

## Original article

# Effects of health behavioral modification program on metabolic diseases in risk Thai clients

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**Background:** Being overweight is a major risk factor for chronic diseases. In 2008, the health screening for chronic diseases in 273,171 Thai workers in Bangkok reported that 85% of them were at risk.

**Objective:** We evaluated the health behavioral modification programs conducted by the participating hospitals in Bangkok. We also compared behavior change and biomedical indicators between before and after program completion.

**Methods:** The behavioral modification program was conducted by 17 public hospitals in Bangkok between May and December 2009. Two thousand nine hundred seventy outpatients at-risk for metabolic diseases were recruited. The intervention program included the various activity lessons focusing on client-centered techniques based on the behavioral and managerial model (PROMISE model). Data was collected using interviewing forms based on Context, Input, Process, Product Evaluation model (CIPP model). Information was obtained from three groups of people including program leaders, commanders of program leaders, some clients, questionnaires for assessing 3-self behavior including self-efficacy, self-regulation, and self-care were prepared for behavioral assessment changes.

**Results:** At the beginning of program implementation, it was found that results from supervision and evaluation of the feasibility for program success revealed that opinions on the context, input, process, and product were at the very good level among the three groups. After the program application, the 3-self health behavior of clients improved significantly ( $p < 0.05$ ). Therefore, after program participation for a certain period, clients had an improvement in biomedical indicators as follows, FBS, BP, waist, weight, and BMI ( $p < 0.05$ ). In addition, after participation, clients with lower BMI tended to have better self-regulation and self-care than those with higher BMI group ( $p < 0.05$ ).

**Conclusion:** The health behavioral modification program based on PROMISE model conducted by the participating hospitals were considered successful and effective in producing improved 3-self behavior and decreased in biomedical indicators.

**Keywords:** Health behavioral modification, self-care, self-efficacy, self-regulation

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Changes in human environment, behaviors, and life styles during the recent decades have resulted in the epidemic of chronic diseases, which are the major causes of death and disability worldwide [1]. In Thailand, the report in 2003 showed that 2.4 out of 63.2 million people had diabetes [2]. The incidence of diabetic patients over 35 year-old was 9.6%. The prevalence of hypertension and prehypertension in the national population in 2004 was 22.2% and 32.8%, respectively [2]. The recent health screening for

chronic diseases in 273,171 Thai workers in Bangkok reported that 85% of workers were at risk of chronic diseases. Cardiovascular disease showed the highest proportion (40%), followed by diabetes (35%) [3]. Heart disease with hypertension and cardiovascular disease ranked as the third and the fourth highest causes of death in 2008, respectively [4]. Obesity and overweight, one of the major risk factors for the chronic diseases [1, 5-8] had high and increasing prevalence in Thailand especially, Central Thailand (37%) and Bangkok (36%) [6]. Healthy diet, regular physical activity, and behavioral approaches were suggested to prevent obesity and its unwanted consequences [1, 5, 8]

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To effectively prevent and control chronic diseases in Thailand, especially in Bangkok, the behavioral and managerial model, named PROMISE model was developed collaboratively between the National Health Security Office (NHSO) and the Behavioral Science Research Institute, Bangkok in 2008 [9]. PROMISE Model was the abbreviation for Positive Reinforcement (P), Result-Based Management (R), Optimism (O), Motivation (M), Individual or Client-Centered (I) and Self – Esteems (SE). The major characteristics of the PROMISE model were as follows; 1) primarily aimed at modifying 3-self behavior which included self-efficacy, self-regulation and self-care; and 2) Be a guidance for health professionals or individuals to develop health behavioral modification program (HBMP) and managing program aimed to enhance 3-self behavior [9]. In 2008, PROMISE model was first applied for developing HBMP by 32 settings in Bangkok, including health settings, academic settings, and Non-Government Organizations. After the evaluation of their effectiveness, the results revealed that the 3-self behavior and health outcomes, such as body mass index (BMI), waist, blood pressure, fasting blood glucose, and lipid profiles significantly decreased from the baseline at 0.05 level. In addition, results of program evaluation based on CIPP model including context, input, process, and product, which were collected from clients, program leaders, and commanders of program leaders showed that opinions on the context, input, process, and product were at the very good level [10]. The first objective of this research was to evaluate the effectiveness of health behavior modification programs conducted by the participating hospitals in Bangkok metropolis, base on CIPP model. Secondly, we examined changes in the 3-self behavior; including self-efficacy, self-regulation and self-care, and biomedicine indicators; including body mass index (BMI), waist, FBS, Lipid profiles, and blood pressure of the participated clients after implementation of the programs. Thirdly, we compared the 3-self behavior and program satisfaction of the participated clients between those with high and low BMI.

### Materials and methods

The CIPP model [11], which was composed of context, input, process, and product, was applied to evaluate the health behavior modification programs. In addition, 360-degree feedback was also used

by collecting data from hospital administrators, program leaders, and clients. Overall, conceptual framework of the program evaluation was presented in **Figure 1**.

The informants of this research consisted of three groups, including 21 program leaders, 21 hospital administrators, and 84 patient representatives. The target clients of health behavioral modification program were 2,970 people in the participating hospitals in Bangkok. The inclusion criteria for eligible clients were that; 1) they volunteer to participate in the 5-lesson program during period of four to seven months, and 2) they were at risk of the following metabolic syndromes; cardiovascular diseases, hypertension, obesity, stroke, and diabetes based on National Health Security Office (NHSO) health screening questionnaire.

Seventeen hospitals in Bangkok were funded by the National Health Security Office (NHSO), Bangkok, to conduct health behavior modification programs for changing 3-self behavior in the at risk clients. Overall, 21 programs applying PROMISE Model were implemented under the supervision by Srinakharinwirot University.

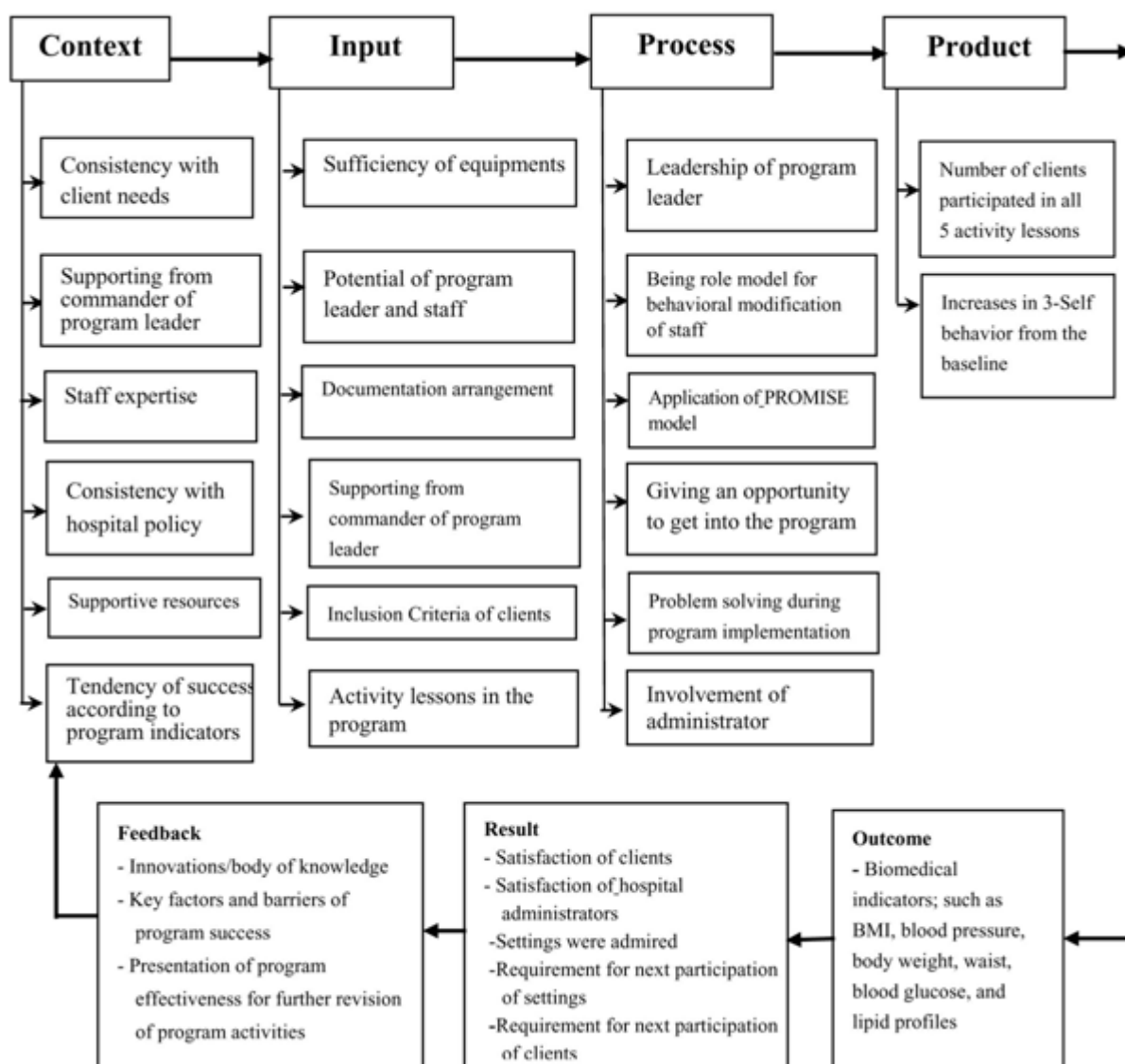
### Measurement

1. Instruments for program evaluation were described below;

1.1 Questionnaire measuring feasibility and program success based on four components of CIPP Model. Responses were made on a 4-point rating scale ranging from not good (score = 1) to very good (score = 4). Respondents to this questionnaire were program leaders, commander of program leaders, and clients. This measure was used by supervisory committee during the program supervision.

1.2 Semi-structured interviewing form. This form consisted of open-ended questions aiming at asking respondents' opinions about the effectiveness of health behavior modification programs applying the PROMISE model. Indicators of program success based on CIPP model were also evaluated in this form. Respondents of this interviewing form were 21 program leaders, 21 commanders of program leaders, and 84 clients. This measure was used by supervisory committee during the program supervision.

2. Measure of 3-self behavior consisted of 17 items assessing self-efficacy (5 items), self-regulation (5 items), and self-care (7 items) of clients. These items were tested and found to have acceptable



**Figure 1.** Conceptual framework of the evaluation of behavioral modification program based on Context, Input, Process, Product Evaluation model (CIPP model).

reliability and discrimination, with the Cronbach's alpha coefficients between 0.73-0.85 and item-total correlation between 0.29-0.76, respectively. The clients were asked to rate their 3-self behavior on 4-point rating scale ranging from absolutely not true (score = 1) to absolutely true (score = 4) both before and after participation in the program.

### Statistical analysis

Quantitative data about program effectiveness derived from three groups of respondents during the program supervision was analyzed using descriptive statistics; percentage, means, and standard deviation. 3-self behavior and biomedical indicators before and

after implementation of the programs were compared using paired t-test. The differences in 3-self behavior and program satisfaction after implementation of the programs were compared using independent t-test.

### Methods

Ethics approval was obtained from Srinakharinwirot University (SWU), Thailand. The research design was evaluative research and mixed method was used as a technique to collect data.

### Process 1: Development of framework for program management and program evaluation

A framework for program management and

program evaluation for 3-self behavioral modification programs based on PROMISE model was developed after a review of literatures. Program leaders and staff from 21 projects were trained to implement HBMP, the 3-self behavior concept and the PROMISE model.

HBMP based on PROMISE model and primarily aimed to increase 3-self behavior was implemented. The programs lasted between four to seven months and consisted of five activity lessons. The lessons included both individual and/or group activities. 3-self behavior and other health outcomes were assessed before and after implementation of HBMP. Changes in 3-self behavior and biomedical indicators and other relevant parameters were evaluated and fed back to relevant bodies for revision of program management.

### ***Process 2: Supervision and evaluation of Health Behavioral Modification Program (HBMP)***

The criteria for HBMP were developed through concepts derived from a good literature review and submitted by hospitals in Bangkok metropolis for scrutiny by experts using evidence-based criteria. Feedbacks were sent to program hosts for revision before a formal contract for HBMP was approved. A manual for implementation of HBMP and a manual for financial management for program leaders and staff were developed to guide implementation and management. A manual for program supervision and evaluation was also made available for use by the supervisory committee. Program leaders and staff were trained to implement the PROMISE model. Periodic supervisions and monitoring to ensure the quality of implementation of each HBMP were undertaken. An exclusive conference on program success after completion of all programs was carried out. It was participated by the leaders and staff of each programs and supervisory committee.

## **Results**

### ***Demographic of the samples***

Overall, most clients were female (67.68%), aged between 30 and 39 years (27.27%), reported high school as the highest level of education (44.68%), and were covered by Civil Servant Medical Benefit Scheme (36.67%). Regarding health risk, around half of the clients were at risk of obesity (49.16%).

### ***Supervision and evaluation of the program success factors***

The results of descriptive statistics from questionnaires collected by the supervisory committee revealed that program leaders, commander of program leaders, and clients rated good or very good level of opinion scores on the context, input, process, and product. The mean opinion scores for those respondents were 3.43, 3.61, and 3.61 respectively.

### ***3-self behavior and biomedical indicators comparison between before and after participating in the program***

**Table 1** presents the results of paired t-test for 3-self behavior between baseline and after the program implementation. The paired t-test results demonstrated that after the application of the PROMISE model: self-efficacy, self-regulation, and self-care significantly increased from the baseline. It was found that, among 3-self behavior, self-care showed the highest mean difference, followed by self-regulation and self-efficacy, respectively.

**Table 2** presents the results of paired t-test for all biomedical indicators between baseline and after the program implementation. The paired t-test results revealed that after the application of the PROMISE model; biomedical indicators, except waist, significantly decreased from the baseline. It was also found that clients' quality of life, which was measured by SF-36, significantly increased after participating in the program.

**Table 1.** Comparison of 3-self behavior between before and after participating in the program (n=2,970)

3-self behavior (range 5-20)	Before		After		MD.	T	p
	$\bar{x}$	S.D.	$\bar{x}$	S.D.			
Self-efficacy	13.27	2.62	15.11	2.36	-1.835	-37.780	0.000*
Self-regulation	12.91	3.41	15.11	2.45	-2.197	-33.850	0.000*
Self-care	18.90	3.56	21.49	3.27	-2.594	-41.803	0.000*

\*Significant at .05 level

**Table 2.** Comparison of biomedical indicators between before and after participating in the program

Biomedical indicators	n	Before		After		MD.	t	p
		$\bar{x}$	S. D.	$\bar{x}$	S. D.			
BMI	1,718	27.37	4.66	26.76	4.31	.614	13.644	0.000*
Systolic BP	1,111	128.45	17.63	123.18	12.97	5.278	11.914	0.000*
Diastolic BP	1,111	78.50	10.59	77.20	8.79	1.293	4.142	0.000*
waist	207	34.93	3.94	34.71	4.06	0.220	1.646	0.101
Waist hip ratio	152	0.77	0.31	0.87	0.06	-.106	-4.163	0.000*
Fasting blood sugar	304	136.14	53.64	125.77	44.70	10.375	3.669	0.000*
Lipid profiles	152	32.55	8.48	31.95	8.48	0.603	3.827	0.000*
HbA1c	100	9.63	1.97	8.14	1.41	1.491	9.571	0.000*

\*Significant at .05 level

### 3-self behavior and program satisfaction comparison between clients who had different BMI

Clients' BMI was divided into two group, low-BMI group (BMI  $\leq 25$ ) and high-BMI group (BMI  $> 25$ ) in order to determine differences in 3-self behavior and program satisfaction between these two groups. The result of independent t-test was displayed in **Table 3**. It was found that after participating in the program, only self-regulation and self-care of the clients in the low-BMI group were significantly different from that of the clients in high-BMI group.

### Discussion

We were able to demonstrate that program leaders, commander of program leaders, and clients rated good or very good level of opinion scores on the context, input, process, and product. This result suggested that HBMP based on PROMISE model in Bangkok metropolis was considered successful. There were several key factors of program success. First, the support of the hospital administrators or commanders of program leaders was essential.

Secondly, the enthusiasm of the staff and their intention to efficiently manage and deliver activity lessons for clients was considered very important. The third factor was the determination and coordination of clients. Finally, the expertise of instructors as well as the characteristic of activity lessons (e.g., clarity, easy to understand, integrated knowledge, well organized, appropriate for target group, well publicized, continually monitored, and innovated) were critical elements. In addition, the activity lessons should include development of networks among clients. Regarding barriers, insufficient time to participate in the program, carelessness in health providers, the lack of powerful leader, and insufficient income of clients were perceived to be barriers for the program success.

Our results revealed that after the application of the PROMISE model, self-efficacy, self-regulation, and self-care significantly increased from the baseline, and biomedical indicators significantly improved. These results were consistent with the results of program evaluation conducted in 2008 and 2009 [10, 11]. The results indicating that HBMP based on

**Table 3.** Differences in 3-self behavior and program satisfaction between low- and high-BMI groups after participating in the program

Variables	n 1	n 2	n 1: High -BMI (BMI $> 25.00$ )		n 2: Low-BMI (BMI $\leq 25.00$ )		t	p
			$\bar{x}$	S.D.	$\bar{x}$	S.D.		
Program satisfaction	903	571	22.88	3.28	23.07	3.32	1.069	0.29
Self-efficacy	1,043	662	15.12	2.35	15.31	2.29	1.675	0.98
Self-regulation	1,043	662	15.03	2.49	15.35	2.45	2.588	0.01*
Self-care	1,040	663	21.63	3.23	22.22	2.90	3.806	0.00*

\*Significant at .05 level

PROMISE model were effective in producing an increase of 3-self behavior and an improvement in biomedical indicators. Some explanations of the findings are put forward here. First, the programs were developed based on some positive psychological and managerial variables; including positive reinforcement, result-based management, optimism, motivation, individual-centered, and self-esteem, which were integrated into the PROMISE model. Second, the success may be due to changes in health behavior, particularly the increases in 3-self behavior. This was supported by previous studies [12-22] suggesting that when health behavior such as healthy eating and regular exercise increased, risk factors for chronic diseases decreased.

Lastly, the results showed that after participating in the program, only self-regulation and self-care of the clients in the low-BMI group were significantly different from that of the clients in high-BMI group. It indicated that self-regulation and self-care were correlated with BMI status. We also showed that the low-BMI group had significantly higher self-regulation and self-care than the high-BMI group.

## Conclusion

The Health Behavioral Modification Program (HBMP) based on PROMISE model conducted by the participating hospitals was considered successful and effective at producing an increase in 3-self behavior and an improvement in biomedicine indicators.

Health practitioners or professional interventionists, who require increases in 3-self behavior and decreases in risk factors of chronic diseases, could apply PROMISE model to develop HBMP. The key factors and barriers for program success previously mentioned should be carefully considered when future programs are contemplated. There may be other factors affecting effectiveness of the programs, for example social support, perceived health information, and motivation. Thus, future research should investigate these factors. Since insufficient time to participate in the program was perceived as a main barrier to the program success, there should be studies examining determinants of participating in the HBMP among clients having different demographic data.

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