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ORIGINAL ARTICLE

Development and exploratory testing of a school-based educational program for healthy life behaviors among fifth grade children in South Korea

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Abstract

Aim: The purpose of this study was to develop an educational program to promote healthy life behaviors and to evaluate its potential effects on the health practices of fifth grade elementary school children.

Methods: The program, which consisted of six categories (daily life and health, disease prevention and management, prevention of drug misuse and overuse, sexuality and health, mental health, and injury prevention and first aid), was developed based on the ADDIE model. A pretest–post-test, one-group, quasi-experimental design was used with 85 elementary school students who voluntarily participated in the program.

Results: A school-based educational program, called the "Six Kid Keys," referring to the six categories of healthy life behaviors, was developed. Significant pre–post differences in two of the six healthy life behavior categories (disease prevention and management, injury prevention and first aid) were found.

Conclusion: A school-based intervention that was aimed at changing habits related to healthy life behaviors could be effective for elementary school children.

Key words: child, elementary schoolshealth behavior, health education, school health services.

BACKGROUND

Undoubtedly, healthy behaviors are very important for both children and adults. It is well known that children's lifestyles affect their current well-being, as well as their future health status. The pursuit of healthy life behaviors (HLBs) is considered to be an essential factor in the optimal growth and development of children (Cartland & Ruch-Ross, 2006; Hong, Yufeng, Agho, & Jacobs, 2011; Lindeboom, Llena-Nozal, & Klaauw, 2009).

Moreover, the health habits of school-aged children can have long-term outcomes and health-related behaviors that are shaped early in life might affect their risk of developing subsequent illnesses (Deshmukh-Taskar *et al.*, 2006; Morrongiello, 2004). Unhealthy behaviors could be risk factors for later chronic diseases or other health problems (Deshmukh-Taskar *et al.*; Herbert, Lohrmann, Seo, Stright, & Kolbe, 2013; Lam, Chan, & Yeung, 2013). However, unhealthy behaviors can be modified easily through interventions with elementary school-aged groups (Cespedes *et al.*, 2013).

The physical and mental growth of the 1 billion school-aged children worldwide today will influence the generations that follow. Therefore, schools also play a crucial role in enhancing whole-life health outcomes (Carruth *et al.*, 2010). Among school faculties, school nurses are particularly critical professionals for assessing children's lifestyle patterns and providing educational interventions that are appropriate to their developmental level. School nurses thereby can have positive effects on children's health habits (Campbell, 2012; Mulaudzi & Peu, 2014).

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School-aged children between the ages of 7 and 12 years are in the critical time to develop industry (Erikson, 1984; Erikson, Erikson, & Kivnik, 1986); therefore, children show a readiness to learn new concepts. For this age group, active learning can maximize the effect of education. Accordingly, health education related to HLBs might be easier and more effective to implement with children of this age group than with those of other age groups (Hong *et al.*, 2011). Therefore, it is necessary to develop school-based health educational programs that emphasize HLBs and use an appropriate educational model for school-aged children.

A major component of any health program for children of this age is school-based education. A person's health condition is, to some extent, related to one's individual choices regarding eating, exercising, and practicing safe behaviors. Thus, children must receive health education that they can understand and easily implement in their everyday life to protect themselves against diseases and harmful injuries in school, with governmental support (Gresham *et al.*, 2001; Kim, 2010; Li *et al.*, 2015; Robinson & Dearmon, 2013).

In South Korea, the government adopted "Healthy People 2020" (Centers for Disease Control and Prevention, 2011) and advertised it to the entire nation (Kim, 2011; Korea Institute for Health and Social Affairs, 2014). In particular, the special concern regarding school-aged children was addressed. However, current health education programs in the elementary schools of South Korea generally do not consider students' developmental characteristics; they tend to be teacher-centered and use teaching by rote as the primary educational method (Lee & Kim, 2004; Song & Shin, 2014). The main problem is that this method does not integrate content, which includes all areas of HLBs, but instead focuses on subtopics separately (e.g. dental health, safety, sexual abuse prevention, diet, and exercise).

Although a considerable number of studies have reported the importance of healthy behaviors in adults, the health behaviors of school-aged children have received relatively little attention, compared to other age groups (Cartland & Ruch-Ross, 2006; Lindeboom *et al.*, 2009; Sormunen, Tossabainen, & Turunen, 2012). Until now, many such studies have been descriptive surveys of the actual conditions of health promotion behaviors (Kim, Lee, & Park, 2005). Little research has been conducted on establishing the criteria for what constitutes effective health education for elementary school students and on how to improve such school-based educational programs (SBEPs). The purpose of this study was to develop a SBEP for HLBs and to evaluate its potential effects on healthy practices among fifth grade elementary school students.

METHODS

Design

In this study, a pretest–post-test, one-group, quasi-experimental design was used for exploratory testing.

Developmental process of the school-based educational program for healthy life behaviors

A SBEP for HLBs was developed based on the ADDIE model (analysis, design, development, implementation, and evaluation). This model was chosen because it is effective, attractive, efficient in delivering educational content, and it is focused on the learner (Morrison *et al.*, 2011). The five steps of the ADDIE model were followed (Fig. 1).

Analysis

In the analysis phase a literature review was carried out of healthy behaviors for elementary school children and then content related to HLBs was selected through four in-depth discussions among the researchers. The criteria for selection were based on an elementary school

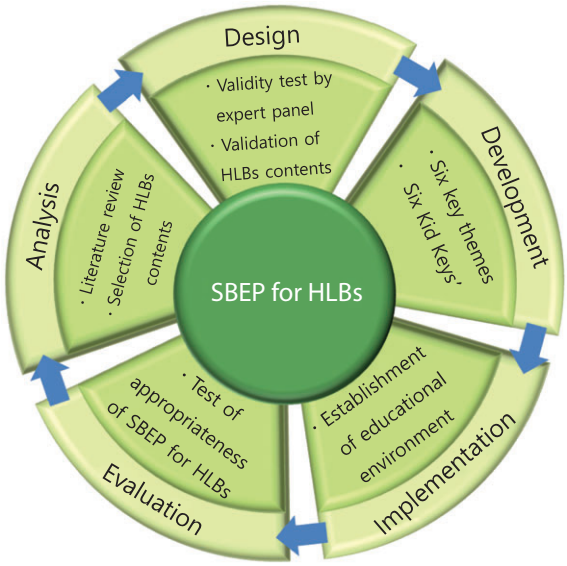

Figure 1 Developmental process, based on the ADDIE model, for the school-based educational program (SBEP) for healthy life behaviors (HLBs).

textbook that was published by the Korean Ministry of Education to conform with the students' level of understanding.

In this study, the goals of the SBEP for the children's HLBs were as follows:

1 Cultivate their ability to understand what HLBs are and what children can do for themselves in everyday life.
2 Promote children's practical knowledge and skills related to disease, safety, and protecting themselves in emergencies.
3 Encourage children's sense of responsibility and adoption of HLBs for their own health.

Design

In the design phase, a validity test was carried out by an expert panel consisting of six people (three researchers of this study and three elementary school nurses). The ideal number of members on an expert panel is ~10 people (Morrison, 2010). At the validity test, the panel confirmed that all content areas of the SBEP were appropriate for fifth grade children.

Development

Six key themes that are required for HLBs of fifth grade children in the study were identified. This program consisted of six areas: (i) daily life and health; (ii) disease prevention and management; (iii) prevention of drug misuse and overuse; (iv) sexuality and health; (v) mental health; and (vi) injury prevention and first aid.

Implementation

The environment was established to develop the SBEP. The educational intervention was implemented once per week for 15 weeks and all of the participants were fifth grade children from one elementary school of one district.

Evaluation

In this phase, the appropriateness of the SBEP for HLBs was pilot-tested with 10 fifth grade elementary school students from another district to detect problems. The results of this test confirmed the adequacy of the developed SBEP for fifth grade children. The potential effects of the health education program on the children's practice of HLBs were examined. One week before the educational intervention, a pre-test was conducted; a post-test was conducted 2 weeks after the program finished.

Participants

The study was conducted with a convenience sample of fifth grade elementary school children who attended one elementary school in Chunchon city in South Korea. The sample included the entire fifth grade class of 131 students and 119 (90.8%) agreed to participate in the SBEP's 15 sessions. However, only 85 (64.9%) students completed both of the pre- and post-test HLB surveys. The reasons for dropping out (34 students) were related to either the participant's absence or incomplete pre-test or post-test responses. Using G*Power 3.1.7 (Faul, Erdfelder, & Lang, 2007), it was determined that 23 participants in one group were required for a large effect size of 0.80 with 95% power at a significance level of 0.05 for a paired *t*-test. Thus, a sample size of 85 participants was considered to be acceptable.

Following approval from the institutional review board (IRB), permission was obtained from the administrative affairs department of the school and then a letter was sent to the parents of the students in order to obtain informed consent. The letter clearly stated the purpose of the study, the researchers' credentials, information regarding confidentiality, the voluntary nature of participation in the SBEP and HLB survey, and that the HLB questionnaire would take ~10–15 min to complete. In addition, the letter indicated that there would be no negative consequence for not participating and that the anonymous data would be reported as grouped data, not as individual responses. Written informed consent was obtained from the parents who agreed to their child's participation in the educational intervention (119 sets of parents; 90.8%).

Before the data collection, the study's purpose was explained to the participants and their permission to participate in the program was obtained. The questionnaires were self-administered and were collected after class to avoid any distraction during school activities. The questionnaire was administered twice 1 week pre- and 2 weeks post-program) and the data were collected by different researchers in order to reduce the testing effects. In order to maintain confidentiality, the researchers used the students' birth date and school number to match and measure changes in the scores between the tests.

Educational intervention procedure

The SBEP was administered from September 11 to December 17 2013. Approximately 30 students were in one class at the time of the program's implementation.

The program consisted of 15 weekly sessions (40 min per session) that were offered during regular school hours on weekdays. Various teaching methods were used to address the cognitive characteristics of this age group: lectures, case presentations, demonstrations, practice, picture data, educational movies, videos, and games with enjoyable activities. The reason that various educational methods were used was to sustain the students' attention and to motivate them to participate actively, especially those students who eagerly played leading roles during the role plays. After every session, the students' responses and opinions were identified according to their area of interest, appropriateness, and educational need.

Education was provided each week by one school nurse, who was one of the researchers. This school nurse was well educated, with a specialization in health education and had >25 years of experience at the elementary school level, with an appointment as a master teacher at the school. The SBEP contained six categories (Table 1).

Instrument

The researchers developed the study's questionnaire based on the national elementary school textbook that had been published by the Ministry of Education in South Korea to measure the practice of HLBs pertaining to the six categories. The validity test was conducted by an expert panel to identify whether the developed HLBs were suitable for the questionnaires/categories. A panel that was composed of experts in child health care, child development, and education (two school nurses, two child health nursing professors, and two nurses working at health promotion centers) convened to ensure the content validity of the HLB-practice instrument.

These six categories consisted of daily life and health (five items), disease prevention and management (six items), prevention of drug misuse and overuse (four items), sexuality and health (five items), mental health (eight items), and injury prevention and first aid (nine items). The final questionnaire that was used to evaluate the students' practice of HLBs contained 37 items. Each item measured how often the students behaved in accordance with its content. The questionnaire used a four-point Likert scale (1 = "never;" 2 = "sometimes;" 3 = "usually;" 4 = "always"). Higher scores indicated a greater practice of HLBs. In addition, a pilot test was conducted with a sample of 10 fifth grade elementary school students from an elementary school in another district to identify the appropriateness of each item. Through this process, the suitability of the questionnaire for evaluating the degree to which students practice the HLBs was confirmed.

The Cronbach's alpha was found to be 0.822 for the total scale, indicating good internal consistency, and it ranged from 0.809 to 0.834 for the six categories in the pre-test sample.

Ethical considerations

This study was approved by the IRB of the institute at which the primary researcher was affiliated (No. HIRB-2013-040). The IRB confirmed that the study did not violate human rights and that all the content and processes conformed to the conduct of appropriate research ethics.

Data analysis

Data analyses were carried out by using IBM SPSS Statistics for Windows v. 21 (IBM Corporation, Armonk, NY, USA) in order to describe the demographic data and to test for differences before and after the SBEP with paired *t*-tests. In order to test the HLB survey's score differences according to the participants' general characteristics, *t*-tests and ANOVAs were conducted. Statistical significance was indicated when $P < 0.05$.

RESULTS

School-based educational program for healthy life behaviors

The six content areas of the SBEP were referred to as the "Six Kid Keys," as shown in Figure 2. The six content areas were as follows: (i) daily life and health; (ii) disease prevention and management; (iii) prevention of drug misuse and overuse; (iv) sexuality and health; (v) mental health; and (vi) injury prevention and first aid. Daily life and health (80 min) consisted of "daily patterns of HLBs" and "personal hygiene." Daily patterns of HLBsfocused on the meaning of health and students' daily practice of HLBs, such as exercise, sleep and rest, and regular meals. Personal hygiene focused on hand washing, bathing, and cleanliness. Disease prevention and management (80 min) included two subcategories: "prevention of obesity" and "oral hygiene." The prevention of obesity included not eating instant food, fast food, or soda, and introducing healthy foods, such as vegetables and fruits. This session also provided information regarding lifestyles that induce obesity. Oral hygiene included a discussion of foods that are

Table 1 Content of the school-based educational program for healthy life behaviors

Session	Category (total time)	Subcategory	Content	Methods
1	Daily life and health (80 min)	Daily patterns of healthy life behaviors - How about my healthy life? - Exercise, sleep, and rest - Regular meals	• What is health? • How about my healthy lifestyle? • My health habits • My healthy living plan	• Lecture • Case presentation • Picture data
2		Personal hygiene - Hand washing - Bathing and cleanliness	• Importance of hand washing • Proper hand washing • Hand-washing practice using view-box	• Lecture • Picture data • Demonstration • Practice
3	Disease prevention and management (80 min)	Prevention of obesity - Not having instant food, fast food, or soda -Healthy food (vegetables, fruits)	• The meaning and etiology of obesity • My eating habits • Lifestyles that induce obesity • Practice of obesity prevention lifestyle	• Lecture • Case presentation • Picture data • Video
4		Oral hygiene - Avoidance of food that is detrimental to teeth - Dental screening - Tooth brushing	• Cavity pathogenesis • Cavity prevention lifestyle • High cavity-inducing food • Proper teeth brushing practice	• Lecture • Demonstration • Practice
5	Prevention of drug misuse and overuse (80 min)	Right use of drugs -Identification of expiry date -Taking medicine when symptom(s) appears	• Definition of medicine • Side-effects of medications • Correct drug usage	• Lecture • Activity (group study paper)
6		Non-smoking - Harmfulness of smoking - Avoidance of smoking environment(s)	• Origin of tobacco • Harmful components (pernicious ingredients) of tobacco • Dyspnea experience of patients with emphysema • Detrimental effect of tobacco and smoking prevention	• Lecture • Picture data • Movie pictures
7	Sexuality and health (160 min)	Safe sex - What is sexuality? - Curiosity about sexuality	• What is sexuality? • Desirable sexual life in adolescents	• Lecture • Activity (group study paper) • Picture data
8		Acceptance of changes in puberty - Normal sexual development - Preparedness to become an adult	• Meaning of being an adult • Secondary sexual characteristics in men and women • Physiological phenomena in adolescence	• Lecture • Activity (group study paper)
9		Prevention of sexual abuse I - What is sexual abuse?	• Meaning of sexual abuse • Prevention of sexual abuse - In the house - Out of the house - In transportation - In the elevator	• Lecture • Picture data • Role play • Games (true/false)
10		Prevention of sexual abuse II - Various cases of sexual abuse	• Sexual abuse risk situations and prevention	• Lecture • Demonstration

Table 1 Continued

Session	Category (total time)	Subcategory	Content	Methods
		- Coping methods in case of sexual abuse	• Characteristics of victims and perpetrators	• Role play • Games (true/false)
11	Mental health (80 min)	Communication techniques - Effective communication - Expression of emotion - Refreshing oneself through interesting activities (e.g. music, exercise)	• What is communication? • I-message/You-message • Differentiation between good and bad communication • Talking to friends with I-message	• Lecture • Demonstration • Practice • Role play
12		School without violence - Relationship with friends - Asking for help and how to ask - Helping friends	• Experience that ever afflicted a friend • Types and influence of school violence • Experience a victim's life	• Lecture • Picture data • Role play
13	Injury prevention and first aid (120 min)	Injury prevention - Safety rules at school (stairway, laboratory, classroom, playground) - Undoing of dangerous behavior	• Importance of first aid • Proper first aid - Abrasions - Burns - Bleeding - Nasal bleeding - Foreign body in the eye • Results from incorrect first aid	• Lecture • Demonstration • Practice • Movie pictures • Role play
14		First aid - First-aid methods in various situations	• First-aid methods in various situations - Dental injury - Head injury - Bee sting - Getting bitten by an animal	• Lecture • Demonstration • Practice • Role play
15		Safe life - Call for 911 - Traffic safety	• Keeping safety rules - School safety rules - Dangerous behaviors	• Lecture • Demonstration • Practice • Role play

harmful to the teeth and emphasized dental screening and brushing one's teeth. The prevention of drug misuse and overuse (80 min) consisted of the "right use of drugs" and "non-smoking." The proper use of drugs included the identification of expiration dates and taking medicine when symptoms appear. Non-smoking consisted of information about the harmfulness of smoking and the avoidance of smoking environments. Sexuality and health (160 min) contained four subcategories as follows: "safe sex," "acceptance of changes during puberty," "prevention of sexual abuse I," and "prevention of sexual abuse II." Safe sex involved a discussion of the meaning of sexuality and curiosity about sexuality. Acceptance of changes in puberty informed students that changes are a normal developmental process of becoming an adult and the need to prepare for becoming an adult. The prevention of sexual abuse I informed students of the meaning of sexual abuse. The prevention of sexual abuse II consisted of presentations of real-life cases of sexual abuse and discussions of the coping methods for when sexual abuse situations emerge. Mental health (80 min) consisted of "communication techniques" and "schools without violence." Communication techniques involved effective communication, expressions of emotion, and refreshing oneself through interesting activities, such as music and exercise. Schools without violence addressed relationships with friends, methods of asking for help, and helping friends. The injury prevention and first aid content area (120 min) consisted of three sessions, including "injury

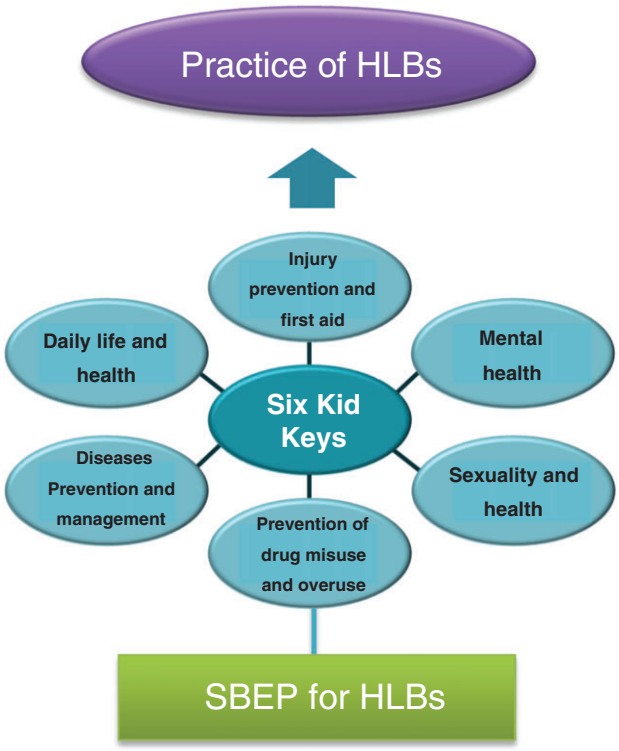

Figure 2 Developed school-based educational program (SBEP) for healthy life behaviors (HLBs).

prevention," "first aid," and "safe life." Injury prevention contained safety rules to be implemented at school, including stairway, laboratory, classroom, and playground rules. First aid involved information regarding first-aid methods in various situations. Safe life provided information about calling 911 and focused on traffic safety.

Participants' general characteristics

The demographic characteristics of the sample are shown in Table 2. Of the 85 participants, 45.9% were female. The participants' mean age was 11.0 ± 0.27 years old and their family type was predominantly nuclear (81.2%). Regarding their birth order, 50.6% were second-born children. In relation to maternal education, 58.9% of the mothers had at least a college degree and 34.1% were high school graduates. For paternal education, 61.2% of the fathers had at least a college degree and 31.8% were high school graduates. Sixty percent of the mothers had a job. The child self-perceived health status was distributed as follows: healthy (45.9%), very healthy (31.8%), and moderately healthy (22.4%).

Table 2 Participants' characteristics (n = 85)

Characteristic	N (%)/Mean (SD)
Gender	
Male	46 (54.1)
Female	39 (45.9)
Age (years)	
Mean (SD)	11.0 (0.27)
10	3 (3.5)
11	79 (92.9)
12	3 (3.5)
Family type	
Nuclear	69 (81.2)
Extended	16 (18.8)
Birth order	
1st	35 (41.2)
2nd	43 (50.6)
3rd	6 (7.1)
4th	1 (1.2)
Paternal education	
Elementary school	3 (3.5)
Middle school	3 (3.5)
High school	27 (31.8)
College or further	52 (61.2)
Maternal education	
Elementary school	3 (3.5)
Middle school	3 (3.5)
High school	29 (34.1)
College or further	50 (58.9)
Mother's job	
Employed	51 (60.0)
Unemployed	34 (40.0)
Self-perceived health status	
Very healthy	27 (31.8)
Healthy	39 (45.9)
Moderate	19 (22.4)

SD, standard deviation.

Exploratory testing of the efficacy of the school-based educational program for students' practice of healthy life behaviors

In order to determine whether the program had effects on the participants' practice of HLBs, the pre- and post-test scores were compared. The mean pre- and post-test scale scores of the 85 students who completed the instrument are reported in Table 3. Of the six categories that were measured, significant differences were found for two of them: disease prevention and management

Table 3 Effects of a school based educational program for healthy life behaviors (n = 85)

Category (no. of items)	Content of questions	Mean (SD)		t-value	P-value
		Pre-test	Post-test		
Daily life and health (5)	1. I exercise more than three times a week 2. Eight hours of sleep a day is enough for me 3. I regularly take three meals a day 6. When I return from a visit, I wash my hands and feet 7. When I wash my hands, I clean them with soap	3.35 (0.42)	3.38 (0.43)	0.66	0.511
Disease prevention and management (6)	8. I hardly have soft drinks, such as lemonade or cola 9. I do not eat fast foods, such as pizza or hamburger 10. I like to eat fruits or vegetables 11. I brush my teeth after eating meals 12. I do not eat foods that are bad for my teeth 13. I have dental check-ups every year	2.54 (0.49)	2.76 (0.98)	2.01	0.047
Prevention of drug misuse and overuse (4)	14. When I take medicine, I check the expiration date 15. It does not matter if I take a medicine that other people have taken if they have the same symptom(s)† 16. When I see a person smoking, I recommend that they stop smoking 17. I avoid smoking areas	3.36 (2.08)	3.40 (0.52)	0.69	0.488
Sexuality and health (5)	18. I do not allow others to touch my body without my permission 19. I do not touch others' body without their permission 20. I am not frightened to see changes in the appearance of my friends who have reached puberty 21. I do not look into rest rooms for adolescents of the opposite sex 22. I do not follow strangers	3.78 (0.45)	3.82 (0.34)	0.80	0.424
Mental health (8)	4. When I am angry or distressed, I frankly tell my parent(s) or friend(s) 5. I am chummy with my friends 23. I express my feelings in an open and frank manner 24. I refresh myself with hobbies (i.e. exercise, music, outdoor activity)	3.31 (0.42)	3.34 (0.44)	0.81	0.416

Table 3 Continued

Category (no. of items)	Content of questions	Mean (SD)		*t*-value	*P*-value
		Pre-test	Post-test		
Injury prevention and first aid (9)	25. I try to maintain close relationships with friends 26. I ask for help if someone harasses me 27. I will help a friend if he (she) is bothered about something 28. I bully friends who behave in a detestable manner† 29. When a wound is dirty, I wash away foreign bodies with running water before disinfecting a cut 30. I bend my head backward to stop the blood flow when I have nasal bleeding† 31. I rub my eyes to bring out tears when dust blows into my eyes† 32. I sleep when I have an injury to the head and feel dizzy† 33. I call for help when I find a person who has fallen down 34. I obey traffic signals 35. I go up and down the stairs only one step at a time 36. I observe safety rules during practice hours and physical education class 37. I do not engage in dangerous sports or games	2.94 (0.36)	3.05 (0.45)	2.25	0.026
Total		3.17 (0.28)	3.26 (0.31)	2.97	0.004

Four-point Likert scale (1 = "never;" 2 = "sometimes;" 3 = "usually;" 4 = "always"). †Reverse intems. SD, standard deviation.

(t = 2.014, P = 0.047) and injury prevention and first aid (t = 2.259, P = 0.026).

Difference in the healthy life behaviors according to the participants' general characteristics

There were significant differences in the HLB scores according to the paternal educational level (t = –2.137, P = 0.037) and maternal employment status (t = 2.378, P = 0.020). However, no significant difference by sex, birth order, family type, maternal educational level, or self-perceived health status was found (Table 4).

DISCUSSION

Currently, the environmental conditions surrounding children could result in health problems that compromise their physical and psychological development. There is growing evidence that health behaviors that are initiated during childhood could have persistent effects through adulthood (Deshmukh-Taskar *et al.*, 2006; Eisen, Pallitto, Bradner, & Bolshun, 2000; Hong *et al.*, 2011).

The most significant contribution of the present study is the development of an effective program to improve the frequency of HLBs among students. It is conceivable that the incorporation of educational content and various teaching methods were factors that led to these results. It is also conceivable that the study's significance lies in its evaluation, bringing together a large amount of information for health educators.

The SBEP had a positive impact on the students' HLBs involving disease prevention and management and injury prevention and first aid. This result suggests that these two topics were the most relevant ones for improving the practice of HLBs by fifth grade children in South Korea.

The specific content of disease prevention and management included a discussion about the types of instant and healthy foods that are related to oral hygiene and the prevention of obesity. Food offered to elementary school students plays an important role in the development of a child's taste preferences. The consumption of

Table 4 Mean differences in healthy life behaviors by general characteristics (n = 85)

Characteristic	N	Mean (SD) Pre	Mean (SD) Post	Mean difference (post–pre) (SD)	t- or F-value†	P-value
Sex					–0.129	0.897
Male	46	3.13 (0.27)	3.21 (0.33)	0.08 (0.27)		
Female	39	3.20 (0.28)	3.29 (0.27)	0.09 (0.23)		
Birth order					1.632	0.109
1st	35	3.16 (0.29)	3.30 (0.32)	0.14 (0.32)		
≥2nd	50	3.17 (0.29)	3.21 (0.30)	0.04 (0.19)		
Family type					–1.196	0.235
Nuclear	69	3.19 (0.27)	3.25 (0.31)	0.07 (0.25)		
Extended	16	3.07 (0.32)	3.22 (0.30)	0.15 (0.25)		
Paternal education					–2.137	0.037
High school or less	33	3.19 (0.19)	3.19 (0.22)	0.00 (0.17)		
College or further	52	3.19 (0.29)	3.31 (0.33)	0.12 (0.29)		
Maternal education					–0.948	0.347
High school or less	35	3.20 (0.23)	3.24 (0.37)	0.04 (0.30)		
College or further	50	3.18 (0.29)	3.29 (0.26)	0.11 (0.25)		
Mother's job					2.378	0.020
Employed	51	3.10 (0.29)	3.24 (0.28)	0.14 (0.24)		
Unemployed	34	3.27 (0.25)	3.27 (0.35)	0.00 (0.26)		
Self-perceived health status					0.348	0.707
Very healthy	27	3.25 (0.29)	3.32 (0.28)	0.07 (0.24)		
Healthy	39	3.22 (0.20)	3.29 (0.30)	0.07 (0.24)		
Moderate	19	2.93 (0.30)	3.06 (0.29)	0.13 (0.28)		

Healthy life behaviors contained a total of 37 items. Four-point Likert scale (1 = "never;" 2 = "sometimes;" 3 = "usually;" 4 = "always"). †The scores of the independent t-test regarding the mean difference between classification (for example, between male and female). SD, standard deviation.

non-nutritious foods, such as soda, sweetened beverages, snacks, and fast food, typically eaten by children in this age group, decreases children's likelihood of having an adequate intake of fresh fruits and vegetables (Creske, Modeste, Hopp, Rajaram, & Cort, 2013; Lindeboom *et al.*, 2009).

In South Korea, there are ongoing rapid changes towards a westernized lifestyle, such as an instant and high-caloric food intake and lack of exercise; thus, many children are faced with obesity. The percentage of obese elementary school students has quickly reached 20% and the number has doubled in the last 10 years (Korea Ministry of Education, 2015). As the rate of obesity increases, the government has made efforts to decrease its incidence over the last decade (Korea Institute for Health and Social Affairs, 2014). Childhood obesity can lead to adult obesity and a shortened lifespan due to a greater likelihood of elevated cholesterol, hypertension, hyperinsulinemia, and metabolic syndrome (Ekelund *et al.*, 2012; Lim *et al.*, 2013; Neumark-Sztainer, Story, Hannan, & Croll, 2002; St.-Onge, Keller, & Heymsfield, 2003). Therefore, school faculty members, including school nurses, should be aware of their students' health practices and educate families and children about obesity.

A significant difference in disease prevention and management, including oral hygiene, was observed among the students who took part in the 15 week program. It is important that school-based health education about oral health care, including routine teeth brushing, depends mainly on the teachers. The standards of oral hygiene and the frequency of teeth brushing in children have been found to be related (Farias, Araujo-Souza, & Ferreira, 2009). For oral hygiene, a continuous school-based health program involving dentists, teachers, and parents would be effective (Alves de Farias, Costa de Araujo, & Fernandes Ferreira, 2009) because childhood dental caries and obesity are reported as the two most common afflictions affecting the health and quality of life of children aged 6–11 years old (Creske *et al.*, 2013).

In this study, there was also a significant effect on injury prevention and first aid. Injuries are a major cause of deaths of children aged 5–14 years and there is a high rate of accidents in school settings (Cartland & Ruch-Ross, 2006; Morrongiello, 2004). Injuries, such as motor vehicle accidents, drowning, poisoning, falls, fire, and violence, affect school-aged children worldwide (Carruth *et al.*, 2010). Li *et al.* (2015) suggested that school-based health programs provide support for the positive effects of injury prevention and that the regulation of laws at the government level is required.

Effective educational interventions targeting school-aged children should be available to help prevent the major causes of mortality and morbidity. Health education, including coping skills and first aid in emergencies, might have a crucial role in saving the life of school-aged children (Kann, Brener, & Allensworth, 2001; Sormunen *et al.*, 2012). When unintentional injuries occur, the initial steps of emergency care depend on the first responders' ability to provide first aid. The outcome of an unintentional injury often depends on the care that is provided at the time of the injury (Gresham *et al.*, 2001; Li *et al.*, 2015).

The scores in four categories (daily life and health, prevention of drug misuse and overuse, sexuality and health, and mental health) were not significantly improved after the SBEP for HLBs and the mean pretest scores were higher (>3.0), compared to the two significant categories (disease prevention and management and injury prevention and first aid). These findings were consistent with a report of Korea Institute for Health and Social Affairs (2014), whose sample survey showed that the elementary school population was not interested in the areas of drug use, sexuality, and smoking, compared to adolescents, and that the requested consultation rate in adolescents was 0.7–3.4% in the area of both smoking and drugs and 1.0–1.7% in the problem of sexuality. However, elementary school students showed little concern.

These aspects can be explained by the following social circumstances. The importance of daily life habits, such as regular meals, sleeping, personal hygiene, and hand washing, has been well established by public education and advertisement. In order to prevent drug abuse, the government separates dispensaries from medical facilities in South Korea so that students cannot easily access drugs without a doctor's medical certificate. Furthermore, in South Korea, buying tobacco is strictly prohibited for minors by law. As child sexual abuse and school violence are increasing steadily, students are taught about prevention and coping methods from formal and informal institutions, including parents, schools, and the mass media (Bahn & Choi, 2013; Im & Park, 2014).

It is necessary to conduct additional program evaluation through further research. In particular, it is suggested that it is necessary to strengthen and simplify the program's categories of "disease prevention and management" and "injury prevention and first aid," which showed significant improvements in this study. The content that is related to these two categories should be given priority in educational programs for HLBs.

In the present study, the adoption of HLBs differed significantly according to the paternal educational level and maternal employment status. Other studies have found that the paternal educational status has a positive effect on children's health (Creske *et al.*, 2013; Sormunen *et al.*, 2012). Although the literature has reported positive effects, few studies have examined the relationship between paternal education and children's health (Case, Lubotsky, & Paxon, 2002; Chou, Liu, Grossman, & Joyce, 2010; Lindeboom *et al.*, 2009). Parental education could affect a child's health practices indirectly via parental behavior. Studies have reported similar findings that children living in families of parents with more education tend to have better health practices (Chen & Li, 2006; Currie, Shields, & Wheatley-Price, 2007, Sormunen *et al.*). Furthermore, mothers with a higher educational level make dietary choices that contain more fruits and vegetables. These dietary choices are considered to be healthier for the prevention of both dental caries and obesity in themselves and their children (Creske *et al.*). In addition to a high paternal educational level, the maternal employment status could be an important factor for children's practices of HLBs. Mothers who do not have jobs are likely to spend more time with their children, guiding them toward practicing healthier behaviors. Furthermore, they can supervise and manage their children's HLBs with greater vigilance than can mothers with a job. However, the present study's results were not consistent with these expectations. This finding thus should be confirmed by further studies.

From these results, it seems that a SBEP intervention aimed at young children might be effective in promoting some HLBs. A SBEP for elementary school children that promotes healthy behaviors could contribute not only to personal health, but also to the nation's future health status.

Limitations of the study

This study has a few limitations. First, this was an explorative study, so there was no control group with which to compare scores. Future studies should use a control group to compare the effectiveness of the SBEP for HLBs. Second, the sample size was relatively small and the participants came from only one district, which was limited to the fifth grade of one elementary school, through convenience sampling. Furthermore, many students were dropped from the study because they were absent or did not complete either the pre- or the post-test questionnaire. Larger sample sizes, including children from other grades and various geographic regions, might provide results that are more generalizable. Third, the HLB survey to evaluate students' practice was developed by the researchers. Although the instrument's reliability and validity were examined, it should be retested for its reliability and validity through further studies, as it was not standardized.

CONCLUSION

The main purpose of this study was to develop a SBEP and conduct an evaluation of its potential effects on the practice of HLBs by fifth grade elementary school students. The results of this study demonstrated that the program had a positive effect on fifth grade students' practice of HLBs. In conclusion, these results suggest that a school-based intervention that is aimed at changing health habits related to HLBs might provide anticipatory guidance for fifth graders. Furthermore, it is necessary to provide periodic education about HLBs to elementary school children.

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CONFLICT OF INTEREST

No conflict of interest is declared by the authors.

AUTHOR CONTRIBUTIONS

S-J. K. carried out the data analysis and was responsible for the drafting of the manuscript; S-S. B. conducted the data collection; K-A. K. was responsible for the study's conception and design and made critical revisions to the paper for important intellectual content.

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