

School-based Health Promotion Program for Prevention of Cardiovascular Disease

- Healthy Life for School-Aged Children

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1. Introduction

Over the past few decades, dramatic socioeconomic developments have resulted in the change of epidemiological transition from infectious to chronic diseases as leading causes of death in Korea¹⁾. Behavioral factors, particularly smoking, diet and activity patterns, alcohol consumptions are among the most prominent contributors to mortality.

Since after landmark reports on health promotion in Canada and USA during the 1970s and 1980s, which heralded the commitment of governments to health promotion, many studies have been made on it²⁾. Korea also enacted laws on health promotion in 1995 to prevent chronic disease more active by education and practice, and several projects have been demonstrated since then on the health center basis. However most of them have only focused on adults over 18 years old, which consequently caused to pay little attention to school-aged children.

Contrary to the conditions of Korean society, there have been lots of projects for health promotion in western countries performed mainly targeting school-aged children for following reasons: healthy children can form more productive society, school based education is outstandingly cost-efficient, habits related to health are cultivated usually in the early stage, risk factors of chronic disease are proved to already appear in childhood by lots of studies and children can act as health messengers through diffusing the health information and positive change into other family members.³⁾⁴⁾⁵⁾⁶⁾. Many studies on school-site health promotion have chosen topics related to cardiovascular diseases on account of its magnitude- leading cause of death-, and the relative high cost-efficiency among preventable diseases

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For the reasons mentioned above, a large number of programs based on these results have been developed and chosen as the educational curriculum in school or community fields. CDC in USA, for example, established "The Youth Behavior Surveillance System, YBSS" and have been monitoring in every two year on the school basis. To evaluate and improve these programs, CDC has been operating the Division of School Health, emphasizing the comprehensive school based health education⁷⁾.

There are also countless evaluative and efficacy studies of each program on obesity, smoking, physical activity, diet and school based comprehensive health promotion, whose accumulated data showed that chronic diseases could be controlled through active involvement of participants themselves. School based programs are usually linked with community programs and developed, evaluated under the backing of community or national level. Based on these evaluation, guidelines for getting at the truth of matter and planning comprehensive health promotion programs are made and given to personnel in charge⁸⁾⁹⁾¹⁰⁾.

Whereas, Korea is faced with exam-oriented situations, which can force to develop the unhealthy lifestyle. The proportion of obesity and hypercholesterolemia has been increasing because of consumption of junk food and lack of physical inactivity. According to the report on health status of the elementary school-aged by Seoul School Health Center, Body Mass Index(BMI) increased and this tendency was remarkable among 6-13 year old boy whose BMI was even higher than that of USA(NHANES I)¹¹⁾.

Therefore, it is necessary to perform the educational programs focusing on preventing heart and artery disease by developing good habits of healthy diet and activity among children who are in the process of cultivating habits. These programs, easy enough to lead by teachers, can also enable to recognize and practice health directed behaviors.

This study encompassed the historical backgrounds, progress, actual performance in school fields and evaluation of the pioneering school based health promotion program, "Healthy life for school-aged children", focusing on prevention of cardiovascular disease in order to present the further direction of studies on school based health promotion

II . Background of "Healthy Life for School Aged Children"

1. Goal

The purpose of "Healthy life for school-aged children" lies in laying the foundation for increasing and reinforcing adoption and maintenance of the health-directed behaviors among school-aged children by developing healthy lifestyle through imparting information and helping to form the favorable attitude on prevention of cardiovascular disease, all of which lead to lower the risk of cardiovascular diseases in the future.

2. Principles of development

- 1) To employ efficient methods enabling to enhance the motive and increase the educational effect into the maximum level by making the most of limited time
- 2) To able to manage the program by educators themselves on the school basis
- 3) To make children recognize the health directed lifestyle by imparting the comprehensive contents

3. Theoretical Model

The target population of "Healthy life for school-aged children" are fourth grade children whose health status are relatively high, making it hard to improve health status itself during the short period. Thus its aim should be placed on the maintenance or improvement their health directed behaviors, measured by the change of influencing factors.

This program was developed primary based on the Precede-Proceed Model by Green and Kreuter and referred to Self Efficacy for health behavior change and Transtheoretical Model for forming specific strategies<Figure 1>¹²⁾¹³⁾¹⁴⁾.

4. Organization of Research team

To induce active involvement of teachers, this research team included teachers in school

fields and has employed a close collaboration with them within the community by asking the comment on the lots of problems facing with continuously. They also set up the advisory committee as occasion demands<Figure 2>.

5. Program

(1) Healthy Life for School-Aged Children

"Healthy life for school-aged children" is the educational curriculum aiming at balanced diet and increasing physical activity for prevention of cardiovascular disease. It is mainly composed of three sections, introduction and the theory of behavioral modification, exercise and diet, explained in detail below.

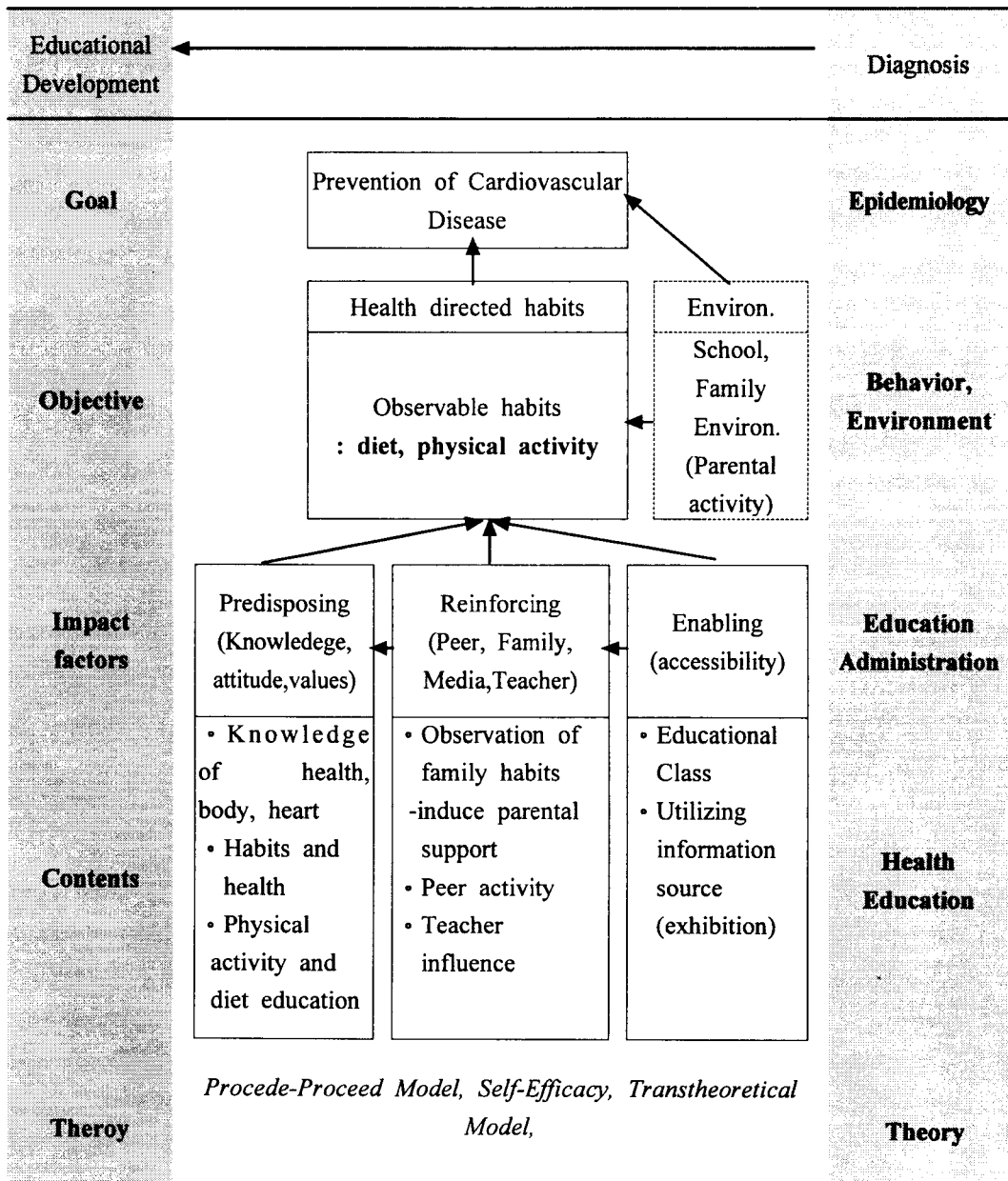


Figure 1. Educational development model for prevention of cardiovascular disease among children

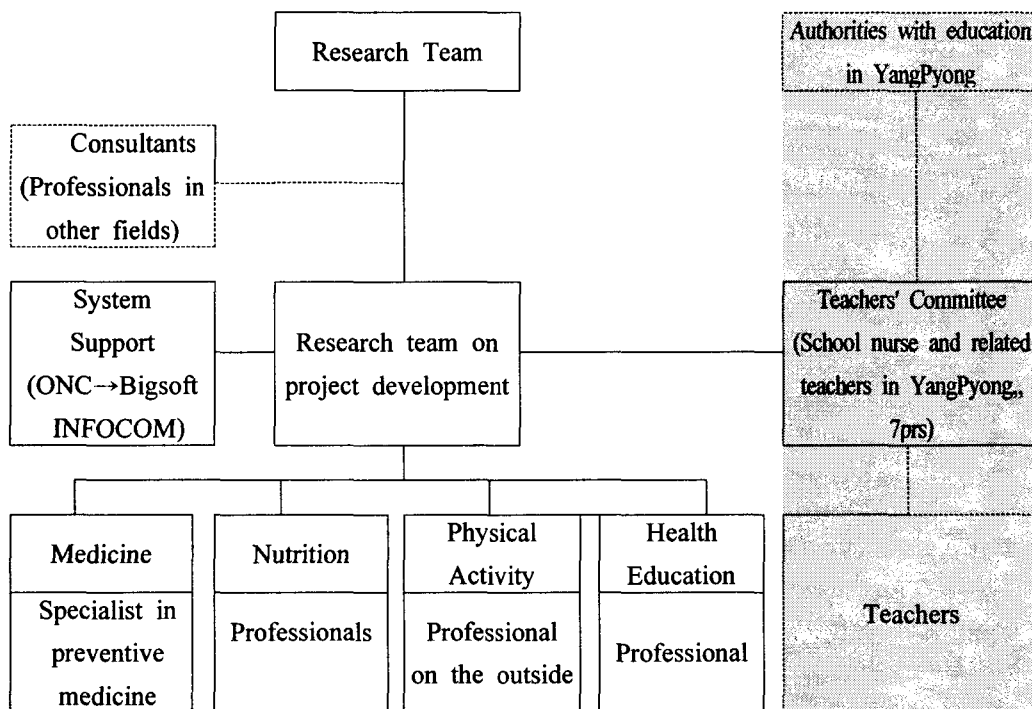


Figure 2. Organization chart for prevention cardiovascular disease in school based health promotion program.

First, introduction and behavioral modification helps to plan for inducing health directed behavior by understanding the concept of health and habit and observing his health directed behavior on the basis of theory. Health behavior observation enables a child to examine his behavior grounded in Precede-Proceed Model and to recognize the factors influencing.

Second, exercise part is not confined into a few sports, but its contents incorporates with plays with friends and giving the information on methods to increase physical activity in daily life.

Third, diet aims at understanding Food Pyramid for balanced diet and making understand about food and food group through experiencing the process of constructing Food Pyramid.

Each class was conducted during physical education, diet class or other related classes according to school's conditions, and was led by teachers in charge, dietitian and other

teachers as well as school nurses.

(2) Strong Kugi(educational game software)¹⁵⁾

'Strong Kugi' is an educational simulation game software with voice. It is composed of raising main character, Kugi, for 6 years whose grandmother are suffered from stroke. This game starts with appointing a participant to be a 'Guardian Angel' of Kugi's family, granted the mission of designing health plans for 6 years.

'Strong Kugi' can be utilized as the educational tools, conveying the health information in a more friendly form and it can be linked with the 'Kids Health(internet web)' as well. This game has a helper character, 'Healthy', whose mission is making game flow more smoothly and pleasant. It intends to induce observational learning(social cognitive theory) through the indirect experience by raising Kugi and to heighten will of practice by enhancing self-efficacy through undergoing success as the cumulative results of 6 year activities.

a. Characteristics of Strong Kugi

- Simulation game with voice
- 6 year period of activity
- Changeable scheduling at any time
- A variety of events and interim evaluation
- Suggestion of detailed evaluation results
- Study quiz and the compendium of health knowledge

b. Game system flow

'Strong Kugi' is divided into education, game and analysis part. A user is supposed to select Kugi's activities related to mainly diet, physical activity. Sociality and mental health also included in them.

(3) Kids Health (<http://www.kidshealth.or.kr>)

'Kids Health' explores the scientific information on cardiovascular diseases and related risk factors in an adequate level of difficulty targeting children, adolescent, teachers and parents on the internet.

III. Actual application of "Healthy life for school-aged children"

"Healthy life for school-aged children" was first developed in 1998 as the results of the investigation by YangPyong-Gun on School Health Study in 1994.

Since then the awareness arisen on the necessity of health promotion led to staff education in 1994 and school-site health promotion in 1996 among one middle and one high school by Hanyang University based on the cooperative efforts with teachers in fields. There has also been the survey of the risk factors- mainly diet, exercise and obesity- of cardiovascular disease in a middle, a high and five elementary schools since 1997¹⁶⁾¹⁷⁾.

In the process of conducting these surveys, attempts were made into developing the program to be help to students practically. As a consequence, the first intervention targeting overweight students in middle and high school was made in 1996, composed of five week plan, which led to "Healthy life for school-aged children". There were some changes such as altering instruction methods, increasing the class time and involving teachers from the planning stage of development after the first intervention.

The second intervention was taken in grades 4-6 involving 90 students and the middle/high school, 11 and 17 students for each, in 1997. The third one employed by teachers themselves in 1998.

Through out these developmental process, several key findings were found. Firstly, active involvement of teachers' in fields is the key to success from the planning stage. Secondly, children prefers to the method of discussion, observation and be conveyed in the form of play. Thirdly, establishment the co-operational system between teachers within community can play the vital role to bear full fruits.

IV. Evaluation Study

1. Study purpose

This evaluative study encompasses measuring the effects of "Healthy life for school-aged children" developed by Hanyang university to identify factors which interfere with the application into the school fields and shortcomings for quality control. This study performs the process, impact and outcome evaluation, whose objective are clearly depicted in Table 1.

Table 1. Program Objectives

Healthy Life	Evaluation Contents	Objective
Process Evaluation	Evaluation for procedure of program (1st : right after termination of program, 2nd: 3 month later)	
Impact Evaluation (Predisposing, Reinforcing, Enabling)	Knowledge	<ul style="list-style-type: none"> • Mean score of knowledge, Attitude, Confidence and parental support on diet and physical activity
	Attitude	
	support of parent	
	Confidence	<ul style="list-style-type: none"> - Difference between before and after - Over 10% increase on the basis of before score (converting 100)
Outcome Evaluation	Activity	
	Diet	<ul style="list-style-type: none"> • Fruit intake (1+/day) • Not drink soda (/w)

2. Study population and design

The evaluative study was carried out by region (Seoul, Yangpyong) and the level of intervention during one semester in 2000. Each of 4 school in Seoul and Yangpyong was classified as mixed, education, game/web and control group according to the levels of intervention <Figure 3>.

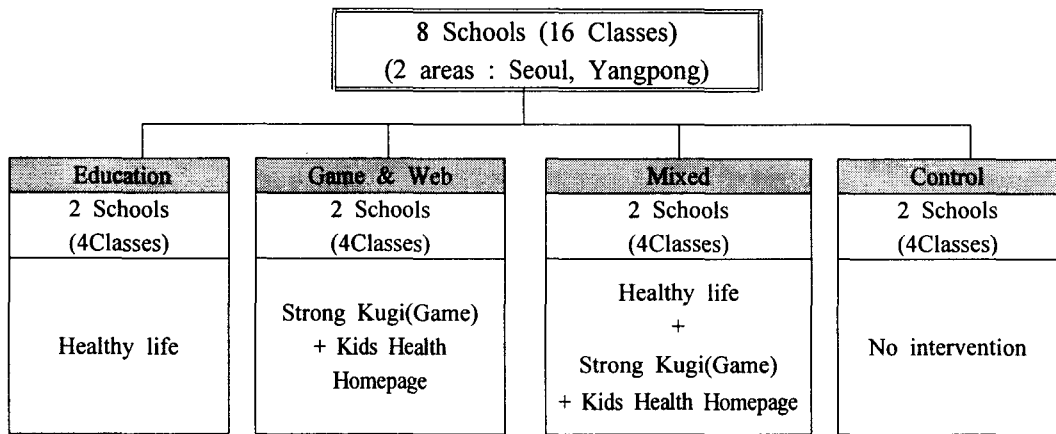


Figure 3. Study Design

3. Study Tool

(1) Student evaluation - Questionnaire

This study examined the educational effect by administering questionnaires developed by ourselves for three times to rate before and after effects more accurately<Figure 4>.

This questionnaire contains demographic factors, behavior modification, behavior, confidence, attitude and knowledge on diet and physical activity, parental support and 24 hour recall diet.

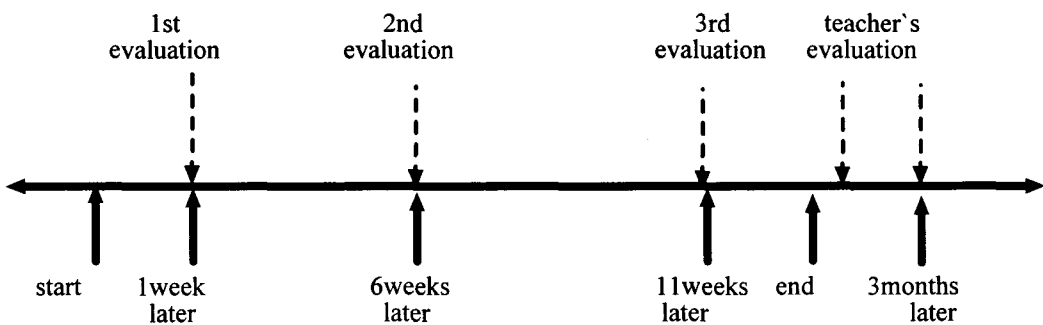


Figure 4. Evaluation Phase

(2) Teacher's evaluation

This study performed process evaluations by teachers in charge for two times, right after terminating the program(1st) and three months later(2nd).

a. The first evaluation

The first evaluation dealt with the performance of program by teachers themselves on the fields of confidence, ability manifestation, self-rating importance of each ability, the degree of preparedness and the obstacles in reality.

b. The second evaluation

It can play the vital role to reflect the opinions of those who were in charge to manage this program. Therefore the second evaluative questionnaire was developed focusing on demerits of the program, which was administered three month later after terminating the program.

V. Result

This evaluative study was performed on the field of process, impact and several outcomes. Process evaluation was conducted twice by teachers and researchers irregularly. Impact and outcome evaluation was done for three times(participant number-1st: 464, 2nd:519, 3rd:482), all of which was performed among 8 elementary schools representing Seoul and YangPyong in grade 4. These Results were as follows.

1. Process Evaluation

One of the key findings from the previous studies was that a teacher's "fidelity" to the curriculum being taught was a critical predictor of positive student change. Therefore this study employed the process evaluation of teachers. The first one dealing with implementing this program showed that teachers had the relatively high confidence and interests in programs, contrasting to lower ability of establishing co-operational relationship

between teachers and administrators. Lack of facilities and time limitation acted as the biggest barrier<Table 2>.

Table 2. Factors and their intensity as barriers in implementing program (%)

Factor	Level of Interference			
	Strong	Mild	Neutral	Not Interfered
lack of administrative supports	0.0	16.7	50.0	33.3
lack of support of colleague	0.0	16.7	50.0	33.3
individually inconvenience	0.0	50.0	50.0	0.0
lack of materials	16.7	33.3	16.7	33.3
relative difficulty of program	16.7	0.0	50.0	33.3
lack of knowledge	16.7	0.0	50.0	33.3
lack of time	50.0	50.0	0.0	0.0
lack of facility	66.7	0.0	16.7	16.7

The second evaluation revealed that this program was beneficial to health promotion of students(66.7% of them agreed) in general but contents on "knowing our body" were somewhat difficult. In conclusion, teachers would be willing to accept this program if attempts are made in overcoming shortcomings pointed out, which implies the success of this program in a certain level.

Along with these evaluations, research team evaluation also showed based on the frequent observations that generally children showed interests and took an active part in educational curriculum and game/web programs. But differences in computer accessibility checked the active participation, which acted dissimilar by region. As a consequence, those who had comparatively lower accessibility lost interests, which emphasized the importance of considering the prerequisite conditions: improvement of facilities, continual stimulation of interests, upgrading the quality by means of reducing bugs in game.

2. Impact evaluation

a. knowledge

Converting average score decreased from 55.7 points to 50.8 points, which was applied

both intervention and control group. However, these tendency was manifested differently by area : increasing for Seoul in all groups except control, decreasing for YangPyong in all group, especially in education group, which remains unsolved. Knowledge was positively correlated, showing the significance, with attitude($r_s=0.277$), parental support($r_s=0.261$), confidence($r_s=0.195$) in order, and parental education didn't show any significance <Table 4>

b. attitude

In all groups, mean attitude score decreased, especially in game/web group of Seoul.<Table 3> Attitude was highly correlated with confidence($r_s=0.659$), which suggested the importance of increasing confidence for holding the favorable attitude. In addition, attitude was correlated with parental support, knowledge, paternal education, income in order, all of which were statistically significant($p<0.01$). <Table 4>

c. confidence

Post test score of Seoul was increased, especially in mixed group. There was no particular change in YangPyong, except showing significant decrease in control group.<Table 3> Confidence was correlated significantly with attitude ($r_s=0.659$), parental support($r_s=0.463$), paternal education($r_s=0.252$), maternal education($r_s=0.235$), knowledge ($r_s=0.195$) in order of correlation, all of which were statistically significant($p<0.01$).<Table 4>

d. parental supports

The score of all intervention groups increased in Seoul. Generally, score of post test was somewhat lower than pretest especially in control group. However it might be unjustifiable to conclude like this because the number of participant of post-test was relatively few<Table 3>. Parental supports were highly correlated with attitude and confidence.<Table 4>

Table 3. The score distribution of impact evaluation by area, level of intervention and stage of evaluation

Contents	Area	education		game/web		mixed		control	
		pre	post	pre	post	pre	post	pre	post
knowledge †	Seoul	55.7	55.1	56.7	61.4	61.8	56.5 *	52.7	48.1
	Yang-pyong	56.5	41.3 **	50.4	46.7	55.4	48.4	52.2	44.6
attitude ‡	Seoul	4.00	3.64	4.18	3.56 *	3.95	3.70	3.79	3.70
	Yang-pyong	3.46	3.39	3.20	3.00	3.11	3.12	3.11	2.57
confidence §	Seoul	3.38	3.33	3.41	3.53	3.59	3.74	3.46	3.15
	Yang-pyong	3.11	3.26	3.30	3.23	3.26	3.19	3.33	2.77 *
parental supports	Seoul	2.38	2.21	2.36	2.12	2.36	2.06 *	2.33	1.85 *
	Yang-pyong	2.17	2.03	2.29	2.00	2.22	2.06	2.00	1.36

* p<0.05, **p<0.01 (paired t-test)

† score correct out of 23 items (maximum score possible : 100)

‡ mean agreement with 20 items (5 = strongly agree, 1 = strongly disagree)

§ mean agreement with 24 items (5 = strongly agree, 1 = strongly disagree)

|| mean agreement with 11 items (3 = strongly agree, 1 = disagree)

Table 4. Correlation Coefficient in Impact evaluation (Spearman's rho)

		knowledge	parents supports	confidence	attitude
knowledge	Correlation Coefficient	1.000	.261	.195*	.277*
	Sig.(2-tailed)	.000	.000	.000	.000
	N	1455	1453	1453	1451
parents supports	Correlation Coefficient	.261*	1.000	.463*	.474*
	Sig.(2-tailed)	.000	.000	.000	.000
	N	1453	1461	1460	1458
confidence	Correlation Coefficient	.195*	.463*	1.000	.659*
	Sig.(2-tailed)	.000	.000	.000	.000
	N	1453	1460	1462	1460
attitude	Correlation Coefficient	.277*	.474*	.659*	1.000
	Sig.(2-tailed)	.000	.000	.000	.000
	N	1451	1458	1460	1460

* Correlation is significant at the .01 level (2-tailed).

3. Outcome Evaluation

a. Change of behavior modification stage

The proportion of 'Maintenance group' who hold healthy habits for more than six months was significantly getting increased both in intervention and control group. Similar findings were observed in mixed group of Seoul ($p < 0.05$). By area, the proportion of 'Maintenance group' in Seoul was 1.68 times higher than that of YangPyong ($p < 0.01$).

b. change of physical activity

(1) regular exercise rate(%)

The regular exercise rate, defined as taking exercise at least three times a week, was only increased in mixed group of Seoul. However, considering the increase of the exercising rate of 1-3 times a week and seasonal factor(winter) which could underestimate the effect, real effects might be higher than observed. By stage of evaluation, there was

no particular trend and by groups, education group in YangPyong was the highest. By area, regular exercise rate of Seoul was 1.31 times higher than that of YangPyong.

(2) Change of exercise habit score

Remarkably, there was the increasing tendency in intervention group, especially in mixed of Seoul, but nothing of particular in YangPyong.

C. Change of diet

(1) change of food intake rate(%)

The rate of children who consumed the fruits over once a day for a week, increased in all groups except in mixed of Seoul. Whereas, there was no remarkable increase between pretest and posttest, but the tendency of increasing rate(4-6times/week) was found in education and mixed group of YangPyong.

D. Change of energy and nutrients intakes

(1) The general overview of energy and nutrient intakes

In both pre-test and post-test, nutrients intake of Seoul was somewhat higher than that of YangPyong, which showed relatively desirable intake of Seoul. Most nutrient intakes were reduced except vitamin C regardless of sex, region and intervention group, which were likely to be explained by various factors such as the lower response rate due to initiation of winter vacation and incidence of measles in Yangpyong. However, we have to remind ourselves of increasing vitamin C, particularly among mixed of Seoul, which might indicated the educational effects

(2) The energy composition of carbohydrate, protein, and fat

The rate of energy composition on fat was significantly decreased in all groups except in control group of Seoul and reduced in YangPyong control group<Table 5>.

Table 5. The change in the energy composition rate of carbohydrate, protein, and fat by intervention

Area/Intervention			Carbohydrate(%)		fat(%)		protein (%)	
			Mean ± S.D.	<i>p</i> -value	Mean ± S.D.	<i>p</i> -value	Mean ± S.D.	<i>p</i> -value
Seoul	Education group	pre-test	57.60 ± 7.55	0.628	26.31 ± 6.31	0.125	16.58 ± 2.51	0.154
		post-test	58.59 ± 7.72		23.73 ± 5.78		17.89 ± 4.17	
	Game/web group	pre-test	58.76 ± 7.47	0.004 [*]	25.81 ± 6.22	0.008 [*]	16.09 ± 3.11	0.028 [*]
		post-test	62.10 ± 8.04		23.24 ± 6.61		14.94 ± 3.15	
	Mixed group	pre-test	59.68 ± 9.49	0.138	26.82 ± 6.97	0.024 [*]	14.01 ± 3.13	0.042 [*]
		post-test	61.88 ± 9.58		24.07 ± 7.45		14.95 ± 3.16	
	Control group	pre-test	59.76 ± 8.29	0.413	23.90 ± 6.10	0.571	16.38 ± 3.16	0.558
		post-test	60.98 ± 7.25		23.21 ± 6.29		16.07 ± 2.56	
Yang-pyoung	Education group	pre-test	61.50 ± 11.37	0.423	24.06 ± 8.77	0.100	15.50 ± 3.22	0.124
		post-test	63.58 ± 9.68		20.49 ± 8.62		16.70 ± 3.31	
	Game/web group	pre-test	61.55 ± 12.24	0.100	23.78 ± 9.15	0.207	15.25 ± 4.23	0.014 [*]
		post-test	66.19 ± 9.51		21.09 ± 7.77		12.86 ± 2.93	
	Mixed group	pre-test	61.00 ± 9.86	0.256	23.77 ± 6.99	0.517	15.68 ± 4.33	0.064
		post-test	57.18 ± 10.74		25.37 ± 8.79		17.72 ± 2.94	
	Control group	pre-test	57.91 ± 8.05	0.000 [*]	25.89 ± 6.32	0.001 [*]	16.64 ± 3.40	0.000 [*]
		post-test	65.16 ± 7.64		21.95 ± 6.12		13.32 ± 2.70	

* $p < 0.05$ ** $p < 0.01$

(3) Energy and nutrient intake compared with RDA (Recommended Dietary Allowances For Koreans)

The intake of energy and nutrients compared with RDA was the highest in education group both in pre and post test, while improvements was the most remarkable in mixed group. More detailed descriptions were as follows. The energy intake was not reached to RDA in both tests, nor increased. However there was the relatively lower decrease in mixed groups of Seoul.

Aparting from others, the level of protein intake was somewhat higher than RDA, only to decrease in post-test except among education of Seoul and mixed of both areas. The calcium intake was decreased as well, indicating relatively lower change in mixed group.

As for vitamin C intake, it exceeded the RDA level both tests, especially notable in post-test, which was significant in all groups except control of Seoul and in game/web and control of YangPyong.

(4) Association between dietary self-confidence/attitude/knowledge and nutrients

On the whole, there was positive correlation between confidence and most nutrients, especially applied in vegetables/fruits and vitamin C intake. There also existed the positive relationship between carotene and calcium and negative between confidence and intake of fat in actual diet. More favorable attitude, the higher intake of most nutrients, particularly related to energy, protein, vitamin C and calcium, all of which held true in the level of knowledge as well.

As the result from the multiple regression analysis, the favorable dietary attitude and the parental support indicated the positive association with intake of nutrients(energy, fat, calcium) and vitamin C, respectively<Table 6>

Table 6. Multiple regression analysis by major nutrients

	Energy		Fat		Protein		Calcium		Vitamin C	
	β	t-value	β	t-value	β	t-value	β	t-value	β	t-value
Knowledge	0.067	1.913	0.073	2.098*	0.083	2.378	0.043	1.242	-0.006	-0.185
Support of Patents	-0.046	-1.172	-0.034	-0.850	-0.037	-0.946	0.035	0.882	0.079	2.015*
Self-confidence	-0.029	-0.636	-0.048	-1.034	-0.033	-0.715	-0.037	-0.799	0.081	1.770
Attitude	0.103	2.197**	0.093	1.972*	0.116	2.470	0.152	3.256*	0.024	0.506
R2(Adj-R2)	0.012(0.008)		0.011(0.007)		0.017(0.013)		0.028(0.023)		0.024(0.019)	
F-value	2.746**		2.507*		3.921**		6.377**		5.394**	

*p<0.05, **p<0.01

VI. Discussion and Conclusion

This research on the whole explored the background, progress, performance of school-site health promotion program and evaluation of the effects on it.

Throughout these steps, it was proved that the belief established among administrators, teachers and researchers should be deserved careful attention considering following reasons. Without understanding about goal and direction of teachers' toward program, considerable behavioral modification of children are hard to be expected. Also without continuous support, it is impossible to induce active involvements of teachers'.

Above all, the core of all the questions is reduced to be the lower priority of school health occupied within school services because of the disapproval as regular course, which consequently caused to have trouble in raising the fund and only few programs implemented on school-based health promotion. Therefore this study was taken up and went through many trials and errors. The significance of this study lies in trying to demonstrate and evaluate the effects of the health promotion program and quantify by multiple approaches, which has hardly been performed.

The major findings of this evaluative study and their implications displayed below.

On the whole, the difference between pre and post test was hardly found by impact evaluation except in mixed group. However, contrary to above result, both teachers and children expressed their satisfaction, and they agreed to contributions of program into practicing health directed behavior according to process evaluation. This observed discrepancy could be mainly attributable to the problems of evaluative tool. This evaluative study employed the questionnaire method for three times during eleven weeks, which might make children too familiarize with it, making little difference among groups consequently. The likert scale used in questionnaire might exert as barriers in answer, hindering reflecting the real effects. Furthermore, in the third questionnaire, there started winter vacation in both study areas and measles epidemic in Yangpyong made the response rate and quality of completion lower. Although this evaluative study tried to set up various evaluative standards in order to measure quantitatively by the passage of time, there paid little attention on the qualitative change at the same time. Process evaluation, of course, was employed to overcome these limitations, but the effect did not change very much. Therefore more depth evaluation including systematic and periodic observations and

interviews toward children should be done, and any measurement must be made only after understanding characteristics and conditions of target population.

Especially, the results of this study differed greatly from area, that is, the results of Seoul reported to be more favorable than YangPyong, which might be concluded that the program was more effective in Seoul, emphasizing the importance of environmental factors. However, we must examine a few factors just before admitting regional effect. Generally residence area are affected by socioeconomic status, so these difference may be mainly due to the gap of income level. Therefore further analysis stratified by socioeconomic status, mainly income level, are needed to confirm this fact. And if it is proved, there should lay emphasis on programs toward the deprived in the level of public service.

In outcome evaluation, the proportion of regular exercise group increased in mixed of Seoul, but these tendency was hardly observed among other groups, which was also true for the diet. Seasonal variations may also affect this results besides the questionnaire limitations. As winter can interfere with practicing target health behaviors focusing on exercise and fruit consumption, it may not reasonable to compare equally regardless of its season. Thus, further study intending to assess the behavioral modification should include at least four seasons to overcome variational effects.

Besides, to minimize the effects of factors influencing the results, planning and process must be done according to the standardized principles and there should be continuous quality control in the meantime.

As this program focused mainly with evaluation, standardized methods among groups were emphasized throughout the study period, restricting educational media as well. But if this program would be further expanded and applied into other settings, a variety of media can be utilized in order to attract interests of target population according to the usage, especially enabling to activate discussion, observation and play which reported to be preferable methods. It is also desirable to strengthen the self-controlling of teachers' for flexible running.

Since health promotion cannot be simply accomplished in a short time, to obtain the desired result, at least more than 10 years should be spent. Therefore we first try to take a broad view and consider the long term effect. The importance should be also placed on establishing the co-operational relationship by developing effectual communication. Likewise, each program must be managed on the ground of pre-surveyed results of

characteristics, and special attention should be also paid on programs targeting for the deprived.

In conclusion, through the efforts of improving the program focused on matters mentioned above based on the co-operational system among school nurse, administrator, health center and research institute for the long term, more desirable modification of health-directed behavior among children can be expected.

Reference

- 1) Korea National Statistical Office. The Cause of Death Statistics in 1998, 1999.
- 2) Gonghyun Kim. A Seminar for Health Promotion and Health Educations Strategy. 1993: 73-87
- 3) Center for Disease Control and Prevention, School Health Index for Physical activity and Healthy eating - Self-Assessment and Planning Guide : Elementary School-, February 2000.
- 4) Perry CL, Griffin G, Murray DM. Assessing Needs for Youth Health Promotion. *Prev Med* 14 : 379-393. 1985
- 5) Williams CL, Wynder EL. A blind spot in preventive medicine. *JAMA* 236, 2196-2197, 1978
- 6) Wynder EL, Williams CL, Laakso K, Levenstein M. Screening for risk factors for chronic disease in children from fifteen countries. *Pre Med* 10: 121-132, 1981
- 7) Center for Disease Control and Prevention. School Health Programs : An Investment in Our Nation's Future. 1998
- 8) Baranowski T, Davis M, Resnicow K, Baranowski J, Doyle C, Lin LS, Smith M, Wang DT. Gimme 5 Fruit, Juice, and Vegetables for Fun and Health : Outcome Evaluation. *Health Education & Behavior* 27(1):96-111, 2000
- 9) Price JH, Beach P, Everett S, Telljohann SK, Lewis L. Evaluation of a Three-Year Urban Elementary School Tobacco Prevention Program. *J Sch Health* 68(1):26-31, 1998
- 10) Resnicow K, Cross D, Wynder E. The Know Your Body Program:A Review Evaluation Studies. *Bulletin NY Aca Med* 70(3):188-207,
- 11) Yun Ju Kang. The prevalence of Childhood and Adolescent Obesity Over the Last 18 Years in Seoul Area. *The Korean Journal of Nutrition*. 30(7) : 832-839, 1997.
- 12) Lawrence W. Green, Marshall W. Kreuter. Health promotion planning : an educational and environmental approach. 1999
- 13) Baranowski T, Perry CL, Parcel GS. How individuals, environments and health behavior interact : In *Health Behavior and Health Education - Theory, Research, and Practice*. 2nd edition, edited by Glanz K, Lewis FM, Rimer BK, Jossey-Bass Publishers, San Francisco, 1997.

- 14) Prochaska JO, DiClemente, Norcross JC. In search of how people change- applications to addictive behaviors. *Am Psychol* 1992; 47(9): 1102-1114
- 15) A Study on the development of information-providing system for children and adolescents' cardiovascular disease prevention. Ministry of information and communication. Report of research results. 2000
- 16) Moran Ki, Boyoul Choi, Mi Kyung Kim, Ki Rang Kim, Jin Nu Fang, Yun Ju Kang. Lipid Profiles and Related Factors in Adolescent. *Korea Journal of Preventive Medicine*. 33(1): 83-90, 2000
- 17) Moran Ki, Bo Youl Choi, Mi Kyoung Kim, Jin Nu Fang, Chun Ying Xu, Dong Hyon Ahn, Yun Ju Kang. Relationship between Adolescent Obesity and Socioeconomic Status of Parents: In Seoul, Yangpyong, and Yanbian Area. *Korea Journal of Preventive Medicine*. 32(1): 9-16. 1999

심혈관 건강을 위한 학교 중심의 건강증진 프로그램 연구

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□ 연구배경

심혈관계 질환으로 인한 사망이 전체 사인의 수위를 차지하는 현대사회에서 그 위험은 어린 시절부터 시작되며, 이와 관련된 식생활 및 운동습관 또한 어린 시절 형성되어 평생을 유지하게 된다. 그러므로 생활습관의 교정이 가능한 초등학교시기에 건강생활에 대한 인식을 전환시키며, 정확한 지식과 올바른 태도를 형성하여 실천에 이르게 하는 것이 중요하다. 이에 본 연구는 주관연구기관에서 개발해온 “어린이 건강생활 익히기”의 배경·과정·실행 및 평가결과를 제시함으로써 향후 학교중심의 건강증진프로그램의 올바른 방향설정에 도움이 되고자 하였다.

□ 연구방법

“어린이 건강생활 익히기”는 심혈관 건강을 위한 균형잡힌 식생활과 높은 활동성을 목표로 하는 11차시로 이루어진 교육과정, 교육용 육성 시뮬레이션 게임인 “꾸러기 튼튼”, 그리고 컴퓨터 게임과 인터넷을 이용하여 교육매체로서의 가능성 및 효과를 알아보고자 한 교육용 웹사이트인 “꾸러기 튼튼 랜드(www.kidshealth.or.kr)”로 구성되어 있다. 본 프로그램은 1994년 경기도 양평군에서 실시된 학교보건 관련 연구를 시작으로 하여 지역 내 교사와 대학 협력체계 구축의 결과로 1998년에 1차 개발·수행되었으며, 그 결과 학교중심 건강증진 사업 계획단계에서 일선 교사의 참여가 중요하며, 토의·관찰·직접활동 등의 교수방법을 학생들이 선호하며, 지역 내 교사들의 협조체계가 교육효과를 높이는데 중요한 역할을 한다는 교훈을 얻게 되었다. 한편, 개발된 프로그램의 파급효과와 실용가능성에 대한 평가연구가, 2000년 9월부터 12월까지 11주간의 교육프로그램으로 수행되었다. 대상자는 서울과 양평 지역의 8개 초등학교 4

학년 16학급 (1차 464명, 2차 519명, 3차 482명)으로, 교육군, 게임 및 웹군, 병행군(교육 및 게임/웹) 및 대조군으로 구분하였다. 평가는 교사(1·2차)와 연구자의 '과정평가' 및 대상 아동에 대한 '영향평가' 및 '결과평가'(1·2·3차)의 3부분에 걸쳐 이루어졌으며, '사전'(1차) 및 '사후'(2·3차)로 구분하여 개입군, 지역별 및 평가시기별로 행동변화 및 지식, 태도, 자신감, 부모의 지지도 변화양상을 파악하였다.

□ 연구결과 및 토의

'과정평가' 중 프로그램 종료 직후 이루어진 1차 교사평가에서 교사들은 전반적으로 높은 수준의 자신감 및 의욕성취도를 보였으나, 실제 행정적인 협조체계를 구축 및 유도하는 방법에서는 취약하였으며, 시설이나 수업시간의 부족이 프로그램 수행에 가장 방해를 주었다고 응답하였다. 프로그램 종료 3개월 후 이루어진 2차 교사평가에서는 신체관련내용이 어렵고, 수업시간의 부족, 한정된 기자재 사용 및 동료교사의 수동적 참여를 제한점으로 들었다. 하지만, 대상교사 전원이 본 프로그램이 수정·보완된다면 다시 사용할 의사가 있다고 응답하여 프로그램의 유용성을 인정하였다. 연구자의 자체평가 결과, 아동들은 전반적으로 본 프로그램에 흥미를 나타내며 적극적인 참여를 보였지만, 컴퓨터에의 접근도 문제나 시간 경과에 따른 현저한 흥미도 저하는 시설이나 지속적인 흥미유발 및 버그를 줄이는 프로그램의 질적인 면 등에 대한 고려가 성패의 선결조건임을 시사해주었다.

'영향평가'는 학생들의 지식, 태도, 자신감 및 부모의 지지도 영역의 4부분에 걸쳐서 수행되었는데, 지식, 태도, 자신감 및 부모의 지지도는 통계적으로 유의한 상관성을 보였으며 그중 특히 바람직한 태도와 자신감의 상관도가 높았다. 그러나, 각 영역별로 사전·사후 평가 및 개입군별 차이가 미미해서 단기간의 프로그램의 시행만으로는 목표로 했던 건강증진을 달성하는데 부족했으므로 장기적인 측면에서의 프로그램 시행이 필요하며, 이러한 변화를 좀 더 민감히 파악할 수 있는 평가방법 개발이 선결 조건임을 볼 수 있었다.

'결과 평가'는 행동수정단계와 운동 및 식습관 변화의 영역에 대해 이루어졌는데, 서울의 개입군 중 특히 병행군에서의 건강습관 유지군의 비율이 높았으며, 평가차수가 증가할수록 건강습관 유지군이 유의하게 증가하였다. 이는 규칙적 운동률, 운동습관 및 과일 섭취율에서도 비슷한 양상을 보였다. 영양소 섭취도 서울이 바람직하였으며, 사후 평가시 모든 부분에서의 영양소 섭취가 감소했음에도 Vit C의 섭취는 증가한 것은 교육의 효과로 해석이 되어질 수 있을 것이다. 권장량 대비 영양소 섭취량의

경우 사후평가에서는 병행군의 섭취율이 증가하였으며, 열량과 칼슘은 권장량에 부족한 섭취량이었는데 비해서, 단백질 및 Vit C의 섭취량은 높았으며, 특히 다른 영양소 섭취가 모두 감소한 추세에서 Vit C는 모든 군에서 증가하였다. 한편, 식생활 자신감, 태도, 자신감 및 부모의 지지도와 영양소섭취의 경우 양의 상관관계를 보였으나 지방 섭취 등에서는 일정성을 보이지 않았다.

□ 결론

본 연구는 초등학교 학생의 심혈관 건강증진을 목적으로 개입방법, 평가차수 및 지역별로 효과 차이를 평가하고자 한 것으로 평가와 영향을 미칠 제변수 대한 고려 및 전반적인 학생과 교사의 높은 순응도에서 그 의의를 찾을 수 있다.

그러나, 본 연구결과에서 보여졌듯이, 단기간의 프로그램만으로는 건강증진이라는 목표를 달성하기에는 무리가 있으므로 좀 더 장기적인 안목으로, 아동의 변화를 좀더 정확히 반영할 수 있는 평가방법의 개발이 선행되어야 할 것이며, 아동의 특성에 대한 기초조사가 선행되어서 수준에 맞는 교육 및 상대적으로 소외된 집단에 대한 특별한 관심이 요구된다. 또한 이러한 프로그램을 진행하는데 있어서 교사, 행정가, 연구기관 간의 협력체계의 구축은 건강증진 프로그램의 효과를 높이는데 중요한 역할을 하게 될 것이다.