

# Effects of Food Fit for Fun Program with Social Media Used on Health Literacy and Obesity Prevention Behaviors among Senior-Primary School Students, in Nakhon Ratchasima Province Thailand

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## Abstract

**Background:** Childhood obesity has become more prevalent all over the globe. In Thailand, the highest prevalence rate of childhood obesity has been found among primary school students in Northeastern (9.9%), which still exceeds 7% recommended by the WHO.

**Objective:** This study aimed to assess the effectiveness of Food Fit for Fun program with social media used on health literacy and obesity prevention behaviors among senior-primary school students in Nakhon Ratchasima Province, Thailand.

**Methods:** A quasi-experimental was conducted. An experimental and a control group each with 34 participants. A 12-week program was implemented with Health Literacy on dietary and physical activities and social media were used for communication and support. Analysis of the data was performed using t-test while a mean difference and 95%CI were used for determining statistical significance.

**Results:** The senior-primary school children in the experimental group improved their mean difference on health literacy in preventing obesity (10.18; 95% CI: 7.11 to 13.24, p-value <0.001) and dietary and physical activity behaviors (13.44; 95% CI: 6.11 to 20.77, p-value <0.001), compared to the control group. After interventions, the experimental group had a statistically significantly lower mean score on nutritional status (weight for height) (0.26; 95% CI: 0.05 to 0.59, p-value <0.05) and fat percentage (1.71; 95% CI: 0.19 to 3.22, p-value <0.05) than the comparison group.

**Conclusions:** This study provided sustainable evidence on effectiveness of Food Fit for Fun program with the use of social media. This outcome showed that it could improve health literacy in preventing obesity and behavioral modification as well as reduce weight and fat percentage in children.

**Key words:** *Childhood Obesity, Health Literacy, Behavioral Modification.*

## Introduction

Nutrition is directly related to a person's health status. It is one of the indicators which show the country's progress. Nevertheless, the physical condition of children receiving more nutrients, coupled with having little physical activity (PA), will cause overnutrition among those children.<sup>1</sup> The prevalence of childhood obesity is increasing worldwide, including Thailand. The prevalence of obesity in primary

schools rose from 8.8% to 9.9% in just two years.<sup>2</sup> As pointed out in Thai National Health Examination Survey, NHES V, during the past 13 years until 2014, on the prevalence of obesity and being overweight in children, the weight of children aged above 9 years gradually increased with the mean of 2 kilograms.<sup>3,4</sup> The problem of childhood obesity appears to have expanded into larger urban areas and is frequently found in the northeast region<sup>5,6</sup>, the prevalence of being obesity among students in Nakhon

Ratchasima province is 15.7% which is higher than 10.0 regarded as a standard range set by Ministry of Public Health (MPH).<sup>6,7</sup>

Obese children tend to become obese adults and are associated with chronic diseases, including type 2 diabetes, hypertension, cardiovascular diseases, and certain forms of cancer.<sup>8,9</sup> Although the origin of obesity is complex, it relates to diet and PA,<sup>10</sup> e.g. the imbalance of the energy received and a rise in sedentary lifestyles, including a lack of health literacy (HL).<sup>11-13</sup>

Thailand added HL as the realization of individuals' knowledge, skills as well as confidence in practicing beneficial behavior.<sup>14</sup> Overall, HL was positively correlated with obesity prevention behaviors; similarly, decision skills were positively correlated with food consumption behavior while self-management skills and media literacy were positively correlated with exercise behavior,<sup>15-17</sup> and it can be easily triggered by environmental conditions and family and friend support.<sup>18</sup>

HL among overweight children, therefore, is the key to understanding the obesity prevention behaviors. However, there are limited studies designed to apply the HL with the use of social media for connecting with children in the network in communicating, participating, and providing social support in decision making aiming towards weight management goals. Therefore, the present study aimed to evaluate the effectiveness of Food Fit for Fun program based on the HL framework<sup>19</sup> with the use of social media among senior-primary school students in Nakhon Ratchasima Province Thailand.

## Materials and Method

### Study design

The study was a quasi-experimental study, applying a two-group pre-test post-test design in Northeastern region, Thailand in the year 2020 (Nakhon Ratchasima province was selected because of its high prevalence of overweight primary school children).<sup>7</sup>

A simple random technique was applied to choose the experimental and control groups. The sample size required to ensure a minimum predictive power of 90% with a 0.05 probability of type I error was determined to be 34 obese children per group. The sample size calculation was taken from Chachumpa and Banchonhattakit (2017).<sup>20</sup>

Inclusion criteria were obese students according to the nutritional status were assessed by measuring weight and height and evaluated by the standard growth curve (z score greater than +1.5 SD) and student had previously been diagnosed with chronic asthma, psychiatric disorders and disability were excluded. Both parents and children provided their written consent.

### Procedure

Food Fit for Fun Program: The activities in this program were modified from the Chopa and Chipa Game of MPH in Thailand.<sup>21</sup>

1) Cognitive skill: main activities of nutrition and PA education were knowledge enhancement, e.g. obesity assessment, the traffic lights food and PA.

2) Access skill: promote children's ability to gain access to, understand and use information maintain weight.

3) Communication skill: develop an online set of training modules and a Line group to teach, communication and support children's understanding of obesity prevention.

4) Self-management skill: based on this guideline, the Chopa and Chipa Game for primary school children has achieved an improvement in physical fitness (3 times/wk.) and use of smartphone applications for daily calorie control.

5) Media literacy skill: advertisement analysis and group discussions oriented to participants' preference of media.

6) Decision skill: role play to prevent obesity and reduce childhood obesity.

Most activities were performed at school by a researcher and a research assistant. The cooks' roles involved preparing and supporting healthy food. In addition, social media were used for communication, information support, encouragement, and compliments.

### Measurement tool

To assess children's HL to prevent obesity, six domains were adapted from MPH in Thailand,<sup>22</sup> namely cognitive, access, communication, decision, self-management,

media literacy skill, dietary and PA behaviors. The questionnaire consisted of 67 items. Possible responses to cognitive items were categorized as dichotomous (Yes/No), and other items ranged from 1=never to 5=usually. The HL was interpreted as 'inadequate', >80 to 108 pts. as 'problematic', and >108 to 135 pts. as 'adequate'. The questionnaire was validated by experts and tested for its reliability (0.87).

A stadiometer was used to measure height and weight. Both height and weight were assessing the nutritional status by standard growth curve. Body fat percentage was calculated using the Body Composition Analyzer (OMRON HBF-222T). All investigators were blinded, and the instrument was calibrated to ensure accurate scale measurement for both the pretest and posttest.

### Statistical Analysis

T-test was used to compare the effects of the Food Fit for Fun Program between groups. All analyses were performed by using Stata version 10.0 (Stata Corp, College Station, TX). All test statistics with a p-value less than 0.05 were deemed statistically significant.

## Result

### Demographic Characteristics

There were no differences in the average age between

the experimental group (10.5 ±0.93 y) the control group (10.5 ±0.90 y). The gender level distribution was similar, more than half of both group of them were female (the experimental group was made up of 61.8% of female students and the control group was of 58.8%). There were no differences of the average fat percentage between the experimental group (28.4 ±2.96 years) and the control group (29.0 ±3.03 years). More than three-quarters of both groups' nutritional status was +2 SD (accounting for 88.3% of the experimental group and 85.3% of the control group). No statistically significant differences were found between the two groups in any of the demographic characteristics measured at the baseline ( $p > 0.05$ ) (Table 1).

The result from pair t-test showed strongly higher changes of six domains related to HL to prevent obesity in the experimental group (21.85; 95% CI: 19.27 to 24.44, p-value <0.001), and those of dietary and PA behaviors were observed in the experimental group (16.59; 95% CI: 10.84 to 22.34, p-value <0.001), compared with their pre-intervention scores of HL. Nutritional status also demonstrated significantly greater changes in the experimental group, compared to the pre-intervention status (0.12; 95% CI: 0.01 to 0.23, p-value <0.05), and significantly higher changes in fat percentage were present in the experimental group after the 12 weeks of intervention (1.56; 95% CI: 1.30 to 1.90, p-value <0.001) (Table 2).

**Table 1. Baseline characteristics**

Characteristics	Experimental group (n=34)	Control group (n=34)
Age (y)	10.5±0.931	10.5±0.90
Gender		
Girls	21 (61.8) 2	20 (58.8)
Boys	13 (38.2)	14 (41.2)
Nutritional status (WFH)		
Overweight	1 (2.9)	1 (2.9)
Obese and morbidly	30 (88.3)	29 (85.3)
obese	3 (8.8)	4 (11.8)
Body fat percentage	28.4±2.96	29.0±3.03

**Table 1. Baseline characteristics**

Pocket money for school		
< 50 baths <sup>3</sup>	6 (17.7)	9 (26.4)
50 – 100 baths	27 (79.4)	21 (61.8)
> 100 baths	1 (2.9)	4 (11.8)
Students living		
Parent	26 (76.5)	24 (70.6)
Grandparents	6 (17.7)	5 (14.7)
Uncle/Aunt	2 (5.8)	5 (14.7)
Parental occupation		
Government agencies	10 (29.4)	10 (29.4)
Self-employed	9 (26.5)	7 (20.6)
Agriculturist	7 (20.6)	6 (17.7)
Employee	8 (23.5)	11 (32.3)
Parental education		
Non education	4 (11.8)	4 (11.8)
Primary School	3 (8.8)	2 (5.8)
Junior High School	4 (11.8)	2 (5.8)
Senior High School	5 (14.7)	4 (11.8)
Diploma	6 (17.6)	4 (11.8)
Bachelor's degrees	9 (26.5)	10 (29.4)
Bachelor's degree or higher	3 (8.8)	8 (23.6)
Family history of obesity <sup>4</sup>		
Yes	12 (35.3)	15 (44.1)
No	22 (64.7)	19 (55.9)

<sup>1</sup>  $\bar{x} \pm SD$ , <sup>2</sup> n; percentage <sup>3</sup> 1 bath = US\$0.03 at the time the questionnaire was completed.

<sup>4</sup> Family refers to parents, grandparents, and parents' siblings.

**Table 2. Mean difference within group using Pair t-test**

Health Literacy to prevent obesity	Experimental group (n=34)					Control group (n=34)				
	Base line	After 12 weeks	Mean diff	95%CI	p-value	Base line	After 12 weeks	Mean diff	95%CI	p-value
Health Literacy	86.85 (0.99)	108.71 (1.26)	21.85	19.27 to 24.44	< 0.001*	88.73 (1.01)	98.53 (0.88)	9.79	7.83 to 11.76	< 0.001*
Dietary and PA behaviors	60.68 (2.79)	77.26 (2.02)	16.59	10.84 to 22.34	< 0.001*	64.12 (2.07)	63.82 (3.06)	0.29	-8.02 to 8.61	0.943
Nutritional status	2.06 (0.06)	1.94 (0.06)	0.12	0.01 to 0.23	<0.05*	2.09 (0.06)	2.21 (0.09)	0.12	-0.09 to 0.32	0.254
Fat percentage	28.38 (0.51)	26.82 (0.53)	1.56	1.30 to 1.90	< 0.001*	29.02 (0.52)	28.52 (0.54)	0.49	0.32 to 0.67	< 0.001*

\* A p-value less than 0.05 was deemed statistically significant.

**Table 3. Mean difference between group using Independent t-test**

Health Literacy to prevent obesity	Baseline					After intervention 12 weeks				
	Exp. group	Con. group	Mean diff	95%CI	p-value	Exp. group	Con. group	Mean diff	95%CI	p-value
Health Literacy	86.85 (0.99)	88.73 (1.01)	1.88	-0.94 to 4.71	0.188	108.71 (1.26)	98.53 (0.88)	10.18	7.11 to 13.24	< 0.001*
Dietary and PA behaviors	60.68 (2.79)	64.12 (2.07)	3.44	-3.50 to 10.38	0.326	77.26 (2.02)	63.82 (3.06)	13.44	6.11 to 20.77	< 0.001*
Nutritional status	2.06 (0.06)	2.09 (0.06)	0.03	-0.15 to 0.20	0.738	1.94 (0.06)	2.21 (0.09)	0.26	0.05 to 0.59	<0.05*
Fat percentage	28.38 (0.51)	29.02 (0.52)	0.64	-0.81 to 2.09	0.381	26.82 (0.53)	28.52 (0.54)	1.71	0.19 to 3.22	<0.05*

\* A p-value less than 0.05 was deemed statistically significant.

After interventions, the result from independent t-test showed that compared with the control group, the experimental group displayed the improvement in their mean differences on health literacy in preventing obesity (10.18; 95% CI: 7.11 to 13.24, p-value <0.001), dietary and PA behaviors (13.44; 95% CI: 6.11 to 20.77, p-value <0.001). A significant decrease in mean differences in nutritional status was discovered in the experimental group compared to the

control group over the duration of 12 weeks of intervention (0.26; 95% CI: 0.05 to 0.59, p-value <0.05). Similarly, there were statistically significant differences in mean differences on fat percentage reduction between the experimental and control groups (1.71; 95% CI: 0.19 to 3.22, p-value <0.05) (Table 3).

## Discussions

Evidence suggests that a HL approach is the most

effective strategy to promote lifestyle changes and confirms that HL is the key to ensuring adherence to the healthy path of obesity management. In line with previous evidence, the results of this study seem to be able to show how an HL approach is effective in children, where a significant decrease in body weight and in fat percentage was observed as well as improvement of the nutritional and PA.

It can be noticed that, there is a statistically significant difference in the post-intervention mean score of HL to prevent obesity between two groups in terms of the levels of HL immediately after the intervention. Regarding the results of this study, the training program had a positive impact on the improvement of HL. The various aspects of PA and its benefit were evaluated in both the experimental and control groups, and the results are consistent with the literature.<sup>23</sup> In consistence with the present study, Sarittha S. in 2018 determined a significant increment of HL after the intervention.<sup>24</sup> The effect of training programs on the level of health literacy in children with obesity and demonstrated that almost all them had adequate literacy after the training sessions.<sup>25</sup> Similarly, the previous literature showed the impact of health literacy-based education on the lifestyle entailing diet and exercise on obese children.<sup>13,15-17</sup>

The HL approach structured in an intervention model can deliver better outcomes than the isolated intervention. This result is in conformity with other studies which found that an obesity prevention intervention improved the body fat percentage of the participants. The activities in this intervention consisted of nutrition and fitness which positively affected BMI. Therefore, further studies within different age, including applying the study design to enhance HL, are to improve weight loss strategies to cover all ages and ensure sustainability.

#### Conclusions

The Food Fit for Fun program with social media use can improve HL for preventing obesity and behavioral modification in overweight or obese children.

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