An Internet-Based Program to Promote Healthy Eating Behavior among Thai Early Adolescents

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ABSTRACT

This participatory action research (PAR) aimed to develop an Internet-based program for promoting healthy eating behavior among Thai early adolescents based on a participatory approach. The study participants were 73 adolescent members and 27 adolescent leaders, aged 12-13 years, attending a private school in the urban area, Chiang Mai, Thailand. Key stakeholders were also involved, including: fifteen teachers, one school nurse and seven parents. The study used various methods to collect both qualitative and quantitative data. The findings of this study are presented in respect of unhealthy eating behavior issues among Thai early adolescents, critical elements of the Internet-based program and the outcomes of implementing the Internet-based program.

Key words: Early adolescents, Healthy eating behavior, An Internet-based program, Participatory action research, Thailand

INTRODUCTION

Thailand is similar to many other countries where unhealthy eating behavior is an important problem that affects the nutritional status during adolescence, including overweight and obesity, undernutrition and micronutrient deficiencies and eating disorder. Several studies have shown that adolescents in Bangkok and other urbanized provinces not only consume poor energy foods and skip meals, but also consume high amounts of fast and energy-dense foods, saturated fat and dietary supplement products (Limpijarnkit, 1995; Anukoolwuthipong, 1997; Boonpraderm, 1997; Pawaputanond Na Mahasarakam, 2001; Phuphaibul et al., 2003). Ensuring good nutrition is challenging for adolescents because this developmental stage is the peak time for body image dissatisfaction, with many teens expressing a desire to have a body weight less than their present weight, and therefore liable to misuse drugs and food products for weight loss (Gunta, 2002; Tanausawanont, 2006). Food habits, lifestyles and social behavior established during adolescents are highly predictable to contribute to poor nutrition and increased diseases in adulthood.

Innovative and effective strategies are needed to promote healthy eating behavior among adolescents, particularly in urban areas. Adolescents are typically early adopters of new technologies. The increasing availability of information technology creates innovative channels for health promotion (Skinner et al., 1997). The Internet in particular provides unique opportunities for engaging youth (Skinner et al., 2003). The Internet can serve as an important tool in acquiring health information because adolescents can easily access this medium (Borzekowski and Rickert, 2001). Using computer-based instruction provides increased learner control, independence and decision-making, making it an effective method of instruction sensitive to the learning preferences of youth (Shegog et al., 2001; Long and Stevens, 2004). Some studies have shown that the interventions available through the Internet and computer-assisted instructional programs are effective in promoting self-efficacy for healthy behaviors in adolescents and other groups (Anderson et al., 2001; Shegog et al., 2001; Long and Stevens, 2004). In addition, some researchers report that healthy eating interventions that use Web-based nutrition education for adolescents results in significant reduction in fat consumption and decreased body fat (Tate et al., 2001; Frenn et al., 2003; Frenn et al., 2005; Williamson et al., 2005; Long et al., 2006).

These previous studies suggest that the Internet is an innovative and effective method to change health-related behavior and improve health outcomes among adolescents. However, Web-based programs are typically designed without adequate input from adolescent perspectives. According to Skinner et al., (1997), adolescents should be integrally involved in all stages of design, development, evaluation and dissemination of developed Internet-based program.

Recognizing the benefit of using a participatory approach, a study was designed to develop an Internet-based program to enhance knowledge and promote eating behavior change among Thai early adolescents at a private school in the urban area, Chiang Mai, Thailand. Following the principles of participatory action research, the development would include key stakeholders, and be based upon the adolescents' needs and desires. An additional goal is that the process would serve to increase capacity building and empowerment of adolescents. In addition, the process of the study aims to create, within the target group, a sense of ownership of the program which would lead to sustainable change in the future.

Objectives of the Study

The overall goal of this study was to develop an Internet-based program that promotes healthy eating behavior among Thai early adolescents at a private school in the urban area, Chiang Mai, Thailand, based on a participatory approach. The objectives in this study were as follows:

1. To identify issues that teachers, parents and early adolescents report as promoting unhealthy eating behavior in Thai early adolescents.

2. To identify critical elements of an Internet-based program to promote healthy eating behavior that is culturally appropriate to Thai early adolescents.

3. To develop and implement an Internet-based program to promote healthy eating behavior in Thai early adolescents using a participatory approach.

4. To evaluate the outcomes of implementing an Internet-based program that promotes healthy eating behavior in Thai early adolescents based on a participatory approach.

MATERIALS AND METHODS

Research Design

Participatory action research (PAR), an enhancement approach, was considered to be appropriate for this study.

Setting and Participants

The research took place with a purposive sample from one private school in an urban area in Chiang Mai province, Thailand. This school was selected because it is a big private school located in an urban area where fast-food restaurants and other convenience food stores are available, and as the students' families are of high socioeconomic status, unhealthy food is easily accessible to adolescents. In addition, this school has the availability of the Internet Server to support the development of an Internet-based program.

Research participants in this study were 100 early adolescents, both male and female, aged 12-13 years, comprising two groups, made up of seventy-three adolescent members and twenty seven adolescent leaders. Other stakeholders involved in this study as facilitators were fifteen teachers, one school nurse and seven adolescents' parents.

Data Collection

Both qualitative and quantitative data were collected using various methods. Qualitative data were collected through participatory activity, group discussions, group meetings and participant observations. Additional quantitative data were collected through a demographic data sheet, a test of knowledge in adolescence's food consumption, an attitude to food consumption questionnaire, a food consumption behavior questionnaire, a nutritional status assessment tool and an Internet-based program satisfaction questionnaire.

Data Analysis

Quantitative data were analyzed by using descriptive statistics, Wilcoxon signed-rank test, paired t-test and chi-square test. Qualitative data were analyzed using content analysis.

Research Process

The PAR process in this study was based on the basic action research process - "look, think, act", as outlined by Stringer (1999). The PAR process extended over a period of sixteen months, from May 2007 to August 2008, divided into the following eight steps:

Step 1 Establishing collaboration. The first step of the PAR process aimed to establish a relationship with school administrators and teachers to obtain permis-

sion and their support for this project. The researcher met the school administrators and teachers in order to present the objectives, research processes and potential benefits to the school.

Step 2 Recruiting adolescent participants and other stakeholders. The second step aimed to recruit adolescent participants and facilitators (teachers, a school nurse and parents) who would be interested in participating in this study. Recruitment strategies included flyers which provided the information about the research objectives and recruiting criteria for the students (grades 7-8), teachers who taught the students in grades 7-8, a school nurse and adolescent parents. Informed consent was obtained from adolescent participants and other stakeholders as well.

Step 3 Assessing eating behavior issues and needs. The third step aimed to identify unhealthy eating behavior issues and potential strategies for promoting healthy eating behavior. The researcher developed a set of activities to conduct need assessment for each group through the reflection process used during participatory activities in the group of early adolescents and group discussions with both teachers' and parents' groups. These activities enabled participants to express and review their experience of unhealthy eating behavioral issues in Thai early adolescents as well as express their opinions on the potential critical elements of an Internet-based program for promoting healthy eating behavior among Thai early adolescents.

Step 4 Recruiting and preparing adolescent leaders. The fourth step aimed to strengthen adolescent leaders' capacities to be competent leaders for developing an Internet-based program and disseminating knowledge regarding healthy eating behavior to other adolescents in the school. The researcher recruited twenty-seven adolescent leaders from early adolescents who volunteered to be adolescent leaders. Then the researcher set up a training session or workshop based on the adolescent leaders' needs, with the aim of improving the working efficiency of the research stakeholders' team and also to strengthen the leadership skills and teamwork spirit. This workshop or training session was arranged at the school for one and a half days. The activities in this workshop were based on a successful program used to train youth leaders in HIV/AIDS prevention, a patented-right program developed by Youth Family and Community Development, the Faculty of Nursing, Chiang Mai University (Fongkaew et al., 2007).

Step 5 Planning and developing the Internet-based program. The fifth step aimed to set up the tentative plan for developing an Internet-based program; and to develop an Internet-based program and research instruments for evaluation of the outcomes of the program. This step consisted of four activities:

Activity I: Organizing reflection session on eating behavior issues and needs data. The researcher conducted the group meeting to brief the adolescent leaders about the findings from assessing eating behavior issues and needs. At this meeting, the adolescent leaders were encouraged to share their opinions and reflect upon the obtained data.

Activity II: Planning the program. The researcher encouraged the adolescent leaders to express their opinions during brainstorming session for planning the program. The adolescent leaders proposed that the tasks could be shared among them based on their abilities and expertise. The responsible leaders of subgroups had to perform their designated duties, so a tentative working schedule appeared, specifying the beginning and ending of the schedule, including designation of the consulting teachers for supervision and advice about the tasks that involved one health education teacher, one school nurse and two computer teachers.

Activity III: Developing the Internet-based program. The adolescent leaders created the six critical components of the Internet-based program, which included contents or information for promoting healthy eating behavior, video clips, animations, webboard discussions, a game and quiz exercises.

Activity IV: Developing the research instruments in collaboration with adolescent leaders. The researcher shared the knowledge about the existing instruments regarding eating behavior in adolescents that had been developed from other researchers, including a test of knowledge in adolescence's food consumption, an attitude to food consumption questionnaire and a food consumption behavior questionnaire. The adolescent leaders were then encouraged to discuss and share their thoughts about the methods and instruments used for evaluating the outcomes of implementing the program. As a result, these developed research instruments were revised based on feedback and made appropriate to evaluate the outcomes of implementing the program. These research instruments were then tested for validity and reliability by sending them to five experts and testing with thirty early adolescents.

Step 6 Implementing the Internet-based program. The sixth step aimed to implement an Internet-based program for promoting healthy eating behavior in collaboration with adolescent leaders. Before implementing the program, the adolescent leaders in collaboration with the researcher assessed baseline data of the adolescent participants (27 adolescent leaders and 73 adolescent members) including their knowledge of food consumption, attitudes towards food consumption, eating behavior and nutritional status (weight for height). The implementing program was arranged to last approximately 12 weeks. During this step, the adolescent members and the adolescent leaders were able to access the Internet-based program at the school and outside the school wherever the Internet was available for access.

The process of implementing the Internet-based program for promoting healthy eating behavior in the present study covered three components as follows:

Component I: Encouraging teamwork and the involvement of adolescent leaders. This component was composed of four crucial strategies including: 1) strengthening leadership skills and the teamwork; 2) brainstorming to set up the action plan of implementing the program; 3) brainstorming to identify methods to motivate adolescent members using the program; and 4) brainstorming to identify

methods for evaluation of the outcomes.

Component II: Maximizing the use of the Internet-based program. This component was comprised of two strategies, namely: 1) motivating and encouraging regularity in using the program; and 2) encouraging self-directed learning and sharing knowledge.

Component III: Gaining the support from the school administrators, teachers, the school nurse and parents. In the process of implementing the program, the cooperation of school administrators, teachers, the school nurse and adolescents' parents was crucial for success, since these stakeholders had important roles in this study as consultants and facilitators.

Step 7 Evaluating the outcomes and process of implementing the Internet-based program. The seventh step aimed to evaluate the outcomes and process of implementing the Internet-based program for promoting healthy eating behavior in early adolescents. To evaluate the outcomes, the knowledge, attitudes, eating behavior and nutritional status (weight for height) of adolescent participants were reassessed by the researcher in cooperation with the adolescent leaders. To evaluate the process of implementing the Internet-based program, participant observations were used to observe the atmosphere, the activities and responsive performance of adolescent participants while they were using the Internet-based program in the school. In addition, small group meetings of adolescent participants were conducted to describe their feelings and problems during implementing the program. Reflection on actions and problems concerned with program implementation was used and empowering was encouraged as well.

Step 8 Integrating the Internet-based program into the school system. The eighth step aimed to sustain and integrate the Internet-based program for promoting healthy eating behavior in the school system. The researcher, in cooperation with the adolescent leaders, organized a school meeting which included two school administrators, four teachers, the school nurse, ten representative early adolescents and three representative parents. In this school meeting, five adolescent leaders presented the details of the Internet-based program and effectiveness of the program by using a PowerPoint presentation. After presentation, open-ended questions were given to the group. These questions allowed the stakeholders to share their ideas about how to integrate and disseminate the Internet-based program in the school. As a result, the idea of using the Internet-based program for promoting healthy eating behavior and the suggested way to disseminate the program in the school by linking it to the school website, were accepted.
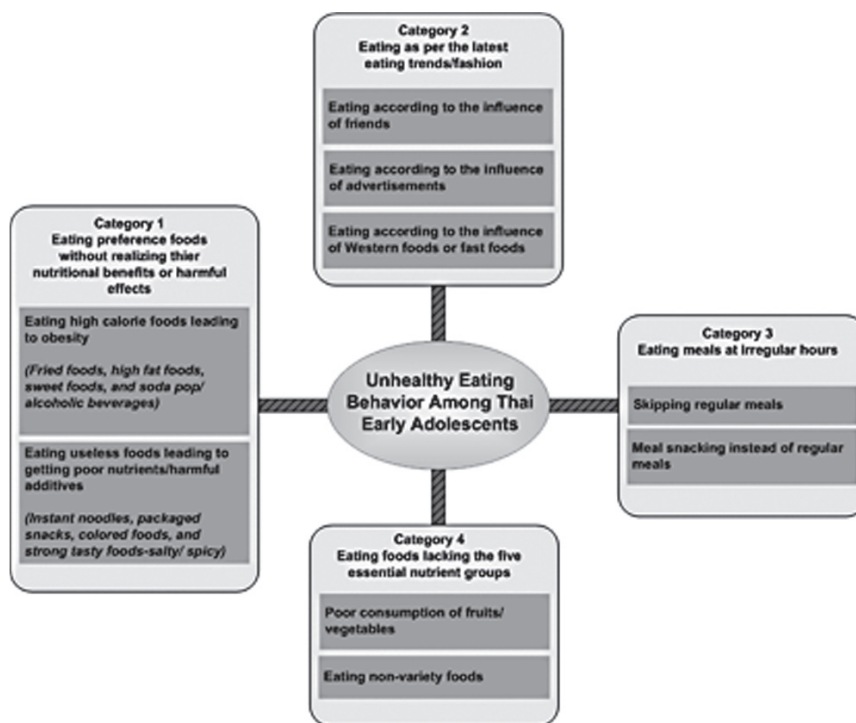
RESULTS

The findings of this study are presented in three parts: 1) unhealthy eating behavior issues in Thai early adolescents; 2) critical elements of the Internet-based program for promoting healthy eating in Thai early adolescents; and 3) outcomes of implementing the Internet-based program to promote healthy eating behavior in Thai early adolescents, using a participatory approach.

1) Unhealthy eating behavior issues in Thai early adolescents

The issues of unhealthy eating behavior among Thai early adolescents were gained from the stakeholders, including early adolescents, teachers, the school nurse and parents. The findings were analyzed and divided into four categories as presented in Figure 1: 1) eating preference foods without realizing their nutritional benefits or harmful effects, 2) eating as per the latest eating trends/fashion, 3) eating meals at irregular hours, and 4) eating foods lacking the five essential nutrient groups.

Figure 1. Illustration of unhealthy eating behavior issues in Thai early adolescents

2) Critical elements of the Internet-based program for promoting healthy eating in Thai early adolescents

After considering the suggestions of critical elements of the Internet-based program for promoting healthy eating behavior which emerged from the stakeholders, the adolescent leaders decided to plan developing the Internet-based program. They designed and developed the program's components, which included the six critical elements as presented in Figure 2: 1) the contents promoting healthy eating behavior, 2) webboard discussions, 3) animations, 4) quiz exercises, 5) a game and 6) video clips. This Internet-based program was named by the adolescent leaders as the F-Club (Food Club).

Figure 2. Illustration of critical elements of the Internet-based program (F-Club) to promote healthy eating behavior among Thai early adolescents.
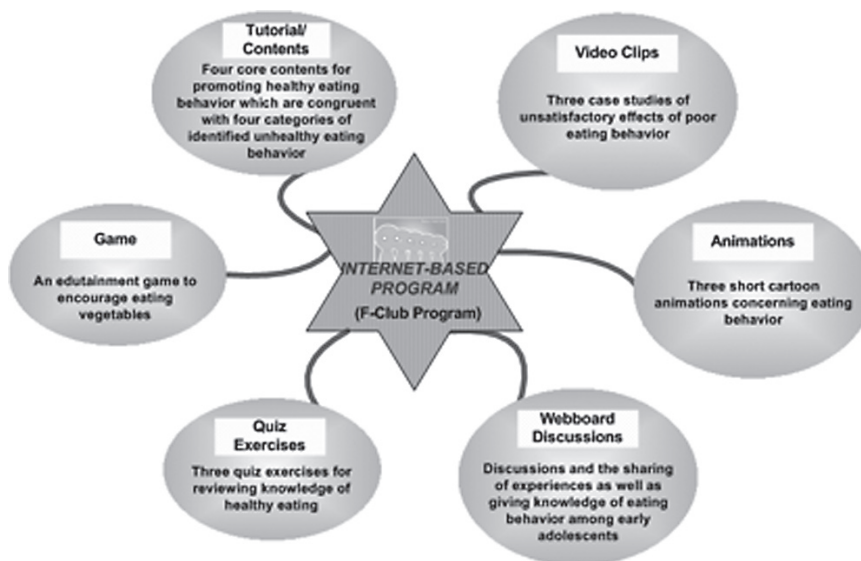
3) The outcomes of implementing the Internet-based program to promote healthy eating behavior in Thai early adolescents using a participatory approach

The outcomes of implementing the Internet-based program could be categorized into four parts as follows:

3.1) Positive changes of the adolescent participants: These positive changes include knowledge of healthy eating behavior, attitudes towards healthy eating behavior, eating behavior and nutritional status.

Improving knowledge of healthy eating behavior

The results revealed that the scores of knowledge of food consumption immediately after implementing the program significantly increased compared to baseline in both the group of adolescent members ($Z = 6.64$, $p = .000$) and that of adolescent leaders ($Z = 4.19$, $p = .000$) according to the Wilcoxon signed-rank test as shown in Table 1.

Table 1. Comparison of the knowledge of food consumption between baseline and immediately after implementing the Internet-based program of the adolescent participants (N= 100).

Adolescent participants	Time of evaluation	n	Mean rank	Sum of ranks	Z	p value
Adolescent members	At baseline	73	14.50	14.50	6.64	.000*
	At immediately after implementation	73	27.96	1696.50		
Adolescent leaders	At baseline	27	0.00	0.00	4.19	.000*
	At immediately after implementation	27	11.50	253.00		

*Significant at the .05 level

Improving attitudes towards healthy eating behavior and having better eating behavior

The paired t-test was performed to analyze and compare the mean score of attitudes towards food consumption and the mean score of food consumption behavior between baseline and immediately after implementing the Internet-based program. The results showed that the mean score of attitudes towards food consumption (t = 5.52, p < .000) and the mean score of eating behavior in adolescent members (t = 2.02, p < .023) had significantly increased immediately after implementing the program, as compared with that at baseline. In addition, the mean score of attitudes towards food consumption (t = 4.90, p < .000) and the mean score of eating behavior in adolescent leaders (t = 4.53, p < .000) had significantly increased at immediately after implementing the program, as compared with that at baseline as well (see Table 2).

Table 2. Comparison of the attitudes towards food consumption and eating behavior between baseline and immediately after implementing the Internet-based program of the adolescent participants (N= 100).

Variable	Baseline		Immediately after implementation		Mean difference	t	p value
	Mean	SD	Mean	SD			
Adolescent members (n=73) Attitudes Behavior	72.70 88.93	8.11 8.45	77.71 90.71	8.09 8.53	5.01 1.78	5.52 2.02	.000* .023*
Adolescent leaders (n=27) Attitudes Behavior	72.26 88.22	6.94 8.60	80.07 94.22	8.71 9.41	7.82 6.00	4.90 4.53	.000* .000*

*Significant at the .05 level

Improving nutritional status

After implementing the program, the researcher in collaboration with adolescent leaders, reassessed nutritional status (weight for height) of the adolescent participants (73 adolescent members and 27 adolescent leaders). Then the researcher analyzed the data of nutritional status at baseline and immediately after implementing the program by using descriptive statistics in terms of frequency and percentage. The results showed the improvement of adolescent participants' nutritional status in both adolescent members and adolescent leaders as the increase in percentage of normal nutritional status and the decrease in percentage of unusual nutritional status including malnutrition, underweight, overweight, preobesity and obesity. In addition, the nutritional status of the adolescent participants between the baseline data and immediately after implementing the Internet-based program was also significantly different as indicated by the chi-square test (see Table 3).

Table 3. Nutritional status of the adolescent participants at baseline and immediately after implementing the Internet-based program (N=100).

Variable	Baseline n (%)	Immediately after implementation n (%)	χ2 test value	p value
Nutritional status of adolescent members (n=73)			299.00	.000*
Malnutrition	3 (4.11)	2 (2.74)		
Underweight	7 (9.59)	6 (8.22)		
Normal	41 (56.16)	46 (63.01)		
Overweigth	7 (9.59)	7 (9.59)		
Preobesity	6 (8.22)	4 (5.48)		
Obesity	9 (12.33)	8 (10.96)		
Nutritional status of adolescent leaders (n=27)			384.39	.000*
Malnutrition	1 (3.70)	1 (3.70)		
Underweight	1 (3.70)	0 (0.00)		
Normal	17 (62.96)	20 (74.07)		
Overweight	4 (14.81)	3 (11.11)		
Preobesity	1 (3.70)	1 (3.70)		
Obesity	3 (11.11)	2 (7.41)		

*Significant at the .05 level

3.2) Improving leadership competency of adolescent leaders

The researcher gained the information from the groups' brainstorming and discussions with the adolescent leaders. They reflected the experiences gained from being adolescent leaders. The findings from this activity showed that they were impressed and proud of being adolescent leaders. They had learned how to work as a team from the research activities. Moreover, they had gained new knowledge about healthy eating behavior from the process of developing and implementing the program. Being adolescent leaders also enhanced their awareness of how to improve their eating behavior. This was a fruitful experience as well as providing useful knowledge for each of them that helped improve their leadership competency. They expressed their impressions from being adolescent leaders as shown by the following statements:

> "We feel proud having participated in sharing views while developing this program and we have derived and gained a lot of experience in being adolescent leaders and having learned about the benefits of healthy eating behavior. The important part is – it is most enjoyable."

> "Being adolescent leaders in this study has given us good practice and better understanding of the teamwork spirit, especially unity in the group and the knowledge about consuming healthy and beneficial foods, and avoiding the unhealthy foods which are detrimental to our bodies and health. Thus, we have learned a lot about the real health–giving beneficial foods, in accordance with healthy eating principles."

3.3) Satisfaction of using the Internet-based program

The opinions of adolescent participants towards the Internet-based program was assessed by using the Internet-based program's satisfaction questionnaire, which has five scales ranging from 'needs improvement' up to 'extremely good'. The results showed that adolescent members felt satisfied with the utility of the Internet-based program in respect of speed and ease, the attractiveness of the website, appropriateness of the screen's design, the interest of the program and the usefulness of the website. In addition, qualitative data related to the satisfaction of adolescent participants towards the Internet-based program for promoting healthy eating behavior in early adolescents were obtained to confirm the results, by using open-ended questions to gain more of the adolescent participants' feelings and opinions as shown by the following statements:

> "It is a good informative program and makes us have positive attitudes towards the choosing of the right healthy and useful foods. Thus, it is a suitable Internet-based program which can be used anywhere and anytime, as today we use the Internet very often."

> "Animations, a game, webboard discussions and practices/quiz exercises are fun and encourage us to eat healthy foods. The contents are very interesting, enjoyable and appropriate for us."

3.4) Integration the program into the school website

Sustainability of the findings was a final concern at the end of the study. After getting information from reflections, the stakeholders confirmed that the program was very useful and effective. The stakeholders gave ideas that this program should be disseminated to other Thai early adolescents to improve and promote their healthy eating behavior. The way to disseminate the program is to carry it over and link it to the school website and show it on first page, thus enabling adolescents and others to get into this program, in this way, easily disseminating the adolescents' right eating behavior at a suitable length.

DISCUSSION AND CONCLUSION

The research findings indicate that using PAR to develop an innovative Internet-based program has the potential to promote healthy eating behavior among Thai early adolescents and enhances the leadership competency of adolescent leaders. It is observed from this study that the research participants' involvement in all aspects of the PAR process was applied. The successful accomplishment and efficiency of this study may be attributable to the fact that it is in line with the concept of participatory action research (PAR) as a potentially-democratic process that is equitable and liberating, allowing participants to construct meaning in the process of group discussions (Koch et al., 2002), as also that the knowledge generated through PAR is no longer exclusively owned and disseminated by academia, but rather is shared by the community or group (Mill et al., 2001).

To be successful in implementing the program, teamwork should be encouraged and the involvement of adolescent leaders promoted. In this study, the adolescent leaders were the important stakeholders who played a major role in this program's development and implementation. Obtaining the commitment of the adolescent leaders to participate in this study was also critical for the success in implementing the program, since the commitment of the participants ensured their whole-hearted devotion to its objectives. The involvement of the adolescent leaders in the study also ensured several aspects crucial to its sustainability and success, because such an approach provides the adolescents with a sense of ownership of the program. The involvement of adolescents in all steps of the research process is very crucial to its success. According to the study of Skinner et al., (1997), adolescents were integrally involved in all stages of the design, development, evaluation and dissemination of CyberIsle, a web-based program for changing adolescents' smoking behavior. CyberIsle was designed and focused on health, personal and social issues identified by adolescents. It indicated that CyberIsle was a more relevant and enjoyable way of learning health information for adolescents than traditional health education classes. Bilal (2004) also recommends that researchers involve users in the design stage so that more effective interfaces that meet adolescents' information needs and support their behaviors are developed.

Moreover, the cooperation of the adolescents' parents was crucial for success in implementing the program as well. These parents supported the implementing of the program by devoting their time to send their children to school and take them home afterwards during the implementing phase, especially when the group meetings of adolescent leaders were held during the weekends. Therefore, the support from the stakeholder groups including parents and school administrators, as well as the participation of teachers and the school nurse, had made the implementation of the Internet-based program smoother towards its success. As shown from the statement of Gonzalez et al., (1991), action research should include several representatives from segments of the target community to guide or oversee the health promotion efforts, and a representative group might include: community residents and other influential people such as school personnel and the staff from community health centers.

As a result of implementing an Internet-based program study, the adolescent participants brought about positive changes in improving their knowledge of healthy eating behavior, improving attitudes towards healthy eating behavior, improving eating behavior, and improving nutritional status. These positive outcomes have shown that the Internet-based program was very efficient for promoting healthy eating behavior among Thai early adolescents. These results are congruent with the previous Internet-based studies which presented evidence of improving self-efficacy for healthy eating (Anderson et al., 2001; Long and Stevens, 2004; Suminski and Petosa, 2006), dietary knowledge (Long and Stevens, 2004; Suminski and Petosa, 2006), healthy eating behavior among adolescents (Anderson et al., 2001; Frenn et al., 2005; Williamson et al., 2005), and achieving reduction in body fat in girls (Williamson et al., 2005). The previous studies using the Internet have also shown

that the interventions available through the Internet and computer-assisted instructional programs are effective in promoting self-efficacy for healthy behaviors in adolescents and other groups (Anderson et al., 2001; Shegog et al., 2001; Long and Stevens, 2004). This indicates that the Internet can be highly beneficial for achieving health promotion in adolescents. It can increase data quality and save on costs in the long run, and it provides the opportunity to enhance the quality of adolescent health promotion (Mangunkusumo et al., 2006). The Internet is an innovative media used to promote the health of adolescents because they are typically the early adopters of new technologies (Skinner et al., 2003). The Internet is also a practical and effective way to deliver health information and interventions to adolescents (Borzekowski, 2006).

In conclusion, the research findings indicate that using PAR to develop an innovative Internet-based program has the potential to promote healthy eating behavior among Thai early adolescents and enhances the leadership competency of adolescent leaders.

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