

The Effects of the Parent Training Program for Obesity Reduction on Health Behaviors of School-Age Children

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Abstract—The purposes of the study were to evaluate the effectiveness of the Parent Training Program for Obesity Reduction (PTPOR) on health behaviors of school-age children. An Ecological Systems Theory (EST) was approached the study and a randomized control trial was used in this study. Participants were school-age overweight or obese children and their parents. One hundred and one parent-child dyads were recruited and random assigned into the PTPOR ($N=30$), Educational Intervention or EI ($N=32$), and control group ($N=39$). The parents in the PTPOR group participated in five sessions including an educational session, a cooking session, aerobic exercise training, 2-time group discussion sessions, and 4-time telephoned counseling sessions. Repeated Measure ANCOVA was used to analyze data. The results presented that the outcomes of the PTPOR group were better than the EI and the control groups at 1st, 8th, and 32nd weeks after finishing the program such as child exercise behavior ($F_{(2,97)} = 3.98, p = .02$) and child dietary behavior ($F_{(2,97)} = 9.42, p = .00$). The results suggest that nurses and health care providers should utilize the PTPOR for child weight reduction and for the health promotion of a lifestyle among overweight and obese children.

Keywords—Parent training program for obesity reduction, child health behaviors, school-age children.

I. INTRODUCTION

THE prevalence of obesity in children has been increasing throughout the world. Obese children aged 6 to 11 years have more than doubled since the 1960's [35]. According in Thailand, data from three consecutive National Health Examination Surveys (NHES) have shown an increase, from 5.8% in 1997 to 6.7% in 2001, for overweight and obesity in school aged children [1]. The results of the 5th National Nutrition Survey also indicated that 15% of children in Bangkok were overweight or obese [31]. In addition, [27] studied obesity among Thai school children in suburban Bangkok and found that 12.8% were overweight and 9.4% obese.

II. LITERATURE REVIEWS

Many problems in children caused obesity. Literature reviews have shown that childhood obesity is strongly associated with risk factors for cardiovascular disease, hypertension, diabetes, orthopedic problems, and mental

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disorders [34], [16], [33]. Moreover, obesity is associated with many physical and psychological consequences [6], [11]. Obesity in children results from an energy imbalance, which involves eating an excess of calories and not getting enough physical activity. There are many risk factors that contribute to obesity such as genetic and behavioral factors [21], [24], [20]. The genetic risk factor is individual child affect obesity but an inappropriate behavior is play major roles in the development of overweight and obesity in children. Studies have presented the causes that influence obesity in children, including increased sedentary behavior, time spent watching television, lack of appropriate physical activity, and eating unhealthy food [3], [6], [9]. In Thailand, studies found that the eating patterns of Thai children that live in urban areas have changed with an increase in consumption of sugar, protein, and fast food, and fewer vegetables and fruits [4], [6]. [25]. Moreover, Thai obese children watched television more than three hours per day [29]. Mostly inappropriate child behaviors arise from the unsuitable child rearing practices of their parents, such as child food preparation, feeding strategies, and behavioral role modeling [17], [6]. As noted in the application of the Ecological Systems Theory (EST) to obesity developed by Division and Birch [8], not only are individual factors associated with child weight status, but also other factors such as family characteristics and parenting styles. Through a systematic review of research studies from the past ten years, parental involvement was identified to be important in managing child obesity [15], [30], [13].

From studies conducted by the authors in Thailand, it was found that the programs studied dietary behavior and physical activity modifications using various techniques, for instance; educational class, focus groups, programs at camp, child sharing of experiences, role modeling, motivational praise, sessions on improving nutrition and health status, approaches to increasing self-efficacy, and multimedia to increase knowledge. The outcomes of the programs were knowledge, attitude, and behavior change of children regarding food consumption and physical activity [23], [19], [26], [36], [28], [32], [5].

III. METHODOLOGY

This study used an experimental approach. A randomized clinical trial (RCT) design was used to examine the effect of the PTPOR on the child and parental health behaviors. Researcher measured health behavioral changes of children

and parents at baseline and with three assessments. The participants of this study were the overweight and obese school-age children between the ages of 6 and 12 and their parents of five demonstration elementary schools in Bangkok and one private elementary school in Pathum-Tani province (sub-urban area) who met the inclusion criteria according to a Thai growth grid of child weight for the height norms for each gender [2].

There were 124 families that agreed to participate in the program: 40 families for the PTPOR, 34 families for the Educational Intervention (EI), and 50 families for the control group. From baseline to 40 weeks, there were 23 families that dropped out: 11 from the control group, 2 from the EI group, and 10 from the PTPOR group. Therefore, a total of 101 parents/children completed the entire study.

The instruments of the study was child instrument including the child health behavior questionnaire (CHBQ) measured the physical activity behavior and dietary behavior of children It was developed by the researcher as well as parental instruments composed of behavior modification handbook, sample cookbook, child obese pamphlet, and demographic questionnaire.

A. Interventions

1) The Parental Training Program for Obesity Reduction (PTPOR)

The characteristics of the PTPOR consisted of five components. The details of each component are described below.

1.1) Parental Educational Session

During the first week of the program, the parents in the PTPOR group participated in a 60-minute educational session given by the researcher about obesity in children, healthy foods, and physical and sedentary activity topics at their child schools. Parents were taught about the causes and effects of obesity in children, the food guide pyramid, healthy diets, reading food labels when shopping, and healthy eating. Moreover, parents were advised about physical activity, sedentary habits, and the advantages of increasing physical activity and decreasing sedentary behavior.

1.2) Food Training Session

In the morning of the second week of the program, parents and their children in the PTPOR group were given a 180-minute healthy food training session by a registered nutritionist and two assistants. Parents received healthy menus for the overweight and obese children from the registered nutritionist, and volunteer parents had to present and cook easy to make healthy foods. Each family had to set a calorie target goal of 1,200 kcal/day/child participants.

1.3) Physical Activity Training Session

In the afternoon of the second week of the program, parents and their children in the PTPOR group were practiced a 55-minute physical activity training from two physical therapy

graduate students. Parents and their children practiced physical activity together by doing aerobic exercises for 45 minutes. The participants started to warm up for 5 minutes before exercising, and then they cooled down for 5 minutes to relax their muscles. Each family also set target goals after finishing the exercise training session. The target goal for increasing physical activity was to exercise together and the target goal for decreasing sedentary activity. Both parents and their children were encouraged to limit screen time to two hours per day.

1.4) Health Management Group Discussion

During the third and fourth weeks of the program, the parents in the PTPOR group discussed the goals for reducing their child's weight for 60 minutes once each week. The two-group meetings addressed parenting styles, barrier identification, problem solving, and positive reinforcement techniques for meeting parents' goals. During these sessions, parents were provided with two work sheets. The first was a self-care experience sheet for parents to record details about the positive effects, barriers, and problems they experienced in implementing changes in diet and activities with their children. The second was a health modification sheet that had details about setting goals and a time table of their child's weight reduction.

1.5) Telephone Counseling

During the fifth and eight weeks of the program (once a week), parents in the PTPOR group received four telephone counseling calls by the researcher. The first call, parents heard the goals that they had set during the previous meeting and ranked their achievement of those goals. The parents were given the option of hearing tips related to the topic of the prior week's goals. The second phone call, the researcher inquired if the parent was able to keep his or her target goals. The parents that had a problem following up on the goals were given suggestions and counseling. During the third and fourth calls, the parents received other advice regarding problems fulfilling their goals. Each phone call took about 20 minutes.

2) Educational Intervention (EI)

During the first week of the program, the parents in the EI group participated in a 60-minute educational session given by the researcher. The details of this session presented obesity in children, healthy foods, and physical and sedentary activity topics at their child schools. Parents were taught about the causes and effects of obesity in children, the food guide pyramid, healthy diets, reading food labels when shopping, and healthy eating. In addition, parents were advised about physical activity, sedentary habits, and the advantages of increasing physical activity and decreasing sedentary behavior. During this session, the parents in the PTPOR group and the EI group joined together.

B. Measurement Validity and Reliability

The Child Health Behavior Questionnaire (CHBQ) was developed by the researcher based on the literature review.

The CHBQ was composed of two parts: exercise behaviors and dietary behaviors. The exercise behavior questions assessed the physical activity and sedentary behaviors of children. An 8-point Likert-scale and a 9-item questionnaire yielded scores ranging from 9 to 72. The Scale-Level Content Validity Index (S-CVI) of this questionnaire was 1.0 and the Item-Level Content Validity (I-CVI) for each scale was 1.0. The Cronbach's alpha was calculated to test internal consistency and the total scale was .65. Meanwhile, the dietary behavior questionnaires assessed the consumption patterns of the children. An 8-point Likert-scale and a 7-item questionnaire yielded scores ranging from 7 to 56. The Scale-Level Content Validity Index (S-CVI) of this questionnaire was 1.0 and the Item-Level Content Validity (I-CVI) for each scale was 1.0. The Cronbach's alpha was calculated to test internal consistency and the total scale was .75. The researcher piloted these questionnaires with 30 overweight or obese school-age children that had characteristics similar to those of the participants and revised the questionnaire.

Eligible parents were invited to participate in the study and the researcher contacted them in writing and by telephone. The researcher explained the purpose and processes of this study and then the participants were asked to sign an informed consent form. The parents received a brief written copy of this study. All data of the participants were kept confidential, and there were no financial incentives. At the end of the program, a total of 101 remaining families completed the entire study, 30 families to the PTPOR, 32 families to the EI, and 39 families to the control group.

The data were analyzed using the SPSS/PC for Windows program. Descriptive statistics (percentage, mean, and standard deviation) were used to describe the parents' and children's demographic variables, and the health behavior of the children. Moreover, Chi-square and one-way ANOVA were conducted to evaluate the differences in the demographic variables. Repeated Measures Analysis of Covariance (ANCOVA) was used to determine the difference among groups and changes over time in the mean scores of the outcome variables of the children.

IV. RESULTS

The research results were presented in 2 sections. The first section included the characteristics of the participants. The second section reported the health behavior of children, including exercise and dietary behaviors.

A. Characteristics of the Participants

The majority of parents were mothers (74.3%), more than half of parents were in the 41 to 50 year-old age range (59.4%), and more than 90 percent of parents were Buddhist and married. The majority of parents completed a bachelor degree (41.6%) and was the employees of private companies (35.6%). About half of parents reported they earned income above 30,000 baht (50.5%). Over half of families lived with a grandfather or grandmother in the home (51.4%). Approximately sixty percent of children in the study were

male (n = 64); meanwhile, about 30% of children were female (n = 37). The mean age of children was 9.2 years (S.D. = 1.41) and more than half of them were the first child of their families (67.3%).

Parents and children among the three groups were similar characteristics at baseline such as parental relationships with their children, age, the number of children, marital status, religion, education, occupation, income, and family members as well as child gender, birth order, and child age. Pearson Chi-Square and ANOVA were used to determine any baseline characteristics of participants and there were no significant differences at the .05 level ($p > .05$). Moreover, the mean scores of the child and parental outcomes of the three groups such as child exercise and dietary behaviors were not significant differences at the .05 level.

B. Child Health Behaviors

Data were analyzed using a Repeated Measures ANCOVA. The main effects of the PTPOR, the EI and the control groups, the main effects of three times, and the interaction between groups and the time intervals on the child health behaviors were reported as follow:

1) Child Exercise Behavior

TABLE I
 REPEATED MEASURES ANCOVA OF CHILD EXERCISE BEHAVIOR

Source	SS	df	MS	F	p
Between Subjects					
Covariate	4583.16	1	4583.16	25.99	<.01
Group	1405.24	2	702.62	3.98	.02
Error 1	17105.52	97	176.35		
Within subject					
Time	2866.33	1.58	1811.60	16.41	< .01
Time*Covariate	609.70	1.58	385.35	3.49	.04
Group*Time	1543.46	3.16	487.76	4.42	< .01
Error 2	16946.95	153.47	110.42		

As reported in Table I, there was a positive relationship between the baseline mean score of the child exercise behavior (covariate) and the 3 times mean scores of the child exercise behavior. After controlling the effect of the covariate (baseline mean score of child exercise behavior), there was significant difference of the main effect of children in three groups of child exercise behavior at the .05 level ($F = 3.98$, $p = .02$), showing that the groups affected the mean scores of the child exercise behavior. Furthermore, the effect of the time intervals on the child exercise behavior was significant at the .01 level ($F = 16.41$, $p < .01$). The interaction among three groups and the time intervals with the exercise behavior was significant at the .01 level ($F = 4.42$, $p < .01$).

TABLE II
 PAIRWISE COMPARISONS BETWEEN GROUPS ON CHILD EXERCISE BEHAVIOR

Group	Estimated mean score	Mean difference among groups		
		PTPOR	EI	Control
PTPOR	39.28			
EI	33.79	5.49*		
Control	35.98	3.30	2.20	

* $p < .05$

As reported in Table II, based on the estimated marginal means for the pairwise comparisons using the Bonferroni procedure, the mean score for the child exercise behavior between the PTPOR group and the EI group was significant difference at the .05 level ($p < .05$). Furthermore, the difference between time period 1 and time period 2, time period 1 and time period 3, as well as time period 2 and time period 3 were statistically significant (see Table III).

TABLE III
 PAIRWISE COMPARISONS BETWEEN TIME PERIODS ON CHILD EXERCISE BEHAVIOR

Time	Estimated mean score	Mean difference of times		
		1 st week	8 th week	32 nd week
1 st week	31.56			
8 th week	33.87	2.31*		
32 nd week	43.62	12.06**	9.75**	

* $p < .05$, ** $p < .01$

2) Child Dietary Behavior

TABLE IV
 REPEATED MEASURES ANCOVA OF CHILD DIETARY BEHAVIOR

Source	SS	df	MS	F	p
Between Subjects					
Covariate	2540.78	1	2540.78	19.05	< .01
Group	2511.44	2	1255.72	9.42	< .01
Error 1	12935.59	97	133.36		
Within subject					
Time	195.18	1.77	110.22	1.90	.16
Time*Covariate	252.30	1.77	142.48	2.46	.10
Group*Time	1575.38	3.54	444.81	7.69	< .01
Error 2	9941.88	171.77	57.88		

As reported in Table IV, there was a positive relationship between the baseline mean score of the child dietary behavior (covariate) and the 3 times mean scores of the child dietary behavior. After controlling for the effect of the covariate (baseline mean score of child dietary behavior), there was a significant difference of the main effect of the children in the three groups of dietary behavior at the .01 level ($F = 9.42$, $p < .01$), showing that the groups affected the mean scores of child dietary behavior. Meanwhile, the effect of time intervals on child dietary behavior was not significant at the .05 level ($F = 1.90$, $p = .16$). However, the interaction among the three groups and the time intervals regarding dietary behavior was significant at the .01 level ($F = 7.69$, $p < .01$).

TABLE V
 PAIRWISE COMPARISONS BETWEEN TIME PERIODS ON CHILD DIETARY BEHAVIOR

Time	Estimated mean score	Mean difference of times		
		1 st week	8 th week	32 nd week
1 st week	47.11			
8 th week	41.29	5.82**		
32 nd week	40.48	6.63**	0.81**	

* $p < .05$, ** $p < .01$

As reported in Table V, based on the estimated marginal means for the pairwise comparisons using the Bonferroni

procedure, the mean score for the dietary behavior of children between the PTPOR group and the control group as well as between the PTPOR group and the EI group were significant difference at the .01 level ($p < .01$).

V. DISCUSSION

The effectiveness of the PTPOR in the child health behaviors, after finishing the PTPOR, it were found that the mean scores of the child exercise and dietary behaviors in the PTPOR group were significantly higher than those for the EI and the control groups across time at the .05 level ($F = 3.98$, $p = .02$; $F = 9.42$, $p < .01$). These positive findings may be due to several possible explanations. First, many sessions of the PTPOR included the interactive and proactive techniques such as demonstrating and cooking the healthy food, practicing aerobic exercise. Second, children in the PTPOR group were performed the real situations, faced with a kindly environment, joined with the same age appropriateness. Third, parents in the PTPOR group were also received health educational session in class, discussed about their child problems together. Parents may be role models in healthy eating behavior. [22] mentioned parents might directly influence their children's eating styles with regard to the types of food consumed, how, where, and at what speed it is eaten. Parents may be role models in practicing physical activities such as jogging, aerobic exercise, and swimming 3 to 5 times per week. These reasons probably influenced child attitude towards physical activity which may lead to an increase in physical activity as well as may influence child attitude towards healthy eating behavior which may lead to an increase in healthy eating behavior. These findings were consistent with the previous studies [10], [12], [18].

From the findings of this study, there were any issues discussed by the parents about child behavior and modification of children's eating and physical activity. First, most of the children in the PTPOR group could not tolerate much increase in exercise and many parents reported that the children had leg and knee pain at baseline. Some children did not join their friends for play and often were commented about their weight by friends. Second, there were many factors that contributed to overweight and obesity in the children of the PTPOR group. The parents reported that most of the children often preferred to consume fried food such as French fries, fried chicken, fried hot dogs, and fried meat balls. They preferred to drink sugary soft drinks and eat snacks often. Furthermore, their children lacked exercise because they were spending time watching TV and playing video games. Some parents reported that their children had inappropriate eating habits; for instance, at each meal they ate too much and too quickly, and some children had their dinner late, after six pm. Third, financial problems were the main issue for the families—many parents in the program reported that they had to buy new clothes more often than their peers. Last, after the parents in the PTPOR group finished the group discussion they found ways to approach their child's eating

and activity-problem behaviors. Most parents decided to change their behaviors concerning food preparation and consumption and to be role models for their children. They intended to cook meals for the families by boiling and steaming instead of frying and using fish and chicken breast instead of pork. Most parents reported that they intended to serve and consume more vegetables and non-sweetened fruits and to reduce or avoid high caloric food such as fried, sugary, and fast food. Some parents reported that they intended to serve and drink only low fat milk, skim milk, 100% fruit juices, and water instead of sugary beverages. Furthermore, some parents reported that they and their children intended to exercise two or three times per week and 30 minutes each time. Some parents intended to limit the TV viewing and computer game playing times of their children from more than four hours to less than two hours per day. Some parents reported that they intended to talk with their children about the advantages of healthy consumption, increasing physical activity, and decreasing sedentary behavior.

VI. SUGGESTIONS

The suggestions of this study included intervention issue and instrument weak.

Intervention issue, the PTPOR may exhibit some weaknesses, such as the amount or dose of the intervention and type of exercise. First, the dose of the intervention may be important for achieving a positive outcome [37]. The researcher conducted the 8-week PTPOR that incorporated 9 activities for the five components to the PTPOR group, including obesity basics, cooking, exercise, 2 group discussions, and 4 telephone counseling sessions. Many researchers implemented 20 or more contacts or sessions for their interventions and the results were positive for both parents and child outcomes [15], [12], [18]. However, many activities or does of the intervention may consume the high costs such as the training and transportation. Recommendations for further studies are to investigate the effect per hour of the intervention and to add more group sessions to introduce new content or to reinforce content appropriately. Second, a long period of aerobic exercise may not be the best activity to use with parents and children during the first exercise session. However, the researcher used aerobic exercise as a specific type of physical activity training session because aerobic exercise can directly burn body fat [7]. Furthermore, regular physical activity should include activity or sport that the families choose independently by themselves such as walking, biking, jogging, swimming, and playing tennis or football.

Instrument weak, the researcher developed the new questionnaires to evaluate the child health behaviors, the child health behavior questionnaire (CHBQ). The questionnaires were piloted with 30 families that had characteristics similar to the participants and revised the questionnaire. The items of these questionnaires had about 7 and 9 items. The reliabilities of these instruments were medium to good level (alphas = .65

and .75) that based on the Cronbach's alpha accepted rule of thumb [14]. Since a few items of the questionnaires that may affect the reliability of each questionnaire. For future studies, this may require the other standard tools that have high levels of validity and reliability or modify previous instruments to reach higher alphas.

VII. RECOMMENDATION FOR FUTURE RESEARCH

The findings from this study, there are four recommendations for future research.

- 1) Evaluation of the effects of the PTPOR on child anthropometric Measures such as child BMI percentile, waist circumference, and body fat percentage
- 2) Evaluation of the effects of the PTPOR on child metabolic outcomes, such as total cholesterol, High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), and triglycerides levels
- 3) Replication of this program in other areas and populations such as with school-age children and parents in rural areas or with pre-school children
- 4) Incorporation of the additional sessions with multidisciplinary such as nutritionist to reinforce nutrition concepts or psychologist to empowerment concepts to the intervention

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