOBT. Intervention programs, which lower perceived severity and barriers and increase susceptibility and health motivation, should be developed and implemented.

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### Introduction

Colorectal cancer is a major cause of cancer deaths worldwide (World Health Organization, 2012). It was the 7th leading cause of death in 2008 (World Health Organization, 2008). Colorectal cancer is common in western developed countries (Centers for Disease Control and Prevention, n.d.; Haggard and Boushey, 2009). However, recent statistics have shown a significant increase in colorectal cancer in East Asian countries (e.g., South Korea, China, and Japan) (Moghimi-Dehkordi and Safaee, 2012; Pourhoseingholi, 2012; Sung, 2007; Sung et al., 2005). Kim et al. (2011) attribute the increased prevalence of colorectal cancer in South Korea, in part, to a change toward westernized lifestyles, i.e. high meat consumption. According to the National Cancer Registry of South Korea, colorectal

cancer ranked second-highest among males (15.2%) and third-highest among females (10.6%) in the rates of cancer incidence (Statistics Korea, 2012). Also, the number of deaths per 100,000 persons due to colorectal cancer has risen from 8.8 persons in 2000 to 15.4 persons in 2011 (Statistics Korea, 2012).

Thus, it is critical to implement intervention strategies to resolve problems related to colorectal cancer in South Korea. Of the available approaches such as screening, diagnosis, and treatment (Karsa et al., 2010), colorectal cancer screening is cost-effective, and early detection through screening tests significantly enhances cancer survival rates. Accordingly, colorectal cancer screening is strongly encouraged in diverse countries (e.g., Europe, the United States, and South Korea) (Korean National Cancer Center, 2011; Minozzi et al., 2012). The current literature suggests three strengths of FOBT: (a) FOBT is a non-invasive and simple test, which causes minimal harm (Levin et al., 2008; Ministry of Health and Long-Term Care, 2009), (b) the test is affordable (Heitman et al., 2008; Pignone et al., 2011), and (c) the test has been effective in preventing deaths due to colorectal cancer (Pignone et al., 2011).

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However, the test rates for colorectal cancer (35.3%) in South Korea are lower than those for the stomach (64.6%) and cervical cancer (62.4%) (Korean National Cancer Center, 2011). In particular, rates of FOBT are much lower than those for other types of cancer screening. In 2008, only 21.2% of the target examinees in South Korea participated in an FOBT (Shim et al., 2010), although the rate in 2008 is about twice the rate in 2004 (10.5%) (Choi et al., 2012). Furthermore, the rates of FOBT adherence are lower than the rate of one-time FOBT (Fenton et al., 2010). This is a critical matter because repeated FOBT is a major factor affecting the long-term success of population-based screening programs (Janda et al., 2010; Lieberman, 2007). Given efficacy of FOBT and the importance of FOBT adherence, it is urgent to enhance the rates of adherence to FOBT (Fenton et al., 2010; Janda et al., 2010). To do so, significant factors associated with adherence to FOBT must be understood. However, currently little is known about the correlates of FOBT adherence (Beydoun and Beydoun, 2008; Janda et al., 2010).

Thus, this study aims to explore the strong factors linked to repeated FOBT among adults aged 50 years and over in South Korea. More specifically, this study focuses on factors derived from the Health Belief Model (HBM): Beydoun and Beydoun (2008) have suggested the necessity of examining the associations between HBM-related factors and FOBT adherence because they are likely to differ from HBM-related factors affecting the initiation of colorectal cancer screening (i.e., CRC). For instance, they propose that levels of self-efficacy and the characteristics of perceived barriers and benefits could be different.

### Theoretical underpinnings

The HBM was developed to understand why programs targeting health behavior changes showed limited success in the 1950s, and since then it has been widely used to elucidate the changes and maintenance of health behaviors (Janz et al., 2005). The HBM is a value-expectancy theory. A person's engagement in certain behaviors depends on that person's values and expectation in relation to those behaviors. Values imply the desire to avoid ailments or to get well, and expectations means the belief that certain health activities would avoid or improve illnesses (Champion and Skinner, 2008).

The HBM is composed of six components: perceived susceptibility, severity, barriers, and benefits, health motivation, and self-efficacy (Champion and Skinner, 2008; Janz et al., 2005; Rosenstock et al., 1988). Perceived susceptibility and perceived severity mean a person's belief regarding, respectively, the risks and serious consequences of a health condition. The combination of these two components serves as perceived threat. Perceived barriers signifies adverse aspects of taking a health-related action, while perceived benefits implies the positive effects of taking an action. If a person considers that benefits are greater than barriers, it is more likely that the person engages in the behavior. Health motivation is the desire to engage in a certain behavior. The last component of the HBM is self-efficacy, which is confidence in successfully performing a specific behavior.

### Methods

#### Sample and procedure

This study used a cross-sectional survey design, and collected data from 265 adults aged 50 years and over, who visited a national health screening center within a magnet hospital located in Seoul, South Korea. After obtaining IRB approval for the current research from the magnet hospital (Approval number: KHNMC IRB 2011-070), data were collected for approximately one month, from October 29 to the December 31, 2011. Those who did not undergo

**Table 1**  
Information on the subscales in the health belief model.

Subscale	The number of items	Measurement	Possible score range	Mean (standard deviation)	Cronbach's alpha
Perceived susceptibility	5	5-point Likert Scale ranging from strongly disagree to strongly agree	5–25	2.23 (0.67)	0.88
Perceived severity	7		7–35	2.67 (0.69)	0.83
Health motivation	7		7–35	3.71 (0.49)	0.70
Perceived barriers	6		6–30	2.22 (0.59)	0.79
Perceived benefits	6		6–30	3.86 (0.55)	0.91
Self-efficacy	5		5–25	3.77 (0.44)	0.54

an FOBT in the past were excluded from the sample because it was not possible to include these persons as a separate category of the outcome (FOBT adherence), due to the small numbers of respondents ( $n = 28$ ). Thus, the subjects for this study were those who had an FOBT at least once during the prior decade (2002–2011) ( $n = 237$ ).

For the current research, the survey questions were revised, and medical terms were paraphrased to enhance clarity. For example, the HBM instruments, which were originally developed for colon cancer, were modified to precisely examine their associations with FOBT. Also, medical terminologies (e.g., FOBT) were changed into easy terms (e.g., stool test) for a better understanding among laypersons. Thus, prior to the full-scale study, a pilot test was performed at the end of October in 2011 on 40 adults, aged 50 years and over in order to examine the clarity of survey questions and the internal consistency of the HBM instruments. The internal consistency of the HBM variables in the pilot study was satisfactory in general: Cronbach's alpha varied from 0.58 to 0.92. In the full-scale study, cronbach's alpha for self-efficacy was 0.54, and the other HBM-related factors demonstrated a satisfactory level of internal consistency (Cronbach's alpha > 0.7) (Table 1).

The average age of the respondents was 60 years, and about 55% were in their 50's (Table 2). Approximately half of the subjects were male (46%) and had a job (46%) at the time of the survey. The majority of respondents graduated from high school (46%), followed by college graduation or higher (30%). A relative majority of the respondents (39%) had a monthly household income ranging from 2.01 to 4 million won (KRW). The average household income in South Korea in 2012 was approximately 4 million won (Korean Statistical Information Service, 2010), which is equivalent to 3597 US dollars. For more detailed sample characteristics, please refer to Table 2.

#### Measures of main interest

##### Adherence to fecal occult blood test

A question asking if the respondent had had an FOBT at least every other year during the prior decade (2002–2011) was used. Before 2011, the South Korean government had recommended an FOBT every two years, but since 2011 it has recommended an annual FOBT (Ministry of Government Legislation, 2011a, b). Thus, the current study defined adherence to FOBT as an FOBT every 1–2 years because the respondents were asked about their history of FOBT during the 10 years prior to data collection (2002–2011). Yeses were coded with a value of 1, and noes were coded with a value of 0.

##### Health Belief Model instrument

Six factors of main interest in this study (perceived susceptibility, perceived severity, health motivation, perceived barriers,

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