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RESEARCH ARTICLE

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Adaptation and validation of the health belief model scale for colorectal cancer screening

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Abstract

Korea has the second highest incidence of colorectal cancer in the world. Instruments that are culturally and contextually sensitive, as well as valid and reliable, for determining health beliefs regarding colorectal cancer screening are essential for obtaining accurate information. The purpose of this study was to adapt and validate the health belief model scale for Koreans regarding colorectal cancer and fecal occult blood test utilization. Individual and cognitive interviews (also known as cognitive debriefing) with 33 Koreans, expert reviews with seven nursing practitioners and professors, and a pilot test with 18 Koreans were conducted to make the existing health belief model scale culturally and contextually sensitive. Subsequently, a cross-sectional survey with 728 Koreans aged ≥50 years was conducted. Exploratory and confirmatory factor analyses of the construct validity and internal consistency reliability supported the adapted health belief model scale. The adapted and validated health belief model scale in this study could contribute to the assessment of health beliefs regarding the fecal occult blood test among Koreans with a greater degree of accuracy with respect to Korean culture and context.

KEYWORDS
belief, colorectal cancer, Korean, scale, screening

1 | INTRODUCTION

Colorectal cancer (CRC) is a critical health threat globally and the third most common cancer worldwide. In 2018, there were over 1.8 million new CRC cases (World Cancer Research Fund International, 2018) and Korea had the second highest incidence rate of CRC in the world (44.5 per 100 000) (World Cancer Research Fund International, 2018). In 2017, Korea had the third highest mortality rates (17.1 per 100 000) (National Cancer Information Center, 2018). The 5 year survival rates of CRC were 75.9% from 2012 to 2016 (77.8% for Korean men and 73.2% for Korean women) (National Cancer Information Center, 2019b). Survival rates are inversely related to stage at cancer diagnosis (American Cancer Society, 2016). Koreans are likely to be diagnosed with later-stage CRC. For example, a recent study of Koreans showed that a total of 3128 Koreans were diagnosed with CRC. Among them, 822 (26.3%) had early-stage CRC (*in situ*/local stage) and 2306 (73.7%) had late-stage CRC (regional/distant) at diagnosis (Kweon, Kim, Kang, Shin, & Choi, 2017).

Both CRC incidence and mortality rates can be decreased by performing CRC screening, which increases the likelihood of diagnosing CRC at an early stage and treating polyps and CRC sooner (National Cancer Information Center, 2019a). In Korea, the National Cancer Screening Program provides a fecal occult blood test (FOBT) every year to Medical Aid recipients and National Health Insurance beneficiaries aged ≥50 years. If the FOBT is positive, a colonoscopy or double contrast enema is selectively conducted according to clinical judgement and participant preferences (National Cancer Information Center, 2019a). Despite the presence of the National Cancer Screening Program for

CRC, Koreans have low FOBT rates for detecting CRC. For example, the Korean National Cancer Screening Survey reported that from 2007 to 2013, only 19–27.6% of Koreans had undergone an FOBT in the previous year (Suh et al., 2016).

A literature review of CRC screening research revealed two significant issues. First, although many researchers reported that culture-specific health beliefs significantly influenced cancer screening behaviors in diverse racial and ethnic groups (Lee, 2015; Lu et al., 2016; Shaw et al., 2018), only a few studies examined health beliefs about CRC screening behavior as factors that influence CRC screening utilization in Koreans (Bae, Park, & Lim, 2014; Park & Kim, 2014). Most CRC screening studies focused on the demographic characteristics and health behavioral factors (e.g. alcohol consumption, smoking, physical activity) associated with CRC screening in Koreans (Kang et al., 2014; Myong, Shin, & Kim, 2012; Suh et al., 2016). Second, Previous research has revealed the importance of culture on cancer screening utilization and explaining cancer screening disparities to racial and ethnic groups (Lee & Im, 2013; Maxwell, Crespi, Antonio, & Lu, 2010). To identify the prevailing factors associated with CRC screening behavior, reliable and valid instruments that are culturally and contextually sensitive should be available for CRC screening research for each ethnic groups (Naz et al., 2018; Rogers, Goodson, & Ogechi, 2018). However, to date, Korean cancer screening research has used health belief instruments previously developed for Chinese individuals (Park & Kim, 2014) and Americans (Bae et al., 2014). Scales that were developed for non-Korean cultures might not include constructs specific to Korean culture, because of cultural differences in constructs by racial and ethnic groups.

Among health behavior theories, the health belief model (HBM) has been the most widely used model in cancer screening research; constructs of the HBM have been shown to reveal correlates of various rates of cancer screening utilization (Glanz, Rimer, & Viswanath, 2008). A previous study developed the HBM-driven instruments measuring CRC screening to be culturally sensitive, reliable and valid for Korean Americans in the USA. (Lee & Lee, 2015). When we applied Lee and Lee's (2015) instruments to Koreans in Korea, several issues arose. First, focus group interviews with 64 Koreans revealed their cancer screening beliefs and knowledge (Lee & Lee, 2018). In that study, one benefit of cancer screening was found to be taking advantage of the government's medical payment support program, which subsidized some of the medical expenses of low-income Koreans with cancer, but only if they participated in the National Cancer Screening Program (Lee & Lee, 2018). One barrier to cancer screening among Koreans was distrust of the National Cancer Screening Program, because it provided only simple cancer screening tests and there were many misdiagnoses (Lee & Lee, 2018). Because the study addressed general awareness about cancer screening (Lee & Lee, 2018), there is a need to ascertain whether benefits and barriers to cancer screening were the same as those specific to CRC screening. Second, the self-efficacy subscale should be modified by reflecting FOBT procedures in Korea, because self-efficacy items should be measured based on the specific procedure of the test (Champion, Skinner, & Menon, 2005). Lastly, although Korean Americans in the USA and Koreans in Korea share similar beliefs about health, there are also differences due to different health care systems of the U.S. and the Republic of Korea. Thus, this study adapted Lee and Lee's instruments (2015) measuring Korean Americans' health beliefs about CRC screening to be appropriate for Koreans in Korea by considering Korean contexts, such as the national healthcare systems that offer the National Cancer Screening Program. The purpose of this study was to adapt and validate the HBM scale for Koreans regarding health beliefs about CRC and FOBT utilization through individual and cognitive interviews, expert reviews, a pilot test, and a cross-sectional survey. Culturally and contextually sensitive, as well as reliable and valid, instruments measuring health beliefs are essential to enable researchers to understand health beliefs influencing Koreans' CRC screening behaviors and to develop appropriate educational programs.

2 | METHODS

2.1 | Study design

This study had sequential methodological phases to make the previously developed HBM scale culturally and contextually sensitive to Koreans and to validate the adapted subscales of the HBM to establish their psychometric properties with a focus on the FOBT (Lee & Lee, 2015; Netemeyer, Bearden, & Sharma, 2003). Interviews, expert reviews, and a pilot test were used for the instrument adaptation, and a cross-sectional survey was used for the instrument validation in this study, which was conducted in a metropolitan city in Korea.

2.2 | Setting and samples

The study sample consisted of Koreans aged ≥50 years according to the Korean National Cancer Screening Program guidelines for CRC screening (National Cancer Information Center, 2016). Individual and cognitive interviews were conducted with 33 Koreans recruited from churches and community centers using convenience sampling. Of the 33 Korean participants, more Korean women (66.7%) than men (33.3%) were interviewed. The numbers of middle-aged (aged 50–64 years, 51.5%) and older (≥65 years, 48.5%) Koreans were almost equivalent. A pilot test was completed with 18 Koreans (44.4% men and 55.6% women, 38.9% aged ≥65 years and 61.1% aged 50–64 years) who were recruited using convenience sampling. For the cross-sectional survey, a total of 942 Koreans aged ≥50 years were recruited from churches, community centers, stores, and companies, and from 728 completed questionnaires to test the validity and reliability of the HBM scale.

2.3 | Ethical considerations

The Ethical Committee of Chosun University approved the protocol of this study (institutional review board no. 2015-0046). The participants were informed about the purpose and procedures of the study, privacy protection and confidentiality, as well as their right to withdraw from the study. Informed consent was obtained from all participants. Data were collected anonymously.

2.4 | Measurements

The HBM scales in this study were based on Lee and Lee's (2015) Korean version of the HBM scale, which was developed as a culturally appropriate instrument measuring health beliefs about FOBT utilization for Korean Americans in the USA. Lee and Lee (2015) modified the previous HBM subscales, including Menon's et al. (2003) susceptibility, benefits, barriers, and self-efficacy items, as well as Champion's (1993) severity scale, through several qualitative and quantitative methodological steps that included interviews, expert reviews, and a cross-sectional survey. Lee and Lee's (2015) HBM scale included four susceptibility items, eight severity items, five benefit items, 22 barrier items, and seven self-efficacy items. These five HBM subscales have demonstrated good reliability, with a Cronbach's alpha >.70 (DeVellis, 2017), and their construct validities were established using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Lee & Lee, 2015). All items were scored on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The instruments used in this study were developed by the authors.

2.5 | Procedure

2.5.1 | Step 1: Individual and cognitive interviews

Thirty three participants discussed their perceptions and health beliefs about CRC screening using semistructured and open-ended questions (Table 1). When CRC and FOBT were discussed, only a few participants were familiar with the term "FOBT". Most of the participants were aware of the availability of a stool test provided by the National Cancer Screening Program, but interestingly, they did not know what the stool test was used for. They said that health professionals, mostly nurses, told them to bring in stool samples after collecting them at home, but never told them what tests would be conducted with their stool samples. Some participants cited the Korean proverb "Knowing can be a disease, unknowing can be medicine" as a barrier to undergoing the FOBT. Knowing their health status by receiving cancer screening could have a negative effect on their mental and physical health due to intense anxiety. Due to this issue, one item, "Because knowing can be a disease, unknowing can be medicine, I do not have a stool blood test", was added to the barriers scale.

TABLE 1 Individual interview guide for health belief model concepts

Concepts	Discussion questions
Perception	When you hear "colorectal cancer" or "fecal occult blood test", what comes to mind?
Susceptibility	Who gets colorectal cancer? Do you think that you will get colorectal cancer?
Severity	What are the consequences if you have colorectal cancer? What would you be worried about most if you had colorectal cancer?
Benefits	What are the benefits of undergoing a fecal occult blood test?
Barriers	What prevents you from getting a fecal occult blood test? What are your experiences with this test?
Self-efficacy	How confident are you that you could undergo a fecal occult blood test?

The procedures for FOBT were described according to the participants' experiences. Koreans in Korea usually visit medical facilities, including hospitals or clinics, to receive a small bin for the FOBT, and healthcare professionals, such as nurses, explain that a few stool samples should be submitted to them in person. In contrast, in the USA, people can buy a FOBT kit with instructions at stores and send it to medical facilities through the mail. Thus, due to differences between the USA and Korea regarding FOBT procedures, self-efficacy items were revised by adding "visiting" or "hospitals" to the items instead of "mail" or "stores" to reflect FOBT procedures in Korea. Overall, most of the scale items were validated as appropriate, and the HBM subscales for barriers and self-efficacy were modified through concept discussions with participants during the interviews.

After discussing the concepts, the participants reviewed all items of the HBM scale during cognitive interviews using the concurrent verbal probing method (i.e. additional specific questions were asked to elicit further information about response errors in the survey questionnaires after the participant responded to the survey questions) (Willis, 2005). Cognitive interviewing (also known as cognitive debriefing, Wild et al., 2005) focused on the interpretation of items, rather than on collecting data, in response to items to evaluate sources of response error in the survey questionnaires, and to examine how Koreans understand and interpret the items for the HBM scale. This method was used to ensure the correct interpretability of items from target and respondents' cognitive ability and was commonly used in scale adaptation (Lam et al., 2017; Wild et al., 2005).

Before the item reviews, one item related to lingual barriers in the original HBM scale for Korean Americans ("I don't communicate well in English, which would keep me from having a stool blood test") was removed. The term "stool blood test" was used instead of "FOBT", because only a few participants were familiar with the term "FOBT". Additionally, one barrier item, "Not having private freedom to use the bathroom alone would keep me from having a stool blood test", was difficult for Korean participants to understand, because privacy among family members is not a familiar concept in Korean culture. The barrier item was changed to "I have difficulty using the family bathroom alone for a long time to collect stool samples, which would keep me from having a stool blood test" by removing the phrase "private freedom", which caused confusion among the participants. All of the revised self-efficacy items reflecting FOBT procedures in Korea were confirmed with participants during the cognitive interviews.

2.5.2 | Step 2: Expert reviews

A panel of Korean experts, including four clinical nursing researchers with more than 10 years of clinical experience in nursing and three nursing professors with expertise in cancer research, reviewed the contents of the instruments after individual and cognitive interviews to determine the cultural and contextual appropriateness, as well as the content validity of the adapted HBM scale for Koreans.

TABLE 2 Rotated factor analysis of the adapted health belief model subscales in the EFA (n = 367)

Scale and items	Factor loadings 1	2	3	4	Corrected item-total correlation
Factor 1 (barriers)					
BAR1. Fear of finding something wrong would keep me from having a stool blood test	.54				.55
BAR2. Being embarrassed to handle stool would keep me from having a stool blood test.	.61				.60
BAR3. Not having enough time would keep me from having a stool blood test	.70				.67
BAR4. Not knowing how to do the test would keep me from having a stool blood test	.71				.67
BAR5. I have difficulty using the family bathroom alone for a long time to collect stool samples, which would keep me from having a stool blood test	.68				.65
BAR6. Having to handle stool would keep me from having a stool blood test	.67				.64
BAR7. Not having symptoms would keep me from having a stool blood test	.68				.66
BAR8. I am too busy to have a stool blood test	.74				.70
BAR9. I do not think I will get cancer which would keep me from having a stool blood test	.70				.70
BAR10. Not having a doctor's recommendation would keep me from having a stool blood test	.69				.65
BAR11. Getting a stool blood test is too much of a hassle	.76				.75
BAR12. Being lazy would keep me from having a stool blood test	.77				.76
BAR13. Being careless would keep me from having a stool blood test	.75				.75
BAR14. No need of having a stool blood test would keep me from having it	.73				.72
BAR15. No chance of having a stool blood test would keep me from having it	.75				.72
BAR16. At my age, a stool blood test is not necessary	.65				.60
BAR17. Financial reasons, such as medical costs and health insurance, would keep me from a stool blood test	.68				.65
BAR18. I have more urgent and important problems than having a stool blood test	.64				.62
BAR19. Other colon cancer screening options such as colonoscopy are more accurate than a stool blood test, which would keep me from having a stool blood test	.60				.58
BAR20. I tend to put off having a stool blood test due to my family obligations	.61				.59
BAR21. Fear of being a burden to the family, if diagnosed with colon cancer, would keep me from having a stool blood test	.68				.66
BAR22. Because knowing can be a disease, unknowing can be medicine, I do not have a stool blood test	.62				.61
Factor 2 (susceptibility and severity)					
SUS1. I will get colon cancer		.67			.48
SUS2. I will get colon cancer in the next few years		.64			.52
SUS3. I will get colon cancer sometime during my lifetime		.64			.55
SUS4. As I get older, my chances of getting colon cancer increase		.66			.60
SEV1. The thought of colon cancer scares me		.69			.67
SEV2. When I think about colon cancer, my heart beats faster		.75			.69

(Continues)

TABLE 2 (Continued)

Scale and items	Factor loadings 1	2	3	4	Corrected item-total correlation
SEV3. I am afraid to think about colon cancer		.70			.68
SEV4. Problems I would experience with colon cancer would last a long time		.74			.70
SEV5. Colon cancer would threaten a relationship with my spouse		.73			.70
SEV6. If I had cancer, it would disrupt the harmony in my family		.68			.67
SEV7. If I had colon cancer, my whole life would change		.68			.69
SEV8. If I developed colon cancer, I would not live longer than 5 years		.47			.36
Factor 3 (self-efficacy)					
SE1. I can go hospitals and obtain a stool blood test kit			.72		.66
SE2. I can collect three separate stool samples			.80		.76
SE3. I can get the sample back to the hospital			.89		.87
SE4. I can complete a stool blood test even if I do not know what to expect			.88		.85
SE5. I can complete a stool blood test if I really want to			.85		.82
SE6. I can find hospitals to get a stool blood test			.68		.62
Factor 4 (benefits)					
BEN1. Having a stool blood test will help me detect colon cancer early				.81	.75
BEN2. Having a stool blood test will help me not worry as much about colon cancer				.79	.69
BEN3. Finding colon cancer early means that the treatment might not be as bad				.77	.66
BEN4. A stool blood test can enable me to reduce a burden to my family by detecting colon cancer early				.84	.78
BEN5. A stool blood test can enable me to take care of my family by detecting colon cancer early				.83	.74
Eigenvalue	12.99	5.54	3.58	2.89	
Variance explained (%).	28.87	12.30	7.96	6.41	

Abbreviations: BAR = barrier; BEN = benefit; EFA = exploratory factor analysis; SE = self-efficacy; SEV = severity; SUS = susceptibility.

Quantitative agreement of item relevance and qualitative comments on items were achieved, along with content validity of the HBM scale. The content representativeness was rated on a 4 point ordinal scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant) by experts (Polit & Beck, 2006). The item-level content validity index (I-CVI) and the scale-level content validity index (S-CVI) were calculated as the number of experts providing either a 3 or 4 rating divided by the total number of experts (Polit & Beck, 2006). All the I-CVI and all five HBM subscales of the S-CVI were 1.0, because all the items were rated as 3 (quite relevant) or 4 (highly relevant) by all seven experts. The experts proposed a few changes in the wording to make the items clearer, so the items were revised accordingly.

2.5.3 | Step 3: Pilot test

A pilot test was conducted to assess whether the HBM scale could be administered in a survey without problems. A survey questionnaire was distributed to 18 Korean participants aged ≥50 years to determine the clarity of the questions and whether there were any difficulties completing the HBM scale. Findings from the pilot study indicated that the administration of a large study would be feasible, because there were no other comments on the instrument and the participants found it to be clearly understandable, except for some redundancy that was eliminated from the survey questionnaire.

2.5.4 | Step 4: Cross-sectional survey

The psychometric properties of the final HBM subscales (susceptibility, severity, benefits, barriers, and self-efficacy) related to FOBT were examined in a cross-sectional survey with 728 Koreans aged ≥50 years. The final version of the HBM scale that was modified based on findings from the individual and cognitive interviews, expert reviews, and pilot test was administered for the cross-sectional

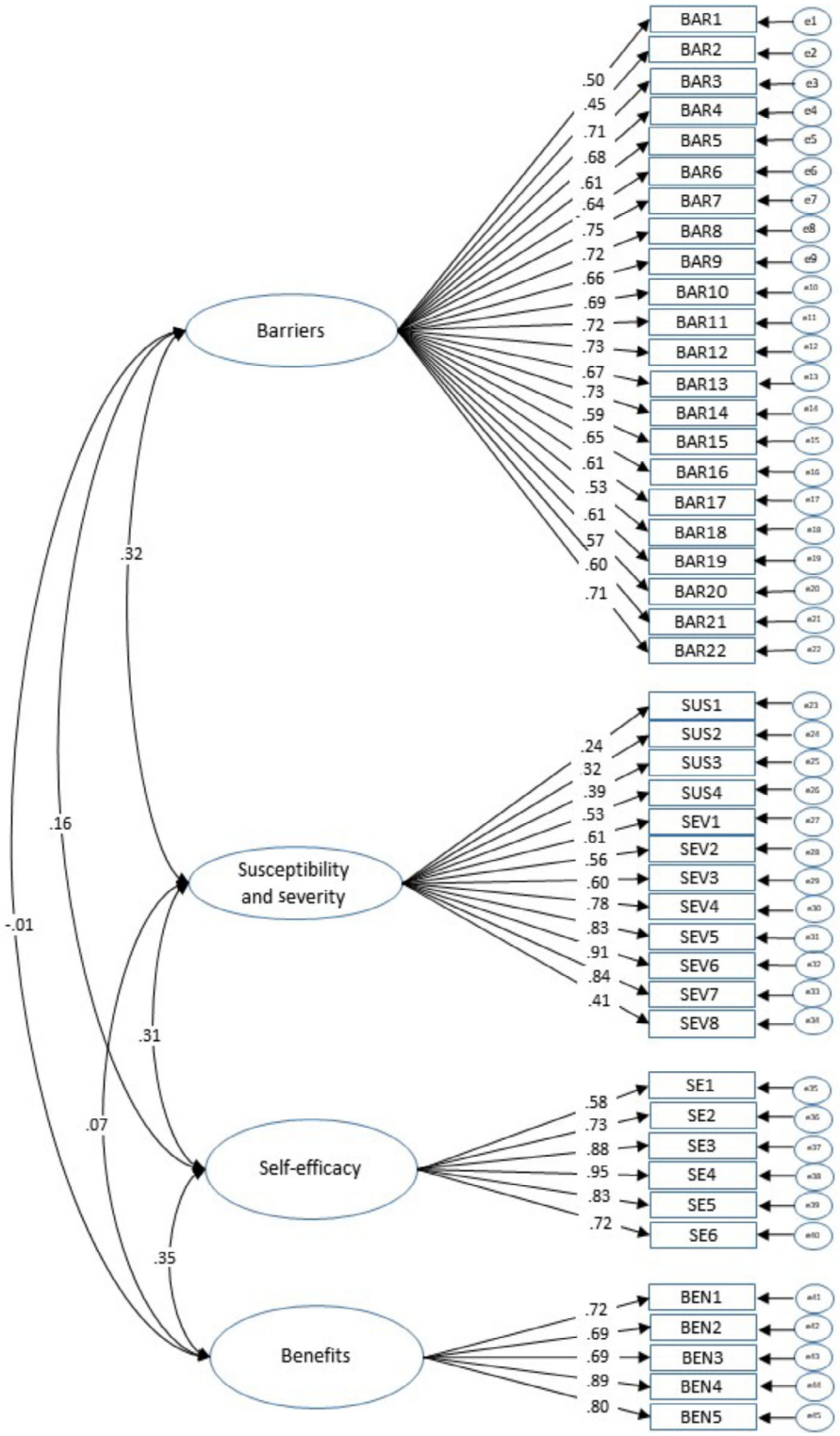

FIGURE 1 Confirmatory factor structure of the health belief model scale. BAR = barrier; BEN = benefit; SE = self-efficacy; SEV = severity; SUS = susceptibility

survey. The final version of the HBM scales on the study questionnaire included 45 items with five subscales (4 susceptibility items, 8 severity items, 5 benefits items, 22 barrier items, and 6 self-efficacy items).

The principal investigator (PI) and research assistants collected data from community-based sample of Koreans aged ≥50 years using convenience sampling. The PI and research assistants provided participants with a self-administered survey questionnaire, which the participants returned to the researchers.

2.6 | Data analysis

The final HBM subscales were tested for construct validity, including EFA, CFA, and internal consistent reliability, using SPSS version 24 and Amos version 23. We conducted the EFA to reveal the scale's underlying structure and we subjected the resulting model to a CFA to verify the relationships based on the theory (Tabachnick & Fidell, 2001). In the EFA, a principal component extraction with a varimax rotation was

performed. Before the EFA models were estimated, Bartlett's sphericity test and the Kaiser–Meyer–Olkin (KMO) index were applied to calculate the adequacy of sampling. A scree plot and eigenvalues were used to identify the number of factors. Item-total correlations and factor loadings were evaluated to see how well each item was related to the scale. In the CFA, multiple fit indices, including the relative χ^2 (χ^2 divided by degrees of freedom [d.f.]), goodness-of-fit index (GFI), comparative fit index (CFI), and root mean error of approximation (RMSEA), were used to achieve an adequate fit for the models (Ullman, 2001). We performed a rigorous and detailed assessment of the instrument properties by combining the EFA and CFA methods in this study.

3 | RESULTS

3.1 | General characteristics of participants in the cross-sectional survey

A total of 728 Koreans completed the surveys (response rate = 77.3%). The total sample was randomly split in half using the algorithm available in SPSS for the EFA and CFA samples. The EFA and internal consistency were examined using the EFA samples. Regarding demographic information, for the EFA sample (n = 367), the age of the participants ranged from 50 to 75 years, with a mean age of 60.29 (standard deviation [SD] = 7.04). Sixty six percent of the respondents were female, 82.6% had a high school diploma or higher, and most participants (85.6%) were married. For the CFA sample (n = 361), the participants ranged in age from 50 to 75 years, with a mean age of 60.22 (SD = 6.56). Fifty nine percent were female, 91.4% had a high school diploma or higher, and 88% were married. No statistically significant differences emerged between the two groups in terms of demographic variables.

3.2 | Construct validity and model fit

The obtained data were suitable for the EFA analysis (n = 367), because the KMO result was .90 and the χ^2 value for Bartlett's test of sphericity was 11 966.919 (P < .001). The EFA revealed four factors with all items loaded at ≥.40 (Table 2). All items associated with each factor were from the same construct, except susceptibility and severity, which were loaded on one factor (factor 1 = barriers, factor 2 = susceptibility and severity, factor 3 = self-efficacy, and factor 4 = benefits). Four factors accounted for 28.87% (barriers), 12.30% (susceptibility and severity), 7.96% (self-efficacy), and 6.41% (benefits) of the variance and were extracted with eigenvalues >1.

The CFA was subsequently applied to the data to examine construct validity (i.e. how well items fit the theoretical construct) of the four factor model extracted from the EFA. The results obtained from the CFA analyses (n = 361) indicated that the factor structure of the HBM provided an applicable scale. The multiple fit indices supported the four factor structure of the data: χ^2/d.f. = 1.99 (χ^2 = 1741.657, d.f. = 874, P < .001), GFI = .83, CFI = .92, RMSEA = .05, standardized root mean square residual = .06, and normed fit index = .85. The χ^2 results in the present study had large values, with P < .05, which demonstrates that there are large residual effects and that the model does not fit the data. However, χ^2 statistics are inflated by large sample sizes, which involve excess power; therefore, other fit indices should be considered (Schumaker & Lomax, 2004).

TABLE 3 Internal consistency reliability (n = 367)

Scales	No. items	Mean (SD)	Cronbach's alpha
Susceptibility and severity	12	2.73 (1.11)	.90
Benefits	5	3.88 (.49)	.88
Barriers	22	2.47 (1.09)	.95
Self-efficacy	6	3.57 (.88)	.91

Abbreviations: SD = standard deviation.

The standardized factor loadings on the four factor model HBM scale are presented in Figure 1. Factor loadings of items in the CFA were found to be between .24 and .95. The CFA shows that all items in the HBM subscales, except three items in the susceptibility subscale, had factor loadings >.40, which indicated good construct validity (Nunnally, 1978).

3.3 | Reliability assessment

The reliability of the HBM subscales was examined through Cronbach's alpha coefficients, which are estimates of internal consistency reliability. The number of items, item means, mean of the item SD, and Cronbach's alpha for each subscale are presented in Table 3. All subscales demonstrated satisfactory internal consistency reliability, with Cronbach's alpha values >.70, according to the guidelines established by DeVellis (2017).

4 | DISCUSSION

To the best of our knowledge, this is the first attempt to develop a culturally and contextually sensitive measure for beliefs about FOBT among Koreans in an HBM-driven context. This study used several sequential methodological processes, which are common methods in the literature, to adapt and validate the HBM scale for Koreans (Champion et al., 2005; Lam, Chan, Chong, Wong, & Ye, 2018; Lee, Lee, & Aranda, 2018). The HBM subscales for barriers and self-efficacy were modified according to Korean culture and context. EFA and CFA of the construct validity and internal consistency reliability supported the final version of the HBM scale.

We addressed cultural and contextual issues in the HBM adaptation and validation processes for Koreans. Cultural issues associated with the methodological processes included avoiding knowledge of health status and familism. Based on individual and cognitive interviews, an item reflecting the Korean cultural proverb, "because knowing can be a disease, unknowing can be medicine, I do not have a stool blood test", was added to the barrier scale. The refusal to obtain health information on health status from a screening that participants mentioned in this study was similar to the findings from individual interviews with Korean Americans (Lee & Lee, 2013). When people heard about their health status, they worried that this knowledge

would have negative effects on their health. Thus, by avoiding a CRC screening, they could avoid knowing their health status. The EFA and CFA indicated that this cultural belief performed well as an indicator of the barrier construct to FOBT.

An issue associated with familism was that the original HBM scale for Korean Americans in the USA was modified by adding items that reflect the importance of relationships between family members in undergoing the CRC screening test (Lee & Lee, 2015). Items related to familism in the original HBM scale for Korean Americans included severity items (SEV5: "Colorectal cancer would threaten a relationship with my spouse", SEV6: "If I had cancer, it would disrupt the harmony in my family"), benefit items (BEN4: "A stool blood test can enable me to reduce the burden to my family by detecting colorectal cancer early", BEN5: "A stool blood test can enable me to take care of my family by detecting colorectal cancer early"), and barrier items (BAR20: "I tend to put off having a stool blood test due to my family obligations", BAR21: "Fear of being a burden to my family if diagnosed with colorectal cancer would keep me from undergoing a stool blood test"). This study demonstrated that these items related to familism had high factor loadings in both the EFA and CFA and indicated that familism is a significant cultural belief associated with CRC screening behaviors among Koreans. Asian culture emphasizes familism, rather than individualism, under the influence of traditional Confucianism (Lee & Lee, 2013). For Koreans, family relationships are intertwined in their mind, and individuals and family members are not encouraged to think separately, because the family behaves as a basic unit of health practices (Lee, 2015).

From a contextual point of view, issues were revealed in this study regarding FOBT awareness and procedures in the Korean National Cancer Screening Program. The Korean national healthcare system conducts the National Cancer Screening Program, including an annual FOBT, for Koreans aged ≥50 years. The interviewed participants mentioned that although they knew there is a stool test provided by the National Cancer Screening Program and they had undergone a stool test, they were not familiar with the medical term "FOBT", which is why we used the term "stool blood test", rather than "FOBT", in the survey. In addition, items for self-efficacy in the original HBM scale for Korean Americans were changed to reflect differences in the healthcare systems in the USA and Korea during individual interviews, which was confirmed by reviewing items during the cognitive interviews. Self-efficacy items were changed to suit the Korean healthcare system, because self-efficacy was measured based on the specific procedure of the test (Champion et al., 2005).

A comparison of the original HBM scale for Korean Americans and the adapted HBM scale for Koreans in this study revealed that the factor loadings of the EFA and CFA, as well as the Cronbach's alpha results of the HBM scale, for Koreans had better scores compared with the scores associated with the original HBM scale for Korean Americans. Interestingly, the EFA in this study extracted four factors from the HBM scale. Similar to the original HBM scale analysis, the present study demonstrated that susceptibility and severity loaded one factor that can be considered a threat construct, according to the HBM (Glanz et al., 2008).

There are two main implications in this study. First, this study developed an HBM scale for CRC screening among Koreans. Barrier items (e.g. refusal of health information), benefit items (e.g. familism), and self-efficacy items (procedures of FOBT in Korea) of the HBM scale in this study were different from the items developed for other ethnic groups. Healthcare professionals, including nurses, should have a better understanding of the contextual aspects of CRC screening behaviors. Second, it came as a surprise that Koreans participating in the National Cancer Screening Program did not know the purpose of the stool blood test. This study result implies that healthcare professionals should explain the FOBT in greater detail, including a description of what it is and why and how it should be conducted. This intervention will enable people to improve their knowledge of the FOBT and increase their participation in the FOBT.

Although the adapted HBM scale had promising results, the following limitations should be considered. First, although we examined construct validity and the internal consistency reliability of the scale, other types of validity and reliability could have been examined for accurate test results of psychometric properties of the HBM scale. For example, test–retest reliability can test the stability of the HBM scale over time, although the timing of the test is important, because we can obtain considerably different estimates depending on the interval (DeVellis, 2017). Second, our study included a community-based sample in local areas and might be limited to non-representative participants, because participants were recruited using convenience sampling. Future research should test this instrument using different types of validity and reliability; it should also examine it with different age groups and a variety of places, such as rural, urban, or other communities, to increase the generalizability of the results.

5 | CONCLUSION

The HBM scale was adapted to be culturally and contextually sensitive, and it was found to be reliable and valid for Koreans. The adapted and validated HBM scale in this study could contribute to more accurate measurements of health beliefs about FOBT by reflecting Korean cultures and contexts, and could thus improve FOBT screening behaviors.

AUTHOR CONTRIBUTIONS

Study design: S.-Y.L. and E.L.

Data collection: S.-Y.L., E.Y., and S.H.

Data analysis: S.-Y.L. and E.L.

Manuscript writing and revisions for important intellectual content: S.-Y.L., E.L., Y.R., and S.L.

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