

Health promotion in young adults at a university in Korea

A cross-sectional study of 625 participants in a university

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Abstract

Young adulthood is a critical developmental period for establishing life-long health behaviors. However, too little attention has been paid to young adult health promotion. The purpose of this study was to describe the processes of development and implementation involved in a collaborative university-wide health promotion program and to evaluate the achievements of the program.

A 3-day university-wide health promotion program was developed and implemented in the nation's largest public university in South Korea in September 2013. Its objectives were to heighten health awareness, to promote healthy behaviors, especially active lifestyle and healthy diet, and to disseminate health knowledge, skills, and access to health resources among young people. The program comprised 14 health lectures, 12 events, and 25 booths. To monitor and evaluate the program, a cross-sectional postevent survey was conducted. A convenience sample of 625 university members who participated in the program was used. The statistics were analyzed with a general linear model and paired *t* test.

The program evaluation demonstrated that this university-wide program effectively provided opportunities for students to access health information, knowledge, skills, self-confidence, and available health services and resources. Participants positively evaluated most of the processes of the program activities and services. Participants' overall evaluation score (83% rated "excellent" or "good") and reparticipation intention (86%) were high. The majority of participants reported increased awareness of health (80%) and the need for a university health promotion program (87%) after the program. Most of the evaluation scores were similarly high for health lectures and booths/events.

In conclusion, the university-wide health promotion program was effective in improving university members' health awareness and providing opportunities for students to access various health information and resources. We believe that our results would be useful for sharing information on the planning and implementation of future university health promotion programs.

Abbreviations: NCD = noncommunicable disease, SNU = Seoul National University.

Keywords: awareness, evaluation, health promotion, public health, university, young adult

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1. Introduction

Noncommunicable diseases (NCDs) are one of the major challenges to global public health in the 21st century.^[1] As the leading cause of death, NCDs were responsible for 68% (38 million) of the world's deaths in 2014.^[2] Four major NCDs (cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes) are responsible for 82% of NCD deaths.^[2] The most important risk factors for NCDs include high blood pressure, high blood cholesterol, inadequate intake of fruit and vegetables, overweight or obesity, physical inactivity, and tobacco use. Five of these risk factors are closely related to health behaviors, including unhealthy diets and physical inactivity; thus, unhealthy behaviors are the leading causes of the major NCDs.^[1,3] Because many of the unhealthy behaviors are adopted as human beings grow, a life-course perspective supporting healthy behaviors from childhood to young adulthood and beyond is essential for the prevention and control of NCDs.^[1,3,4]

Young adulthood is a critical developmental period in which individuals establish life-long health behaviors and take responsibility for their own health care.^[5] Ensuring the health of young people is critical for the prevention of health problems in their later adulthood and also for social prospects.^[6] Nonetheless, recent research has revealed that young adults are surprisingly unhealthy, and their health status is declining.^[5,7,8] Compared to adolescents, young adults have higher mortality

and morbidity rates, and greater engagement in health-damaging behaviors (eg, unhealthy diet, sedentary lifestyle, cigarette smoking, and binge drinking).^[7,9,10] In addition, the first manifestations of mental illnesses (eg, schizophrenia, bipolar disorder) often develop during young adulthood, implying that this age group is an important target for early intervention.^[11]

However, too little attention has been paid to young adult health promotion.^[12] Health promotion is the process of enabling people to increase control over their own health and environments through providing health information and education, and enhancing life skills; empowerment is the core mechanism of health promotion.^[4,13,14] In fact, most young adults lack awareness of their own health and have limited knowledge and information about health issues or resources. Because young adults are usually under financial hardship due to low income or high youth unemployment,^[12,15] they receive significantly fewer screening and preventive services and are less likely to have a usual source of care than other age groups.^[7,9,16]

Cumulative evidence highlights the potential for universities to become settings in which young adults' health concerns may be addressed.^[11] Health promotion works through concrete and effective actions made in setting priorities.^[13] For more than a century, schools have proven to be a popular and powerful setting for health promotion and disease prevention initiatives among youth.^[14,17] In recent decades, the proportion of young people who are attending universities has increased, and university students have become more diverse in many countries. In the United States, 63% of young adults aged 25 to 29 years had completed at least some college in 2012.^[11] In Korea, over 70% of young adults were enrolled in colleges or universities in 2015.^[18] Although the central mission of universities is academic success and educational achievement, the interdependence of health and education has been widely recognized. Good health is essential for effective learning and cognitive development, and education is important for improving one's economic prosperity and health outcomes.^[6,11,14] Thus, university settings may provide an efficient and effective framework of health promotion for young adults.

Health promotion programs provide a coordinated set of activities or services that are organized within a particular time frame. The underlying assumption is that programs that employ multiple strategies targeting physical, regulatory, and socioeconomic environments are more supportive of healthful behavior.^[14] Despite the potential effects of health promotion programs, a limited number of studies have reported their effectiveness in improving health awareness, knowledge, and behaviors.^[19–21] Most reports were limited to measures of simple outputs (eg, number of people who participated or were screened).^[21–23] In terms of health promotion, interest is increasing in describing and analyzing the program process. No established tools for process assessment exist, and one should take account of the cultural context in which the intervention is implemented.^[14] However, evaluation studies on the process or impact of health promotion programs within the Korean context have not often been documented. This research gap makes it impossible to establish whether the lack of impact on the outcome were attributable to inadequate implementation or to ineffective programs.^[14]

In this study, we aimed to describe the processes of development, implementation, and evaluation of a collaborative university-wide health promotion program in the nation's largest public university in Korea; evaluate the achievements of the program's activities and services (process evaluation); and

analyze the program results focused on intermediate outcomes, such as participants' awareness of health and health promotion programs (results evaluation).

2. Methods

2.1. *The healthy campus initiative*

In 2012, Seoul National University (SNU) in South Korea, the nation's largest public university, launched its "Healthy Campus" initiative designed to meet the health needs of the university members. The initiative was organized by an interdisciplinary group of SNU faculty, staff, and administrators. Its goals were to improve the health and well-being of the students and to put health high on the agenda of the university's policies. The initiative's action plan was based on the framework for the evaluation of health promotion developed by the WHO.^[14] The initiative's activities included: identifying and prioritizing students' health problems and needs; developing programs and policies that meet the students' health needs; and offering a healthier learning and living environment that promotes the university members' health and well-being.

2.2. *Health needs assessment*

The Healthy Campus initiative conducted a health needs assessment among the students before the projects were launched. Two cross-sectional surveys and a student health check-up were conducted between 2012 and 2013, and these revealed that a large number of students had various health and behavioral problems. The detailed findings have been described elsewhere.^[24,25] In summary, of the 2479 students who responded to a web-based self-administered survey between 2012 and 2013, 45.5% reported using health screening services within the past 2 years. Although the overall rates of health screening service use were not different across income levels, significant disparities in the types of utilized health screening services were found by income groups. Low-income students were more likely to use university-provided health screening services, and they were less likely to use private sector services requiring high out-of-pocket payments.^[26] Of the 5241 students enrolled in the survey and health check-up in 2013, 40.4% were lack in physical activity, 44.8% skipped breakfast, 77.6% had insufficient fruit intake, 26.4% were either overweight or obese, 12.3% reported heavy drinking, 5.5% were currently smoking, and 29% reported mental health issues.^[25]

Based on the needs assessment among SNU students, the initiative prioritized inequalities in access to preventive health services and 5 health-related behavioral problems (physical activity, diet, smoking, heavy drinking, and mental health). To intervene in these health priorities, the initiative called for a university policy expanding the coverage of the free university-provided health check-up services and planned a university-wide health promotion program, "SNU Health Week." In this paper, we describe the process of development, implementation, and evaluation of the health promotion program.

2.3. *A university-wide health promotion program:*

"SNU Health Week"

2.3.1. *Development.* A multiprofessional committee of faculty members, health professionals, staff, and senior administrators planned and coordinated a university-wide health promotion program "SNU Health Week," over a 6-month period prior to

the event. Its objectives were: to heighten health awareness and bring about changes in attitudes and beliefs on health promotion; to promote healthy behaviors, especially active lifestyles and healthy dietary habits; and to disseminate health knowledge, skills, and access to health resources among university members. The committee planned program activities and services that were relevant to the program objectives and the students' health needs. They also determined the modalities of the program; identified the resources; and partnered with and invited public or not-for-profit community organizations, businesses, and voluntary health care providers. The SNU Health Week was publicized extensively through various sources: flyers, posters, banners, and placards put up throughout the university; announcements in the university newsletter; e-mail and mobile text messages sent to all the students; postings on the university's intranet, websites, and blogs; faculty announcements; and word of mouth.

2.3.2. Implementation. The SNU Health Week was held at a large auditorium and schoolyard between 10 am and 6 pm from September 25, 2013 to September 27, 2013. The students were able to attend the 3-day event at any time between, after, or in place of their classes. Because different approaches to health promotion may be synergistic and the broad determinants of health cannot be effectively addressed through interventions focused on a narrow range of disease-based outcomes or single lifestyle,^[14] the health promotion program employed a wide range of disciplines and approaches. Programs were served and supported by 15 colleges or institutions of the university, the SNU health center, 3 partner hospitals, 10 community health organizations, and 4 businesses; numerous volunteers staffed the program.

The SNU Health Week comprised 3 main modalities: health lectures, events, and booths (Table 1). The entire program was designed to be relevant to the health priorities of the SNU students. Overall, 10 activities or services on physical activity, 12 on diet, 2 on smoking, 2 on alcohol use, 11 on mental health, 8 on health knowledge, and 6 on health care service were provided. One-hour educational lectures on a variety of topics were provided by health experts, hospital doctors, and medical school professors at a large auditorium. Various health events (eg, Tai Chi, futsal matches, health quiz games, and campus walking) were held on the schoolyard or in the fields to provide engaging entertainment and activities for the university members. A total of 25 health booths were set up on the schoolyard throughout the 3-day program. Because activity-oriented health programs are known to inspire more learning and be more effective in changing behaviors than a passive look-and-see approach,^[23,27] many health booths provided interactive hands-on learning activities and emphasized skill-building perspectives. Dental specialists demonstrated proper tooth brushing and flossing techniques; sports medicine specialists demonstrated proper use of exercise equipment and measured the visitors' body composition and isometric muscle strength. In addition, physicians and nurses offered free personal consultations and health checks (eg, anthropometry, blood pressure, and total cholesterol) and referred individuals with abnormal values for follow-up care.

To engage as many students as possible in the SNU Health Week, a "health passport" was designed. Participants could collect stamps after attending each health lecture, event, booth, and evaluation survey, and then exchange their stamps for souvenirs. Other incentives included free refreshments, free samples of healthy foods, giveaways, and lottery prizes.

Table 1
The SNU Health Week program activities and services.

Day	Health lecture	Health events	Health booths (day 1–3)
Day 1	Food and obesity [D] Safe cigarette? [S] Art and healing [M] Psychological complex [M] Sexually transmitted diseases [K] Tuberculosis [K]	Yoga [P] Tai Chi [P] Traditional martial arts [P] Healthy cafeteria [D] Meditation [M]	Fitness and ergonomics [P] Isometric muscle strength tests [P] Exercise equipment demonstrations [P] Postural coordination & back pain prevention [P] Healthy café [D] Herb and health [D] Healthy food choice [D] Healthy food market [D] Nutritional supplements [D] Tobacco cessation and cancer prevention [S] Drink smart [A] Suicide prevention [M] Stress management [M] Plants and mental health [M] Meditation and relaxation [M] Mental health checkup and counseling [M] Cardiopulmonary resuscitation [K] Indoor environment quality [K] Chemical hazards and toxic substances [K] SNU Health Center promotion [C] Medical counseling for foreign students [C] Health checkup and consultation [C] Teeth brushing demonstration [C] Dental and oral examination [C] Body composition measurement [C]
Day 2	Low salt diet [D] Supplement use [D] Relaxation technique [M] Medication safety [K]	Futsal match [P] Healthy cafeteria [D] Music and healing [M]	
Day 3	Diet and weight management [D] Alcohol use [A] Suicide [M] Laboratory safety [K]	Campus walking [P] Women's soccer [P] Healthy cafeteria [D] Obesity quiz game [K]	

The SNU Health Week program consisted of 10 activities/services on physical activity, 12 on diet, 2 on smoking, 2 on alcohol use, 11 on mental health, 8 on health knowledge, and 6 on health care service. A = alcohol use, C = health care service, D = diet, K = health knowledge, M = mental health, P = physical activity, S = smoking, SNU = Seoul National University.

3. Participant evaluation survey

3.1. Study population

To monitor and evaluate the SNU Health Week, a cross-sectional postevent evaluation survey was conducted by trained volunteers after the participants attended health lectures or finished visiting booths or events. We used a convenience sample of participants aged over 19 years who volunteered to answer the survey. To increase interest in the evaluation survey and avoid overlapping populations, we provided survey participants with a stamp on their health passports and did not enroll those who already had a survey stamp on their passports.

Data were collected and analyzed by researchers involved in the program evaluation, and were not publicly deposited. This study was approved by the SNU Research Ethics Committee in 2013 (SNUIRB 1301/001-007). All participants provided written informed consent.

3.2. Measures

Researchers in the evaluation teams developed and pilot-tested a questionnaire for an evaluation survey (please see Supplement, <http://links.lww.com/MD/B574>). The main questions were related to 2 issues: whether the program was successful in achieving its plan of action especially during the implementation phase (program delivery and process evaluation); and what were the effects of the program's activities and services on participants' awareness of health promotion (program results evaluation)? Delivery and process evaluation consisted of 9 questions (eg, relevance of activities/services, health literacy, motivation, practicality, self-confidence, comprehensiveness, availability, accessibility, operational issues, and publicity). Results evaluation consisted of 5 questions and was mainly focused on intermediate outcomes (eg, overall evaluation score, reparticipation intention, awareness of health, and awareness of the need for university health promotion programs). Participants' responses were obtained using a 5-point Likert scale (5 = strongly agree, 4 = agree, 3 = undecided, 2 = disagree, 1 = strongly disagree). In addition, we collected information about the participants' favorite speakers/events/booths, desired activities/services for future university health programs, and general suggestions in the form of free text comments. We obtained demographic information, including age, sex, position (student, staff, and faculty), and academic status (undergraduate, master's course, and doctoral course).

3.3. Statistical Analysis

We collected and analyzed data quantitatively and qualitatively. To describe and compare the study participants' characteristics, frequencies were calculated, and chi-square tests were conducted. We analyzed participants' evaluations using a Likert scale as both continuous and categorical variables. We compared participants' evaluations of health lectures and booths/events using a general linear model with adjustments for age, sex, position, and academic status. A paired *t* test was used to compare an individual's awareness of the need for a university health promotion program before and after participation in the SNU Health Week. Missing values for each survey item were excluded from the analyses. All *P*-values were 2-sided, and $P < 0.05$ was considered statistically significant. Statistical tests were performed using SAS software, version 9.4 (SAS Institute, Cary, NC).

4. Results

4.1. Coverage of the SNU Health Week

During the 3-day program, about 550 people attended the 14 health lectures. The estimated attendance of 12 health events ranged from >50 to >400 for each event, and attendance at each of the booths ranged from >300 to >1600 . Most participants visited more than 1 booth or event.

4.2. General characteristics of the evaluation survey participants

Of all the SNU Health Week participants, 625 completed the postevent survey (267 in health lectures, 358 in booths or events; Table 2). Of the survey participants, 49% were male, 77% were in their 20s, and 80% were students. As to how they knew about the SNU Health Week, "Internet or e-mail" was the most common method (26%), and "word of mouth" was the 2nd most common (24%).

4.3. Program delivery and process evaluation

A majority (87.5%) of participants perceived that the program activities/services were appropriate to the purpose of student health promotion (mean \pm standard deviation, 4.17 ± 0.69), the health lecture was easy to understand (87.4%, 4.33 ± 0.70), the contents were interesting and motivating (85.5%, 4.18 ± 0.74), things learned during the program were useful and practical (85.1%, 4.20 ± 0.71), and the participants were confident about practicing their new knowledge or skills (72%, 3.96 ± 0.82 ; Table 3). Approximately 75% responded that the overall programs were organized well and were run smoothly (3.96 ± 0.74). However, the evaluation scores for accessibility, comprehensiveness, and some technical quality issues were somewhat lower than those for other issues, including time allotment for each activity (60%, 3.65 ± 0.97), meeting the participants' health concerns (53.3%, 3.55 ± 0.89), and the effectiveness of publicity (43.4%, 3.25 ± 1.09). Most of the evaluation scores were similar between the health lectures and booths/events ($P \geq 0.06$), but the scores for the operation and publicity were significantly higher those for the health lectures than those for the booths/events ($P \leq 0.001$).

4.4. Overall evaluation score and reparticipation intention

The participants' overall program evaluation scores were high. On a 5-point scale, 83% of the participants rated the program as "excellent" or "good," and 86% responded they would reattend a university health program next year ("strongly agree" or "agree"; Fig. 1). When we compared the participants' evaluations as continuous variables between the health lectures and booths/events with adjustment for the covariates, overall evaluation scores were higher among the health lecture participants ($P = 0.03$), but reparticipation intention was higher among the health booth/event participants ($P = 0.01$; Table 4).

4.5. Awareness of health and a university-wide health promotion program

About 80% of the participants reported that the SNU Health Week increased their awareness of health (Fig. 1). We found no significant differences in the participants' response scores between the health lectures and booths/events ($P = 0.76$; Table 4).

Table 2
General characteristics of study participants.

Characteristic	Total (n=625)	Health lecture (n=267)	Booth/event (n=358)	P*
Sex, n, %				0.001
Male	309 (49.4)	152 (56.9)	157 (43.9)	
Female	316 (50.6)	115 (43.1)	201 (56.2)	
Age, year, n, %				<0.001
19–29	481 (77.0)	159 (59.6)	322 (89.9)	
30–39	57 (9.1)	30 (11.2)	27 (7.5)	
40–49	34 (5.4)	29 (10.9)	5 (1.4)	
50+	53 (8.5)	49 (18.4)	4 (1.1)	
Position and academic status, n, %				<0.001
Student	499 (79.8)	161 (60.3)	338 (94.4)	
Undergraduate	360 (57.6)	115 (43.1)	245 (68.4)	
Master's course	61 (9.8)	16 (6.0)	45 (12.6)	
Doctoral course	29 (4.6)	18 (6.7)	11 (3.1)	
Others	49 (7.8)	12 (4.5)	37 (10.3)	
Staff or faculty	126 (20.2)	106 (39.7)	20 (5.6)	
Way to know about the program, n, %				
Internet, e-mail	163 (26.1)	104 (39.0)	59 (16.5)	<0.001
Word of mouth	151 (24.2)	45 (16.9)	106 (29.6)	<0.001
University announcement	120 (19.2)	91 (34.1)	29 (8.1)	<0.001
Poster, banner	119 (19.0)	18 (6.7)	101 (28.2)	<0.001
Brochure, flyer	42 (6.7)	20 (7.5)	22 (6.2)	0.51
Mobile text message	32 (5.1)	6 (2.3)	26 (7.3)	0.005
On-site participation	24 (3.8)	1 (0.4)	23 (6.4)	<0.001

* By chi-square test.

Participants' awareness of the need for a university health promotion program was significantly higher after the program. About 61% responded that they had been aware of the need for a university health promotion program before the SNU Health Week, whereas 87% reported awareness after participation in it (Fig. 1). In the same individuals, after-participation awareness scores were significantly higher than the before-participation scores ($P < 0.001$).

4.6. Participants' free comments

Many participants offered free comments on their favorite speakers/events/booths (n=399), general suggestions (n=187), and desired activities/services in future programs (n=89). Participants preferred activities/services that provided actual experiences, such as health screening and counseling (11%), quiz games (8%), dental examinations (8%), body composition analysis (8%), and the virtual experience of being in a heavily

drunken state (8%). Respondents suggested several improvements for future health programs, including more extensive promotion of the program, sufficient time allotment for health lectures, extension of the duration of the entire program to better address students' health concerns, more organized and coordinated operation of health booths, and sustained university health programs on a regular basis rather than a 1-time event. As for future desired activities/services, various topics were suggested, including exercise and sports, diet, obesity, allergies, skin problems, health screening, sleep disorders, stress management, and mental health.

5. Discussion

This evaluation study of health promotion demonstrated that the university-wide program, SNU Health Week, effectively provided opportunities for students to access health information, knowledge, skills, self-confidence, and available health services and

Table 3
Program delivery and process evaluation among study participants.*

Question	N	Total	Health lecture	Booth/event	P†
The topics of the lectures/booths were appropriate for the purpose of student health promotion.	624	4.17 (0.69)	4.26 (0.70)	4.11 (0.67)	0.12
The health lecture was easy to understand and clear.	267	–	4.33 (0.70)	–	–
The topics and contents were interesting and motivating.	625	4.18 (0.74)	4.18 (0.81)	4.18 (0.68)	0.62
All of the things learned in the events (or lectures) were useful and practical.	621	4.20 (0.71)	4.28 (0.73)	4.14 (0.70)	0.14
After participating in the SNU Health Week, I am confident that I can practice the knowledge or skills I learned.	621	3.96 (0.82)	4.09 (0.86)	3.86 (0.78)	0.06
The events (or lectures) were well organized and were run smoothly.	620	3.96 (0.74)	4.11 (0.74)	3.85 (0.72)	<0.001
The period for the events (or lectures) was sufficient.	620	3.65 (0.97)	3.65 (1.04)	3.66 (0.91)	0.90
My health-related questions and concerns were mostly addressed in this program.	611	3.55 (0.89)	3.55 (1.01)	3.55 (0.80)	0.65
Efforts to publicize and promote the SNU Health Week were effective.	620	3.25 (1.09)	3.56 (1.06)	3.03 (1.07)	0.001

Numbers are presented as mean (standard deviation) unless otherwise indicated. SNU=Seoul National University.

* Likert scale was used with the most negative response as 1 point and the most positive as 5 points.

† Difference between health lectures and booths/events after adjustment for age, sex, status (student/staff), and grade (undergraduate/graduate/others).

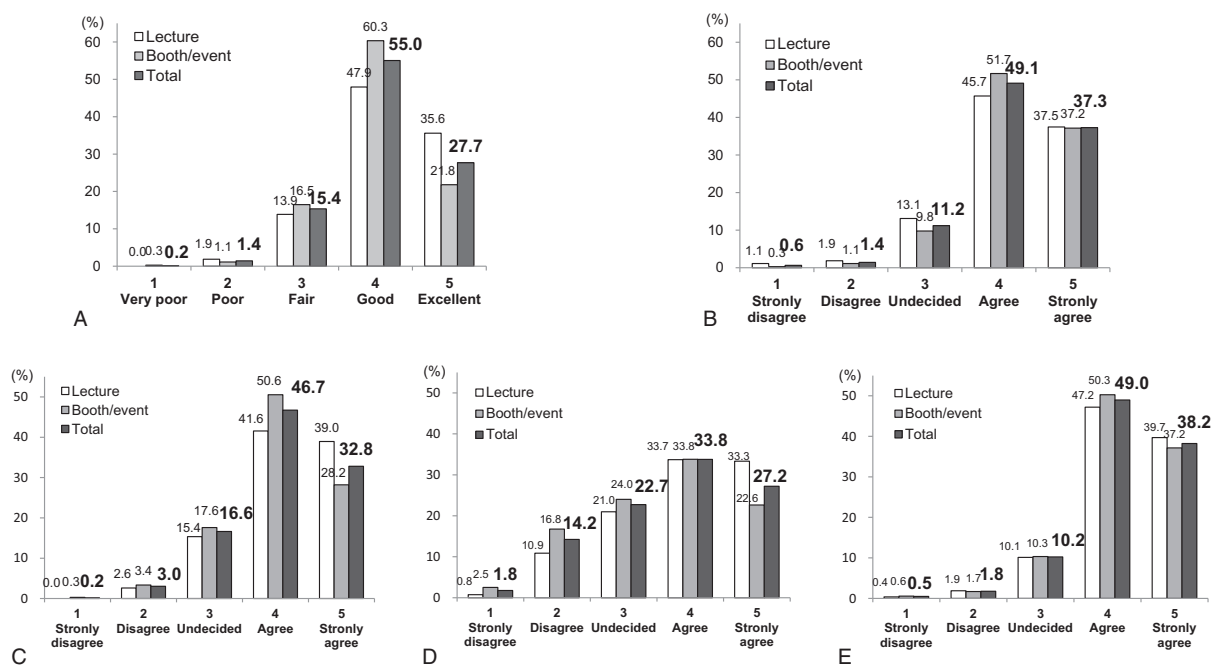


Figure 1. Overall evaluation score and health awareness among study participants. Ratings were on a 5-point Likert scale with the most negative response as 1 point and the most positive as 5 points. (A) “Overall, how would you rate the Seoul National University (SNU) Health Week?” (B) “I would attend a university health promotion program again next year.” (C) “After participating in the SNU Health Week, my awareness of health has increased.” (D) “Before participating in this program, I was aware of the need for a university health promotion program.” (E) “After participating in this program, I am aware of the need for a university health promotion program.”

resources. Participants positively evaluated most of the processes of the program activities and services except for some operational issues and publicity. Their overall evaluation scores and reparticipation intentions were high. The majority of the participants reported increased awareness of health and the need for a university health promotion program after the SNU Health Week. The evaluation scores were similarly high for health lectures and booths/events, implying that both modalities can play a vital role in university-based health promotion.

The Ottawa Charter of 1986 called for an international action to reorient health services and resources toward health promotion.^[13] For the prevention and control of NCDs, the university setting can serve as one of the most important channel to systematically reach young adult populations through health promotion programs. Universities, in cooperation with other stakeholders, can provide unique settings in which students can easily receive health education and services, and positive environments that empower and encourage healthy behaviors.^[28] The efforts to promote

university students’ health can also positively affect the health of the overall community. Because students are engaged in the wider world (eg, family, neighbors, and peers), student health promotion will disseminate health messages and resources to the less connected sectors of society.^[11] We believe that, to establish health-promoting university settings, comprehensive, integrated, and sustainable policies as well as solid political will ensuring sufficient resources for young adult health promotion are required.

The SNU Health Week was the first intervention to introduce an organized university-wide health promotion program in Korea. The majority of university health programs in Korea were often disorganized without university-wide administrative support, limited to addressing a single behavior or disease, and hosted a relatively small number of participants.^[29,30] We engaged diverse constituencies in creating the university health initiatives and employed a wide range of disciplines and approaches in developing and implementing our program. Our university-wide approaches were more effective and efficient in

Table 4
Overall evaluation score and awareness of health and university health promotion programs among study participants.

Question*	N	Total	Health lecture	Booth/event	P [†]
Overall, how would you rate the SNU Health Week?	623	4.09 (0.70)	4.18 (0.74)	4.02 (0.67)	0.03
I would attend a university health promotion program again next year.	623	4.21 (0.75)	4.17 (0.81)	4.24 (0.69)	0.01
After participating in the SNU Health Week, my awareness of health has increased.	621	4.10 (0.79)	4.19 (0.79)	4.03 (0.79)	0.76
Before participating in this program, I was aware of the need for a university health promotion program [‡] .	623	3.71 (1.07)	3.88 (1.02)	3.57 (1.09)	0.62
After participating in this program, I am aware of the need for a university health promotion program [‡] .	623	4.23 (0.74)	4.25 (0.74)	4.22 (0.74)	0.32
P [‡]		<0.001	<0.001	<0.001	

Numbers are presented as mean (standard deviation) unless otherwise indicated. SNU=Seoul National University.

* Likert scale was used with the most negative response as 1 point and the most positive as 5 points.

[†] Difference between health lecture and booth/event after adjustment for age, sex, status (student/staff), and grade (undergraduate/graduate/others).

[‡] Difference in awareness of the need for a university health promotion program before and after participation in the program, calculated by paired t test.

extracting and sharing the university's resources and in disseminating and implementing the activities and services than were a series of single-target interventions. A large body of evidence indicates that whole-school, multifaceted, and integrated approaches are more effective in achieving health outcomes than are classroom-only or single intervention approaches.^[6]

As we found in the students' health needs assessment, low physical activity and sedentary behavior are the biggest public health problems of the 21st century.^[1,4] Globally, 23% of adults were insufficiently physically active, contributing to 3.2 million deaths and 69.3 million disability-adjusted life years in 2010.^[2] Evidence is overwhelming that regular physical activity has important health benefits ranging from reduced risk of NCDs to enhanced or preserved physical and cognitive functions with age.^[31] In a longitudinal study, low cardiorespiratory fitness accounted for the greatest attributable fraction of all-cause mortality.^[31] Consensus is building that sedentary behavior is distinct from lack of moderate-to-vigorous physical activity.^[32] A sedentary occupation was associated with metabolic syndrome and increased carotid intima thickness in a cross-sectional study.^[33] Prospective evidence suggests that sedentary behavior could be a risk factor for cardiovascular diseases, diabetes, and all-cause mortality.^[32] In addition, physical inactivity and sedentary behavior can indirectly influence other health behaviors (eg, overeating, smoking, stress management, substance abuse, and risk taking), psychological well-being, and health-related quality of life.^[1,32,34] A pedometer-based walking competition among university members enhanced health parameters, physical activity, and subjective health.^[35] Nonetheless, the crucial importance of physical activity is undervalued, and strategies for promoting physical activities have been understudied in the public health sector.^[31] A review of the effectiveness of physical activity interventions in different settings (school, community, family, and primary care) reported that the strongest evidence was for school-based intervention strategies.^[3] We, therefore, suggest that policies and strategies to improve young adults' physical activity should be developed and implemented in university settings. Furthermore, multisectoral collaboration between university, community, transport, urban planning, and various sectors will be required to create an active lifestyle-enabling environment for all.^[2,32,36]

Accumulating evidence suggests that unhealthy behaviors hold important implications for not only the prevention of NCDs but also the socioeconomic inequalities in health outcomes.^[37] Social inequalities are some of the most important determinants of health.^[4,14] Recent evidence indicates that patterns of unhealthy behavior and the linked NCDs cluster among disadvantaged groups, and they usually have more severe health outcomes,^[1,38] contributing to the vicious cycle of poverty and NCDs and even trans-generational effects.^[17,39] A study on health inequalities across 22 European countries found that parts of the inequalities in health outcomes were attributable to socioeconomic differences in unhealthy behaviors, such as smoking and heavy drinking.^[37] The government of the United Kingdom, in which a universal healthcare system has been provided since 1948, prioritized an effort to reduce health inequalities between social groups by strengthening primary care from 2004/2005 to 2011/2012. Consequentially, socioeconomic inequalities in primary care access and quality were substantially reduced; however, only modest reductions in health outcome inequalities were achieved. Evidence suggests that socioeconomic inequalities in unhealthy behaviors (physical inactivity, poor diet, and smoking) increased during this period and contributed to the socioeconomic

inequalities in health outcomes.^[40] In the United States, underinsured or uninsured children had limited access to health care, and their quality of care was suboptimal.^[41] Since 2010, the Patient Protection and Affordable Care Act has expanded healthcare coverage and improved access to care for disadvantaged populations. Some improvements in mortalities for causes amenable to healthcare have been reported.^[40] However, inequalities in health outcomes within the covered population still remain. Despite recent plateauing rates of childhood obesity, severe obesity among low-income youth remained remarkably high, implying that continued and creative public health efforts are necessary.^[42] Therefore, reducing inequality in health outcomes is more complex and challenging than reducing inequality of access to healthcare.^[38,40] Socioeconomic inequalities in health are not only due to inequalities in healthcare access but also to complex interactions between socioeconomic differences, including individuals' health behaviors, self-care, educational opportunities, income distribution, and social support networks.^[37,40] Health promotion action aims at reducing differences in current health status and ensuring equal opportunities and resources to enable all people to achieve their fullest health potential.^[13] We believe promoting healthy behaviors and supporting environmental changes in young adulthood, during which major health behaviors are established, would eventually contribute to reducing the socioeconomic inequalities in health outcomes.

Although topics related to health promotion have become very popular in recent years, their successful implementation remains weak or inconsistent effects have been reported.^[4,43] A systematic review reported that the existing studies on school-based health promotion exhibited low methodological quality and high heterogeneity. They suggested that improvement of the design and better reporting of methods, intervention processes, and their theoretical underpinning are required.^[43] In health promotion, evaluation can increase the quality and effectiveness of any initiative by assisting in the formative development and implementation of programs and by assessing outcomes and summative impact.^[14] Because health promotion programs are complex and multilevel, a balance of program monitoring, process evaluation, and outcome evaluation is required to assess progress toward planned goals and to understand which health activities are successful and why.^[14] Outcome evaluation focuses on the ultimate outcome of a program and often leads to formulate narrow questions concerned with causal relationships.^[14] Process evaluation assesses how a program is implemented, provides the information required for the interpretation of outcomes, and can assist in attributing causality. It focuses on intermediate outcomes that are thought to be triggered by the program, which may in turn affect the ultimate outcome.^[14] However, evaluation in health promotion is one of the challenges and suffers from a shortage of evidence on the effectiveness of initiatives.^[14] In particular, the practice in evaluation has been concentrated on assessing individual level ultimate outcomes but neglected intermediary processes.^[14] The lack of evaluations could be attributed to many factors, including the inherent difficulty of evaluating complex programs that involve multilevel, multistrategy interventions with an extended time frame; no established tools for assessment; the difficulty of identifying limited publications; and limited funding for the evaluation.^[14] We believe that building a strong infrastructure for systematic and comprehensive evaluation, including funding, training, and organizational development, is vital for health promotion interventions to be translated into practice.

Our study has several strengths. To our knowledge, this is the first process evaluation study of a university-wide health promotion program within the Korean context. We described in detail the program delivery process, which is thought to be critically important in the development of health.^[14] We compared different modalities of health promotion activities (health lectures vs booths/events) and found they were both similarly effective. Our evaluation included some measures of quality, such as self-reported opinions about future programs. Despite the lack of objectivity, qualitative data can provide valuable information, such as in public relations.^[14]

5.1. Limitations

This study has the following limitations. First, its cross-sectional nature limits causal and temporal inferences. Because program participants might have higher awareness of health than those who did not attend, it could have affected our results. Second, we did not measure changes in health awareness. Participants were asked about their past and current awareness simultaneously; thus, their current perceptions or inaccurate recall might have biased their responses. This makes it difficult to believe the *t* test result was adequately convincing. Third, we used convenience sampling, and not a representative sample of all the participants. In reality, obtaining a representative sample at a public health program is a major challenge because those programs are usually held as open-ended and unstructured events in a public space with many people coming and going.^[23,44] Fourth, as the survey was conducted during the program, we cannot be sure the participants' reported perceptions will be sustained in the long-term. Last, we did not evaluate health outcomes. In practice, however, no single evaluation is likely to address all dimensions of health promotion programs.^[14]

6. Conclusions

In conclusion, our study demonstrated that the SNU Health Week was effective in improving university members' health awareness and in providing opportunities for the students to access health information, knowledge, skills, self-confidence, and available health services and resources. Compared to a series of single-target interventions, our university-wide, multifaceted, and integrated approaches were more effective in extracting and sharing the university's resources and in disseminating and implementing activities and services. Since different types of health promotion programs could learn from each other,^[14] we believe our results would be useful for sharing information on the planning and implementing future university health promotion programs.

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