CHAPTER 3

PROJECT EVALUATION

3.1 Introduction

In this chapter, the evaluation of osteoporosis education program that took place for high school in Bangkok because the aged of student in high school is appropriate age to osteoporosis prevention behavior. Sedlak who studied in osteoporosis prevention in young women in 1998 reported that "Young women may not aware of osteoporosis risk factors and do not typically engage in preventive behavior".

The evaluation discussion here involved a design with one experimental group and one control group was used. The participants were young student women whose ages were between 16-18 and never participated in a similar program. Education program was designed to raise awareness in osteoporosis among the participants. The questionnaire on knowledge (13 items), health belief attitudes (21 items), and behaviors (15 items) were collected to assess whether the participants would improve their dietary intake of calcium, weight bearing exercise and risk factors avoidance after education program. Statistics were used to compare whether their knowledge and behavior were changed from baseline.

3.2 Purpose

The main purpose of the evaluation was to

1. Examine the effect of osteoporosis education program in increasing teenagers' awareness of the probability of personally becoming osteoporosis, the serious negative personal consequence of osteoporosis and the personal and interpersonal benefits of weight bearing exercise, adequate daily intake of calcium, smoking cessation, and reduction of alcohol and caffeine.

2. Decrease the psychological, interpersonal and logistical barriers to abstinence of consistent weight bearing exercise and dietary intake.

3.3 Evaluation hypothesis

The hypothesis of this study was young women who participated in an osteoporosis prevention program would have greater knowledge about osteoporosis prevention, higher level of health belief, and high level for osteoporosis prevention compared to those who did not participate in the osteoporosis prevention program. It was hypothesised that over the two-month follow-up period, young women participating in the experimental program would be more likely to limit alcohol and caffeine intake and more consistence in having adequate daily intake of calcium and weight bearing exercise than the young women in the control group.

3.4 Method

3.4.1 Evaluation Design

A quasi-experimental design with one experimental group and one control group was used for this study. Seventy female students in two Mathayom-six classes in a public girl's high school in Bangkok were selected and assigned to either experimental or control group by the teacher head. They were 35 students in each group. The control group participated pretest and posttest evaluation without attending any activities. Participants were between 16 and 18 years of age and had never participated in a similar study and were willing to co-operate through the whole activity. The heights of students were ranged from 139 cms through 167 cms, (Mean =155, SD = 6.00). The mean weight of the 70 students was 45 (SD=5.35). No statistically significant difference were found between the experimental and control groups.

3.4.2 Data collection Methods

Data were collected from the participants at three intervals during the study period. The first was before their exposure to the intervention (baseline). Baseline questionnaires contained demographic (age, weight and height), knowledge and perception as well as behavior. Once teenagers of each group had completed the intervention, they were retested on their knowledge and perception (immediate follow-up) and behavior. Finally, 2 months after the scheduled date of program completion, participants were reasked to complete

part of behavior in order to get information on the impact of the program (two-month follow-up).

3.4.3 Questionnaire

The four major perceptual components; knowledge, susceptibility, seriousness and benefits and barrier applied from Becker, et.,al.(1977) was used as conceptual framework for evaluation. Questionnaires contained question standard demographics, osteoporosis knowledge included the relationship of activity levels, exercise, and dietary intake of calcium (13 items) (see appendix A: Section A). A perfect test score on the health perception include susceptibility (8 items), seriousness of developing osteoporosis (9 items), benefit and barriers to exercise and calcium intake (4 items) (see appendix A : section B : part 1). The response for each item was rank from yes or no. If the answer was "yes", the score was given "1", in the converse, the score was "0".

The baseline and two-month follow-up questionnaires contained measures of the major behavioral variables necessary to assess the impact of the osteoporosis education program on exercise, calcium intake and risk factors avoidance. Osteoporosis behavior measure contained 15 items; exercise (3 items), calcium intake (8 items) and risk factors avoidance (4 items). This measure assessed confidence in activities related to osteoporosis prevention with an emphasis on exercise and dietary intake of calcium. (see appendix A : section B : part 2). The possible scores for each item ranges from "yes" or "no". If the answer was "yes", the score was "1", in the converse, the score was "0". The questionnaire was applied from that used by Nongluk Prasitpol who

conducted a thesis on "Effect on the Application of Health Belief model on Osteoporosis Prevention Behavior among Premenopausal Women". It was already checked for validity (0.9198) and reliability (0.8742) (Prasipol, 1999).

3.5 Data Analysis and Results

3.5.1 Data Analysis

Using the Statistical Package for Social Science (SPSS), difference in means of continuous variables were evaluated by t-test. Proportional differences were compared using chi-square test. I examined whether the experimental group was significantly more effective in improving behavior than the control group when behavior at baseline, and belief and knowledge at baseline and immediate follow-up were controlled by using Analysis of Covariance (ANCOVA).

3.5.2 Results

I examined whether assignment of participants to experimental and control group resulted in generally equivalent treatment group with respect to background characteristics, knowledge and perception as well as behavior. It was found no statistically significant differences in characteristics between participants in the experimental and control group (not shown).

3.5.2.1 Changes in knowledge and perceptions

To determine whether the experimental intervention increased the osteoporosis knowledge of the teenagers who participated in them, I compared knowledge score at baseline and at the immediate follow up separately between each group. The 13 items in the knowledge test were worth one point each. At baseline, the grand mean of osteoporosis knowledge measures was 6.30 (SD = 1.81). Thus, the average teenager answered about 48 percent of the questions correctly. As Figure 3.1 show, at the immediate follow-up, participants in the experimental intervention showed a mean increase of more than four points (from 6.37 to 10.42, p = 0.00), while members of the comparison group showed little increase (from 6.23 to 6.25, p = 0.94).

I then conducted a comparison of the gains of experimental group on the knowledge score to gains made by the control group. As shown in Table 3.1, the intervention program have a significant effect on student scores on the knowledge test. Teenagers in experimental program had higher knowledge scores at the immediate follow-up than did those in the comparison group (p = 0.00).

I also examined changes in the teenagers' health perceptions which compose of susceptibility (8 items), seriousness of developing osteoporosis (9 items), benefit and barrier to exercise and calcium intake (4 items), at baseline and at the immediate follow-up.
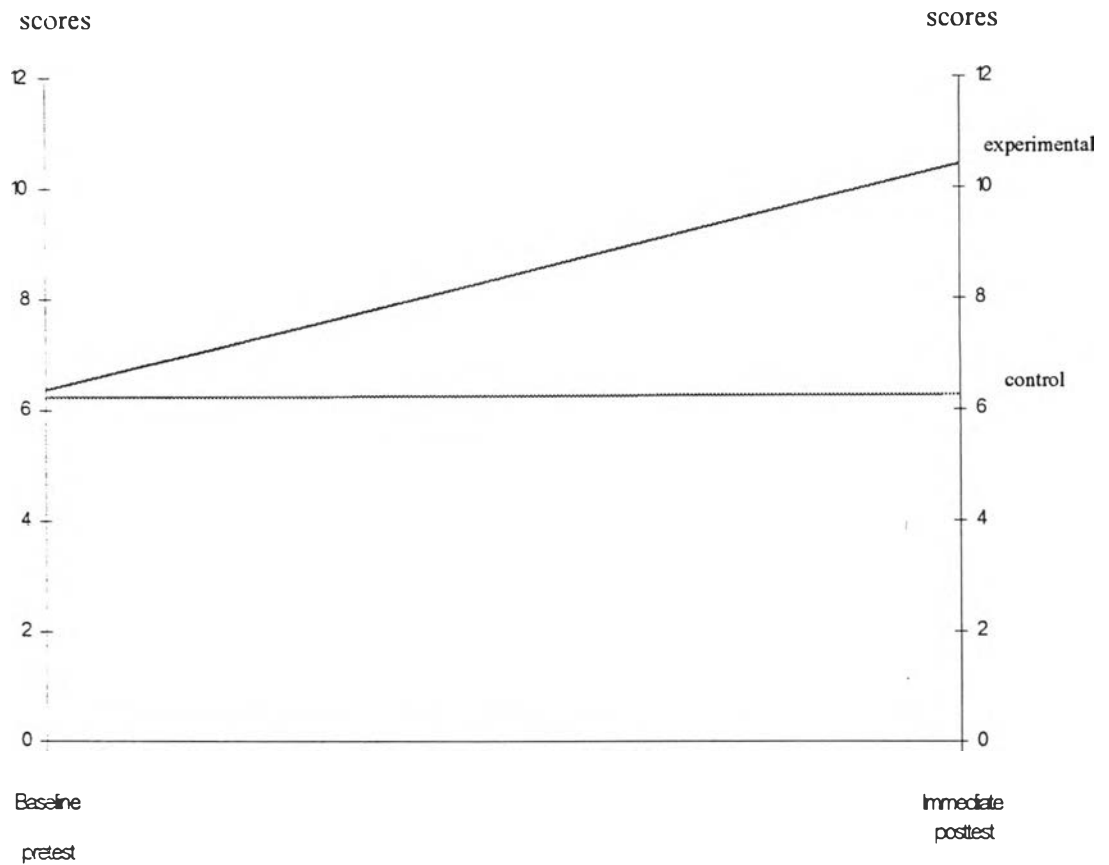
Figure 3.1: Comparison of mean knowledge scores of the experimental and control group at baseline & immediate follow-up.

As shown in Table 3.1, at baseline, the grand mean of perception osteoporosis measure was 14.37 (SD=1.20) and increased to 16.43 (SD=1.10) at the immediate follow-up. The gain mean of the experimental students improved their average overall perception scores (3.80 points increase) better than did the control students (0.33 points increase). This indicated that the osteoporosis education program significantly enhanced students overall perception.(see Figure 3.2).

Table 3.1: Mean score of students' knowledge and perception of experimental and control group regarding osteoporosis at baseline and immediate follow-up.

	Baseline Mean(SD)	Immediate follow-up Mean(SD)	Gain Mean(SD)	P-value*
Knowledge (Total score =13)				
Control	6.23(1.49)	6.25(1.63)	0.02(1.30)	
Experimental	6.37(2.11)	10.42(1.30)	4.05(2.00)	<0.000
Grand mean	6.30(1.81)	8.34(2.56)		
Perception (Total score = 24)				
Total perception				
Control	14.37(1.20)	14.70 (1.30)	0.33(2.54)	
Experimental	14.36(1.23)	18.16 (1.00)	3.80(2.15)	<0.000
Grand mean	14.38(1.20)	16.43(1.10)		
Susceptibility (Total score = 8)				
Control	4.73(1.67)	5.00(1.68)	0.27(1.34)	
Experimental	5.20(1.60)	7.11(1.23)	1.91(1.52)	<0.000
Seriousness (Total score = 9)				
Control	6.26(1.54)	6.22(1.75)	0.04(1.49)	
Experimental	5.71(1.48)	7.40(1.19)	1.69(1.51)	<0.000
Benefit and barrier (Total score = 4)				
Control	3.38(0.60)	3.48(0.61)	0.10(0.37)	
Experimental	3.45(0.65)	3.65(0.59)	0.20(0.58)	0.330

scores   scores

21   21

18   ╱━━━ 18 experimental

15 ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 15 control

12   12

9   9

6   6

3   3

0   0

Baseline   Immediate

pretest   posttest
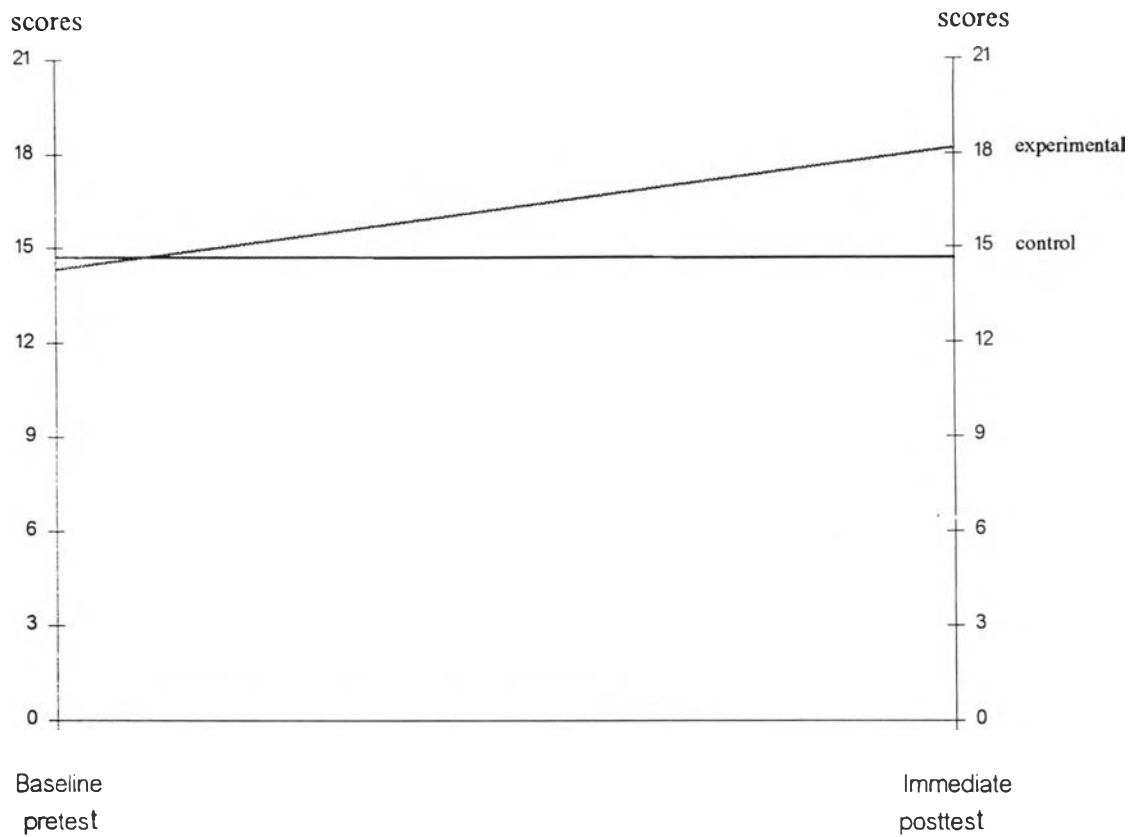
Figure 3.2: Comparison of mean total perception scores of the experimental and control group at baseline & immediate follow-up

The experimental students improved more than the control students did on both susceptibility and seriousness and there were significantly between experimental and control group. But there were not significantly differences between the experimental and control group on benefit and barrier scale (p=0.33) Specifically, the experimental students improved their average scores on susceptibility subscale of the perception (1.91 points increase) significantly higher than did the control students (0.27 points

increase) the program also improved students' average seriousness scored (1.69 points increase) significantly more than did the control students (0.04 points decrease) (see Table 3.1).

3.5.2.2 Effects of Intervention on Behavior

To determine over the two-month follow-up period whether young women participating in the experimental program would be more likely to limit alcohol and caffeine intake (risk factors) and more consistent in having adequate daily intake of calcium and weigh bearing exercise than the young women in comparison group, Chi-square was conducted to compare percentage of the 3 items in exercise, 8 items in the calcium intake and 4 items in the risk factors avoidance. There were no significant differences between experimental and comparison students in behavior at baseline.

3.5.2.2.1 Effect of intervention on exercise

The percentage of experimental and comparison students reported in exercise behavior at baseline and 2-month follow-up is shown in Table 3.2. There was no significant change in any exercise behavior among comparison students.

Among experimental students, there was a significant increase in percentage who reported having walking exercise in the past 2 months from 45 to 74 (p=0.00). In addition, significant changes in time spending in exercise was found from 42 to 68 (p=0.00).

Table 3.2: The percentage of respondents who reported having adequate daily intake of calcium and exercise and risk factors avoidance at baseline and at two-month follow-up in control and experimental groups

	Control group (n=35)		Experimental group (n= 35)	
	Baseline(%)	2-month follow-up(%)	Baseline(%)	2-month follow-up(%)
Exercise				
* Exercise in walking, jogging, aerobic, weight bearing exercise	51	48	45	74*
* Spending time in exercise around half an hour to one hour	40	40	42	68*
* Regular exercise about 5 times per week	31	31	31	54
Calcium intake				
* Taking 1-3 glasses of milk per day	54	57	57	91*
* Taking 4 glasses of tofu juice or more per day	22	25	25	42
* Taking dry shrimp, small fish with bone 1-2 times per week	68	71	71	82
* Taking a fish, shell and sea food 1-2 cups per week	71	68	80	94
* Taking bean 3-4 cups per week	40	34	37	85*
* Taking dark green leafy vegetable 1 cup per day	60	62	62	80*
* Taking food with coconut milk and oil everyday	62	60	60	62
* Taking 3-4 eggs per week	60	62	62	85*
Avoiding risk factor				
* Avoiding smoking	100	100	100	100
* Limiting alcohol intake	91	94	91	100
* Avoiding excess caffeine	68	68	60	91*
* Limiting of salted food	77	82	80	82

* = Chi-square at 95% confidence interval within groups

3.5.2.2.2 Effected of intervention on calcium intake

The percentage of experimental and comparison students who reported in calcium intake behavior at baseline and follow-up is shown in Table 3.2. There was no significant change in any calcium intake behavior among comparison students.

Among experimental students, there was a significant increase in percentage who reported taking 1-3 glassed of milk per day from 57 to 91 (p=0.00). In addition, significant changed in taking bean 3-4 cups per week, taking dark green leafy vegetable 1 cup per day and taking 3-4 eggs per week were found from 37% to 85%, 62% to 80% and 62% to 85% (p= 0.00) respectively.

3.5.2.2.3 Effects of intervention on risk factors avoidance.

The percentage of experimental and comparison students who reported in risk factors avoidance behavior at baseline and 2-month follow-up, there was no significant change in any risk factors avoidance behavior among comparison students as shown at Table 3.2.

Among experimental students, there was found that only percentage of eliminating of excess caffeine was increase significant from 60 to 91 (p=0.00).

Table 3.3 Behavior score at baseline and two-month follow-up by group

	Baseline Mean(SD)	Two-month follow- up Mean(SD)	P-value	R-square (%)
Total behavior				
Experimental	9.42(1.92)	12.01(1.37)	<0.000	58
Control	9.14 (2.27)	9.40(1.89)		
Exercise				
Experimental	1.40 (1.06)	1.97 (0.92)	<0.000	70
Control	1.40 (1.03)	1.40(1.02)		
Calcium intake				
Experimental	4.57 (1.21)	6.28 (1.15)	0.030	33
Control	4.40 (1.53)	4.71 (1.20)		
Risk factor Avoid				
Experimental	3.45 (0.74)	3.74 (0.56)	<0.000	49
Control	3.34 (0.87)	3.28 (0.82)		

3.5.2.3 Effect of efficiency on behavior

Program was conducted by ANCOVA to consider the effect on exercise efficiency, calcium intake efficiency, risk factors avoidance efficiency in the experimental group when controlling behavior at baseline, knowledge and perceptions at baseline and at immediately follow-up (see Table 3.3). When comparing overall behavior improving score for the two groups, it found that experimental students' behavior scores increase significantly more than did comparison students' score.

The overall behavior score was broken down into three subscales: Exercise, calcium intake and risk factors avoidance. As indicated in Table 3.3, it was found that previous exercise behavior, calcium intake behavior and risk factors avoidance were significant predictors of exercise, calcium intake and risk factors avoidance behavior efficiency.