



RESEARCH ARTICLE

REVISSED Comparison of mobile health education messages verses face-to-face consultation for weight reduction among overweight female adolescents in Thailand [version 2; peer review: 2 approved]

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Abstract

Background: Obesity is considered a significant public health problem in Thailand. This study was conducted to compare the impact of mobile health education messages verses face-to-face consultation on weight reduction among overweight female university students.

Methods: This Quasi-experimental study comprised three groups: a control group, a group receiving mobile health education, and a group receiving face-to-face consultation. Each group contained 26 participants taking part over a period of 12 weeks, with a 12-week follow-up thereafter. The data analysis used two-way repeated measures ANOVA with least significant difference testing. The study was ethically approved at Chulalongkorn University, Thailand.

Results: The results revealed that the intervention found significant results in weight reduction among the respondents ($p < 0.05$). In addition, both intervention groups significantly improved their health belief, social support, and health behavior scores in comparison to the control group ($p < 0.001$). The results show that the average scores for social support for eating and exercise at baseline were significantly lower than at post-intervention or follow-up ($p < 0.001$). In addition, the results of both aspects of social support showed that the average social support score at post-intervention was significantly higher than at follow-up. Furthermore, the health behavior score measured post-intervention was higher than at follow-up. There was a statistically significant difference in average metabolism during physical activity ($p < 0.001$) but no statistical difference in average eating behavior score.

Conclusion: The study found that the use of mobile health education to deliver health programs facilitates communication between the

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Any reports and responses or comments on the article can be found at the end of the article.

healthcare provider and individual, and can empower adolescent females in their pursuit of weight loss by improving their attitudes and knowledge, leading to better health behavior.

Keywords

Electronic health education, Facebook, health education, health belief model, social support, obesity, Thailand, health behaviors

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REVISED Amendments from Version 1

We have revised this paper in the light of comments received from worthy reviewer. Detail on study design, sampling technique and validity of tool has been included. A few typo errors in the abstract, result and discussion section have been updated. Table 2 has been merged with table 3 for the better understanding purpose and values in table were used two values after decimal point. We have included more detail in limitation part in the light of reviewer's comments. However, clarification of each individual comment has been responded in detail.

Any further responses from the reviewers can be found at the end of the article

Introduction

Being overweight or obese is known to be an important factor in many serious health issues, and approximately 10% of global health expenditure is spent on fighting obesity.^{1,2} Nearly one-third of Thai university students are reported to be overweight, and Thailand was ranked second highest for obesity in the Southeast Asia region in 2013.³ Studies have proposed face-to-face consultation interventions for weight loss among obese adolescents across the globe based on the health belief model (HBM) and social support theories in different parts of the globe.^{4,5} Such intervention requires significant funding and, over the last decade, the Thai government spent around five billion Baht on the health problem caused by obesity⁶; face-to-face activity spent more than 50% of their budget for food expenditure. Two particularly effective programs aimed at controlling obesity involved sending informative health education messages to smartphones.^{7,8} The younger section of the population, especially students, regularly use smartphones to interact on social networks, such as Facebook.^{9–11} It has been demonstrated that using social networks can be a useful approach in research and can strengthen disease prevention interventions and health promotion programs for control of weight and obesity.¹² Mobile health education (MHE) is a simple means of supporting interactions with an individual and represents a cost-effective intervention approach. Thus, MHE has been used as tool to promote better health.^{13,14} The HBM states that the perception of a personal health behavior influences the consequences of a particular health problem.¹⁵ The HBM has been used to explain and predict preventative health behavior that can influence an individual's decision making, which can be measured.¹⁶ Social support networks are present in relationships involving healthcare behaviors, especially among groups of women. It has been shown that women are more satisfied if their networks are wide, whereas men are more satisfied if their networks are small.¹⁷

MHE could positively influence an individual's behavior based on HBM and social support theory. Therefore, this study used MHE to deliver a weight management program to adolescent females in Thailand and compared this method with a face-to-face health education (FHE) activity.

Methods**Ethical statement**

Written informed consent was obtained from participants prior to the start of the study. Ethical approval was granted by the Ethics Review Committee for Research Involving Human Subjects of Chulalongkorn University, Thailand (COA No. 142.1/60).

Study design

This was a Quasi-experimental study design with control and interventions with three groups: face-to-face consultation (FHE), mobile health education message (MHE) and an observation (control) group.

Sample size and selection

Participants were invited through open advertisement on faculty boards at Srinakharinwirot University, Thailand and were screened according to the inclusion and exclusion criteria. Participants in the two test groups received a health education in the form of a weight management program either via Facebook or through face-to-face consultation; the control group received neither and was only observed (Figure 1). Sample size were calculated by using 80% power, 0.05 alpha with 50% difference assume after the intervention, and 90 respondents were assigned in three groups by using G*Power,¹⁸ using a power of 0.80, alpha value of 0.05, and a correlation between pre- and post-intervention of 0.5 was assumed. Each group was allocated 30 participants through simple random method by allocating an equal number in each group. Four participants from each group were unable to complete the end line assessment due to their personnel reasons. However; the response rate was 87% in this study. Inclusion criteria was the faculty members from one of three faculties at Srinakharinwirot University with BMI ≥ 23 and < 25 ; and for the Facebook group only they also had to have access to Facebook at least once per day. Those were excluded from the study who were disabled, physically inactive, had an underlying disease that could cause abnormal weight loss or gain; or (3) had participated in any other weight management program/trial within the previous six months.

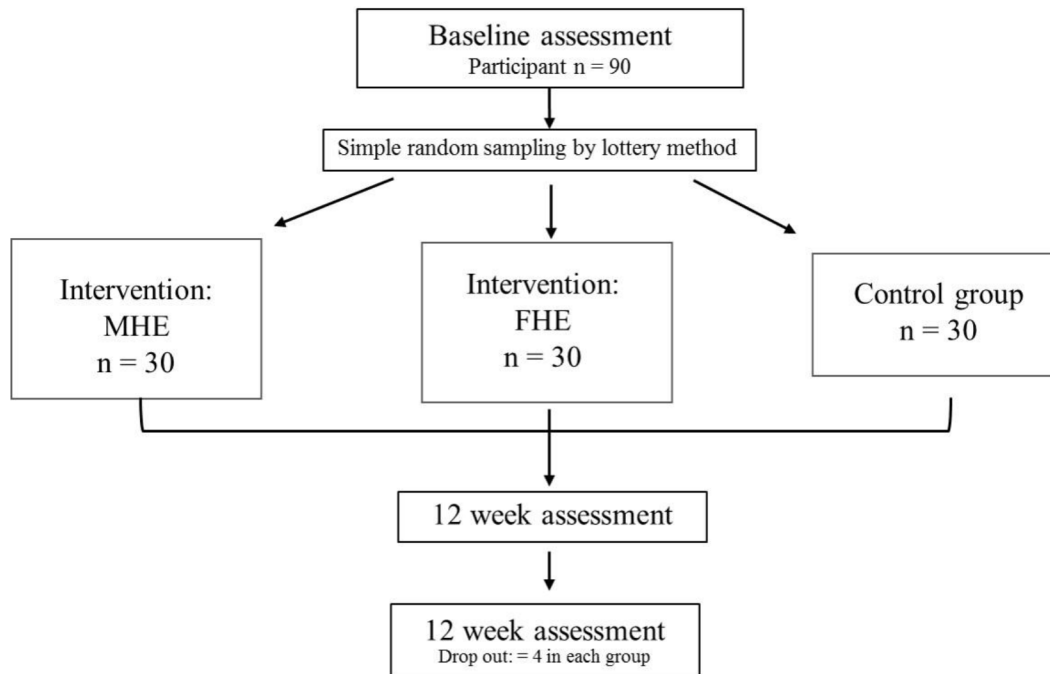


Figure 1. Study flow diagram.

Data collection

The dependent variables of this study were weight, body mass index (BMI, calculated as the weight [kilograms-kg] of a participant divided by the square of their height [meters-m]), waist-hip ratio (WHR, measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest, using a stretch resistant tape that provided a constant 100 g tension), health beliefs, social support, and health behavior (eating and physical activity). Health beliefs were measured and adopted by using the HBM validated and pretested questionnaire,¹⁹ which contains six modules, and social support was measured with a questionnaire²⁰ containing two modules. Physical activity was assessed by adopting the validated and reliable by using the Global Physical Activity Questionnaire (GPAQ) developed by the World Health Organization (WHO) which comprised three domains: activity at work, travel to and from places, and recreational activities. The results describing participants' physical activity were expressed as metabolic equivalents (METs), which reflected the intensity of physical activities as MET-minutes per day,²¹ and eating behavior was recorded through a self-evaluation questionnaire on eating behavior developed by the Department of Health (Thailand).²²

These tools were pretested, piloted and adopted to check the accuracy and reproducibility before the intervention.

The weight management program focused on weight loss. It presented information via an infographic message because it was easier to understand and recognize.²³ The information provided was about being overweight, diet and exercise for weight loss, the severity of obesity, and the benefits of losing weight as described by the Thai Health Promotion Foundation.²⁴ In the MHE group, infographics were posted to Facebook once a day, whereas question and answer activities took place biweekly via private messaging in Facebook for 12 weeks. In the FHE group, participants received a health information booklet and took part in biweekly group activity that included an individual test and an interactive discussion, for 12 weeks. The third group (control) was just observed and compared with the MHE and FHE groups at the end of 12 weeks and again at the total 24 week study period by all assessment (weight, BMI, WHR and questionnaire).

Statistical analysis

Two-way repeated measures ANOVA tests and Fisher's least significant difference (LSD) post hoc tests were used to analyze the data. Data was expressed as mean \pm SD; statistical significance was considered at $p < 0.05$.

Results

The average age of participants was 18.23 ± 0.42 years in the control group, 18.17 ± 0.37 years in the MHE group, and 18.20 ± 0.4 years in the FHE group. The baseline values for all variables, including weight, BMI, WHR, the six HBM modules, two social support modules, and two health behavior modules, are summarized in Table 1.

Table 1. Basic information of the respondents in each group at baseline (n = 78).

Variable	Participant group			p value
	Control group mean (SD) n = 26	MHE (Facebook) mean (SD) n = 26	FHE (face-to-face) mean (SD) n = 26	
Age [years]	18.23 (0.42)	18.17 (0.37)	18.20 (0.4)	0.81
Weight [kg]	62.9 (4.27)	61.8 (4.6)	64.3 (4.0)	0.142
BMI [kg/m ²]	23.8 (0.86)	23.6 (0.75)	24 (0.77)	0.16
WHR	0.84 (0.04)	0.83 (0.03)	0.82 (0.02)	0.051
HBM 1	3.13 (0.39)	3.07 (0.48)	3.2 (0.27)	0.51
HBM 2	3.47 (0.39)	3.25 (0.40)	3.57 (0.45)	0.11
HBM 3	2.66 (0.45)	2.64 (0.37)	2.74 (0.50)	0.48
HBM 4	2.76 (0.41)	2.70 (0.29)	2.83 (0.61)	0.57
HBM 5 (eat)	2.90 (0.29)	2.92 (0.31)	2.85 (0.27)	0.77
HBM 5 (ex)	2.82 (0.28)	2.76 (0.23)	2.89 (0.41)	0.26
Social support (eat)	2.74 (0.38)	3.13 (0.54)	2.59(0.80)	0.08
Social support (ex)	2.82 (0.51)	2.77 (0.43)	3.11(0.74)	0.07
Eating behavior	40.86 (0.28)	39.73 (0.30)	39.81 (0.29)	0.1
MET	580 (35.9)	547.38 (38.65)	523.70 (37.93)	0.54

After the 12 weeks intervention period, all variables were tested for interaction between group and time. When a variable showed $p < 0.05$ then that variable had to test pairwise as described in [Table 2](#). The results from the two-way repeated ANOVA test showed statistically significant differences between the intervention and control groups, within group and the interaction effect taken at the start and end of the study.

Comparisons between groups

Pairwise testing was conducted for all other variables (BMI, WHR, all HBM modules, both social support modules, and MET physical activity; [Table 2](#)). From the pairwise group analysis, the mean BMI and WHR in the MHE group were significantly lower than the control group. There was no significant difference in weight change between groups, but BMI and WHR showed significant differences in each group. The pairwise results revealed that the BMI of the control group was significantly higher than that of the MHE group but lower than the FHE group with no statistically significance. The average BMI of the MHE group was significantly lower than the average BMI of the FHE group. Whereas the average WHR of the control group was significantly higher than the MHE group and also higher than the FHE group, no significant difference was found. Moreover, the average WHR of the FHE group was higher than the MHE group but not significance.

The pairwise analysis of the HBM modules showed significantly different average scores between the control group and both intervention groups, with the exception of HBM 2 (perceived benefits of weight loss), which showed no significant difference between the control and MHE groups but did show a significant difference between the MHE and FHE groups ($p < 0.001$). The average scores for the HBM 1, HBM 3, HBM 4, HBM 5 (eat) and HBM 5 (ex) modules of the MHE and FHE groups were significantly higher than those of the control group. However, the average scores on the HBM 1, HBM 4 and HBM 5 (ex) modules for the FHE group were higher than those of the MHE group, but not statistically significantly so. Meanwhile, the average scores on the HBM 2, modules for the MHE group was significantly higher than those of the FHE group.

The average scores of social support exercise modules of the intervention groups were significantly higher than the average score from the control group. While the average score of social support eating module showed significance higher than control group only in MHE group. The MHE group showed a significantly higher score of social support (eating behavior) than the FHE group. Whereas the social support (exercise behavior) score of the FHE group was higher than that of the MHE group, it was not statistically different. The pairwise analysis between groups revealed that the average MET scores of both intervention groups were significantly higher than that of the control group. The MHE group averaged a higher MET score than the FHE group, but this difference was not statistically significant.

Table 2. Comparisons in three groups after intervention MHE (n = 26), FHE (n = 26) and control groups (n = 26).

Variable	Group pairing (i–j)	Mean difference (i–j)	p value
BMI	Control–MHE	0.55	0.01*
	Control–FHE	–0.01	0.95
	MHE–FHE	–0.56	0.01*
WHR	Control–MHE	0.02	0.02*
	Control–FHE	0.03	0.00
	MHE–FHE	–0.07	0.44
HBM 1	Control–MHE	–0.204	0.00*
	Control–FHE	–0.282	<0.00*
	MHE–FHE	–0.078	0.24
HBM 2	Control–MHE	0.029	0.71
	Control–FHE	0.358	<0.00*
	MHE–FHE	0.329	<0.001*
HBM 3	Control–MHE	0.425	<0.00*
	Control–FHE	0.427	<0.00*
	MHE–FHE	0.001	0.99
HBM 4	Control–MHE	–0.389	<0.00*
	Control–FHE	–0.451	<0.00*
	MHE–FHE	–0.062	0.46
HBM 5 (eat)	Control–MHE	–0.288	<0.00*
	Control–FHE	–0.287	<0.00*
	MHE–FHE	0.001	0.99
HBM 5 (ex)	Control–MHE	–0.250	<0.00*
	Control–FHE	–0.328	<0.00*
	MHE–FHE	–0.078	0.21
Social support (eat)	Control–MHE	–0.738	<0.00*
	Control–FHE	–0.109	0.34
	MHE–FHE	0.629	0.00*
Social support (ex)	Control–MHE	–0.577	<0.00*
	Control–FHE	–0.646	<0.00*
	MHE–FHE	–0.069	0.56
MET	Control–MHE	–175.15	<0.00*
	Control–FHE	–131.41	0.00*
	MHE–FHE	43.74	0.33

*The mean difference is significant at the 0.05 level.

When the differences between time points were analyzed, WHR was the only variable that was not statistically significantly different across the study period. Therefore, pairwise testing was conducted for all other variables (weight, BMI, all HBM modules, both social support modules and both health behavior modules; [Table 3](#)).

When comparing the results at different points in the study, the analysis showed that average weight and BMI measured at baseline were significantly higher than at post-intervention and follow-up, but there were no significant differences between post-intervention and follow-up. There were no statistically significant differences in average WHR between baseline measurements and either post-intervention or follow-up.

A comparison of the HBM scores at different time points revealed that the baseline of all HBM modules differed significantly between the intervention period and the follow-up period ($p < 0.001$). However, there was no significant difference between the end of the intervention period and the follow-up period, except for HBM 2.

The pairwise analysis of the three study phases (baseline, post-intervention and follow-up) showed that the average scores of HBM 1, HBM 4, HBM 5 (eat), and HBM 5 (ex) measured at baseline were significantly lower than those measured post-intervention and at follow-up. Although the average score of the HBM 2 module measured at baseline was significantly lower than the score post-intervention, it was significantly higher than the score at follow-up. The average score of HBM 3 at baseline was significantly higher than post-intervention and at follow-up. HBM 2 was only HBM module for which the post-intervention score was significantly higher than at follow-up, whereas the other HBM modules showed no significant differences between post-intervention and follow-up.

Table 3. Comparisons in three groups at baseline, 12 weeks (after intervention), and 24 weeks (after follow-up).

Variable	Time pair (i–j)	Mean difference (i–j)	p value
Weight	Baseline–12 weeks	0.44	<0.00*
	Baseline–24 weeks	0.44	<0.00*
	12 weeks–24 weeks	0.01	0.90
BMI	Baseline–12 weeks	0.23	<0.00*
	Baseline–24 weeks	0.15	0.01*
	12 weeks–24 weeks	–0.08	0.06
HBM 1	Baseline–12 weeks	–0.24	<0.00*
	Baseline–24 weeks	–0.24	<0.00*
	12 weeks–24 weeks	0.00	0.93
HBM 2	Baseline–12 weeks	–0.09	<0.00*
	Baseline–24 weeks	0.55	0.00*
	12 weeks–24 weeks	0.62	<0.00*
HBM 3	Baseline–12 weeks	0.34	<0.00*
	Baseline–24 weeks	0.35	<0.00*
	12 weeks–24 weeks	0.00	0.95
HBM 4	Baseline–12 weeks	–0.05	<0.00*
	Baseline–24 weeks	–0.04	<0.00*
	12 weeks–24 weeks	0.05	0.36
HBM 5 (eat)	Baseline–12 weeks	–0.04	<0.00*
	Baseline–24 weeks	–0.39	<0.00*
	12 weeks–24 weeks	0.03	0.33
HBM 5 (ex)	Baseline–12 weeks	–0.25	<0.00*
	Baseline–24 weeks	–0.21	<0.00*
	12 weeks–24 weeks	0.05	0.19
Social support (eat)	Baseline–12 weeks	–0.45	<0.00*
	Baseline–24 weeks	–0.26	<0.00*
	12 weeks–24 weeks	0.19	0.00*
Social support (ex)	Baseline–12 weeks	–0.61	<0.00*
	Baseline–24 weeks	–0.30	<0.00*
	12 weeks–24 weeks	0.30	<0.00*
Eating behavior	Baseline–12 weeks	–1.13	<0.00*
	Baseline–24 weeks	–0.49	0.02*
	12 weeks–24 weeks	0.64	0.18
MET	Baseline–12 weeks	–217.28	<0.00*
	Baseline–24 weeks	–51.51	0.04*
	12 weeks–24 weeks	165.77	<0.00*

A pairwise comparison of social support at the different study points showed that the average scores for social support for eating and exercise at baseline were significantly lower than at post-intervention or follow-up ($p < 0.001$). In addition, the results of both social support modules showed that the average scores post-intervention were significantly higher than at follow-up. The pairwise comparison of study points revealed that the average MET and average eating behavior scores at baseline were significantly lower than post-intervention or at follow-up. Moreover, the average MET and average eating behavior scores measured post-intervention were higher than at follow-up. There was a statistical difference in average MET ($p = 0.039$) but no statistical difference in average eating behavior score.

Discussion

The baseline characteristics among the three groups in this study were similar. The average weight of both intervention groups decreased after both the initial period and at follow-up. This is consistent with the findings of previous studies, which found that social media could encourage people to lose weight through social interactions on online notice boards or forums etc.^{25,26} Likewise, BMIs at post-intervention and follow-up were significantly lower than baseline, a finding consistent with previous studies.^{27,28} Pairwise comparisons of the three groups revealed that the MHE group had the highest average scores for perceived benefits, barriers, and self-efficacy in dietary life. The FHE group showed the highest score in perceived threat, cues to action, and self-efficacy in exercise. These findings are consistent with those of a previous study, which found that print or electronic media (an external cue) impacted BMI through the HBM (specifically, perceived benefit, perceived barriers, and perceived threat or severity).²⁹

The FHE group had the highest average score for the perceived threat of being overweight, cues to action for weight loss, and perceived self-efficacy in exercise. These are modules that require motivation to participate in activities such as face-to-face meetings (e.g., counseling) or planned exercise with another person.³⁰ In addition, the perceived threats for adolescents, is about acceptance by their peers, and the participants expressed higher satisfaction if they participated in activities with friends. Previous studies found that female high-school and college students who had a role within their team changed their behavior when they perceived a threat or severity.^{29,31}

Social support was consistent with the results of the HBM in the self-efficacy module; the MHE group had a lower score in the exercise module but a higher score for diet behavior. There was a significant difference in physical activity between groups because behavior modification is different from awareness or belief. Although awareness occurred, behavior might not have changed. This is consistent with previous research that found that online social support had a much greater influence on eating behavior than for exercise behavior.³²

When considering the interaction between the time point of HBM, social support, and health behavior, most of the variables had similar average scores post-intervention, which were higher than baseline and at follow-up. This corresponds well to the findings of previous studies that found that intervention via EHE serves as information support, which is needed to be a successful weight loss program.³² In addition, a previous study revealed that participants who took part in a campaign of physical activity based on self-efficacy via EHE showed significant increasing medium MET scores compared with other groups that received printed brochures.³³ The findings of another study revealed that motivation decreased when intervention ceased, resulting in reduced friend support and confidence to action because participants lack the ability to share and be supported by friends.³⁴

Limitations

Some participants were still in growing up age; therefore, their height has an effect on BMI which could be stable or decrease despite of no change in weight and health behavior. Besides, the intervention has short-term effects because the follow up showed a trend of decreasing health belief, social support, and health behavior but showed an increasing trend in anthropometric assessment. Selection bias and the nature of study design, randomization might affect on the outcome of study. It might be assumed that the frequent users of Facebook would use variety of Social media platforms that could expose them to more knowledge of weight loss information or motivation from famous actress or models they admired. Hence this study cannot be generalized in the whole country due to the limited nature of the population involved.

Conclusions

The data suggests that mobile health education is an effective approach for improving behavior towards weight reduction among obese adolescent females studying at Thai universities. Especially, in a condition where all activities must be based on principles of social distancing, using online social network sites to access activities or programs can stimulate feelings by inducing personal satisfaction. In addition, the program or information provided online should encourage participants to participate frequently in order to promote social support similar to what they receive from face-to-face activities.

Data availability

Underlying data

Open Science Framework. Comparison of mobile health education messages verses face-to-face consultation for weight reduction among overweight female adolescents in Thailand. OSF 2021. <https://doi.org/10.17605/OSF.IO/4KPJ9>.³⁵

This project contains the following underlying data:

- Source data for all table. (Raw data of each table)
- Raw data Supim.xlsx (Deidentified raw data in excel file pattern)
- Raw data Supim.sav (Deidentified raw data in SPSS file pattern)

Extended data

Open Science Framework. Comparison of mobile health education messages verses face-to-face consultation for weight reduction among overweight female adolescents in Thailand. OSF 2021. <https://doi.org/10.17605/OSF.IO/4KPJ9>.³⁵

This project contains the following extended data:

- Questionnaire Supim.pdf. (the questionnaire used in this study).

Data are available under the terms of the [Creative Commons Zero “No rights reserved” data waiver](#) (CC0 1.0 Public domain dedication).

Reporting guidelines

Open Science Framework. STROBE checklist for ‘Comparison of mobile health education messages verses face-to-face consultation for weight reduction among overweight female adolescents in Thailand’. <https://doi.org/10.17605/OSF.IO/4KPJ9>.³⁵

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Reviewer Report 06 December 2022

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Umer Farooq 

Community medicine Department, Ayub medical College, Abbottabad, Pakistan

I have gone through the revisions in the article and the response of the author to the comments and found it satisfactory.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Epidemiology, Health Statistics, Public health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 28 November 2022

<https://doi.org/10.5256/f1000research.140230.r156234>

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Kulnipa Kittisakmontri 

Division of Nutrition, Department of Pediatrics, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand

I have no further comments.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Pediatric nutrition

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 26 September 2022

<https://doi.org/10.5256/f1000research.54287.r150532>

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**Kulnipa Kittisakmontri** 

Division of Nutrition, Department of Pediatrics, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand

The findings of this study are interesting, but the manuscript need major revision to meet the standard requirement of scientific research.

Substantial considerations:

1) Study design

- It was unusual to call a cross-sectional study in case that some interventions were given to the study population.
- I wonder whether simple randomization by lottery method adequately allocated participants in each groups? If the answer is yes, why did the authors called the study RCT? It was very confusing when the manuscript mentioned this study as the 'cross-sectional study' but the flow chart showed that participants were allocated in each group by simple randomization.

2) Sample size calculation

- I didn't understand the method used to determine sample size. What did the correlation pre- and post mentioned by authors for example, correlation of body weight or BMI or behavioral scores? More importantly, it needed a reference for the number used in calculation - where did the correlation of 0.5 come from? It was very unclear to me how this formula was used to determine sample size could relate to main research questions of this study.

3) Study population

- The inclusion criteria were unclear. Which were the three faculties that authors had mentioned? Was there any selection bias if the authors had selected the MHE from a population who frequently used the Facebook than others? It might be assumed that the frequent users of Facebook would use variety of Social media platforms that could expose them to more knowledge of weight loss information or motivation from famous actress or models they admired. At least this issue should be discussed as a limitation of the study.

4) Methodology

- The authors should describe more details of the interventions and questionnaires used in this study. The validation of those questionnaires should be mentioned to confirm their accuracy and reproducibility.

5) Results

- In general, I suggest the authors to seek advices from the medical statistician for the presentation of research findings. I was very confuse with the presentation of the results. All tables should stand alone with clear messages. For those figures and tables, the titles and all abbreviations should be clarified. I suggest the authors should extensively revise all figure and tables. Moreover, the reported numbers should be consistent with specific decimal. If two decimal was used, the authors should write all reported number in two decimal.
- Table 2 - it was very unclear to me what the authors would like to present. The authors should clarify what time point that those results came from (at post intervention?). Basically, I think table 2 and 3 could be integrated into one table when the authors showed the results of all variables divided by groups and showed the post hoc p-value of each pairs. If the post hoc analysis show significant results, thus it can assume the significant p-value of the repeated ANOVA.
- Table 4 - I didn't know the population of this analysis whether only intervention groups were counted or all participants were included.

6) Discussion

- The discussion section should be intensively organized. I found some repetition of some sentences mentioning the same statement. Furthermore, there were many limitations that should be mentioned, for example, as I said before the selection bias of the MHE group, the nature of the study especially in case the authors were not sure with their random allocation, thus the authors cannot infer the causality between the interventions and outcomes because the study was not the RCT.

7) Abstract

- The sentences mentioning that 'the group received MHE had the lowest BMI and WHR' shouldn't be included in the abstract as these could lead to misunderstanding that the MHE groups clearly had benefit from the intervention while the results presented in the manuscript did not demonstrate that.

Minor concerns:

- Please check repetition of the sentences and typos carefully.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

No

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Pediatric nutrition

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 24 Oct 2022

supim Wongtongtair, Srinakharinwirot University, Ongkharak, Thailand

Study design

- It was unusual to call a cross-sectional study in case that some interventions were given to the study population.
- I wonder whether simple randomization by lottery method adequately allocated participants in each groups? If the answer is yes, why did the authors called the study RCT? It was very confusing when the manuscript mentioned this study as the 'cross-sectional study' but the flow chart showed that participants were allocated in each group by simple randomization.

Response: This was Quasi-experimental study design, We have corrected this mistake.

2) Sample size calculation

- I didn't understand the method used to determine sample size. What did the correlation pre- and post mentioned by authors for example, correlation of body weight or BMI or behavioral scores? More importantly, it needed a reference for the number used in calculation - where did the correlation of 0.5 come from? It was very unclear to me how this formula was used to determine sample size could relate to main research questions of this study.

Response: We assumed 50% difference after the intervention, as we were unable to find out the exact difference in score in other interventional studies. Moreover, we have revised this sentence for more clarity.

3) Study population

- The inclusion criteria were unclear. Which were the three faculties that authors had mentioned? Was there any selection bias if the authors had selected the MHE from a population who frequently used the Facebook than others? It might be assumed that the frequent users of Facebook would use variety of Social media platforms that could expose them to more knowledge of weight loss information or motivation from

famous actress or models they admired. At least this issue should be discussed as a limitation of the study.

Response: We have included this in the limitation as per the guidance.

4) Methodology

- The authors should describe more details of the interventions and questionnaires used in this study. The validation of those questionnaires should be mentioned to confirm their accuracy and reproducibility.

Response: We have added this information in method section as per the guidance.

5) Results

- In general, I suggest the authors to seek advices from the medical statistician for the presentation of research findings. I was very confuse with the presentation of the results. All tables should stand alone with clear messages. For those figures and tables, the titles and all abbreviations should be clarified. I suggest the authors should extensively revise all figure and tables. Moreover, the reported numbers should be consistent with specific decimal. If two decimal was used, the authors should write all reported number in two decimal.

Response: We have corrected as per the guidance

- Table 2 - it was very unclear to me what the authors would like to present. The authors should clarify what time point that those results came from (at post intervention?). Basically, I think table 2 and 3 could be integrated into one table when the authors showed the results of all variables divided by groups and showed the post hoc p-value of each pairs. If the post hoc analysis show significant results, thus it can assume the significant p-value of the repeated ANOVA.

Response: We have merged the table 2 as per the guidance.

- Table 4 - I didn't know the population of this analysis whether only intervention groups were counted or all participants were included.

Response: We have included final 26 participants in the analysis. 4 from each group who did not complete the intervention were excluded in the analysis.

6) Discussion

- The discussion section should be intensively organized. I found some repetition of some sentences mentioning the same statement. Furthermore, there were many limitations that should be mentioned, for example, as I said before the selection bias of the MHE group, the nature of the study especially in case the authors were not sure with their random allocation, thus the authors cannot infer the causality between the interventions and outcomes because the study was not the RCT.

Response: Agreed and revised as per the suggestions.

7) Abstract

- The sentences mentioning that 'the group received MHE had the lowest BMI and WHR' shouldn't be included in the abstract as these could lead to misunderstanding that the MHE groups clearly had benefit from the intervention while the results presented in the manuscript did not demonstrate that.

Response: Revised as per kind guidance.

Minor concerns:

- Please check repetition of the sentences and typos carefully.

Competing Interests: No competing interests were disclosed.

Reviewer Report 18 August 2021

<https://doi.org/10.5256/f1000research.54287.r90391>

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Umer Farooq 

Community medicine Department, Ayub medical College, Abbottabad, Pakistan

- The study covers an important topic and provides evidence based results regarding an important intervention.
- Most of the references used are more than 6 years old. The author may look for some more studies recently done and include them in the write up.
- This is a cross sectional study. Why it was not planned as an experimental study? The researchers are doing the intervention then why wasn't it planned as an experimental study?
- The researchers have done a good analysis and have explained the results well as of a cross sectional study.
- The external validity of the study is very limited as it applies only to the girls of that university.

Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

No

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Epidemiology, Health Statistics, Public health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 20 Apr 2022

supim Wongtongtair, Srinakharinwirot University, Ongkharak, Thailand

Reviewer: The study covers an important topic and provides evidence based results regarding an important intervention.

Response: Thank you for understanding our efforts.

Reviewer: Most of the references used are more than 6 years old. The author may look for some more studies recently done and include them in the write up.

Response: I agree for this and adding some recently study already but can only change some references because this work was done in 2018. Therefore some data which used as rational or theory of the study cannot changed. However, after this editing reference more than 75% will be in period of 2017-2021.

Reviewer: This is a cross sectional study. Why it was not planned as an experimental study? The researchers are doing the intervention then why wasn't it planned as an experimental study?

Response: This issue is in line with our concern too. Because 3 groups of this study was done in same university. Therefore we try to decrease contamination by specify faculty which less likely to encounter each other. However, we choose faculties where students have similar academic and social characteristics. For the reasons mentioned above, we therefore use the cross sectional design with pre -post study.

Reviewer: The researchers have done a good analysis and have explained the results well as of a cross sectional study.

Response: Thank you for the compliment.

Reviewer: The external validity of the study is very limited as it applies only to the girls of that university.

Response: It's an issue that we used to be afraid of. However, this study is based on HBM and social support principle which the universal theory to use for weight management in adolescent. Moreover, our results were also consistent with similar previous research as

you seen in discussion.

Competing Interests: This study has no competing interests

Author Response 29 Jun 2022

supim Wongtongtair, Srinakharinwirot University, Ongkharak, Thailand

Reviewer: The study covers an important topic and provides evidence based results regarding an important intervention.

Response: Thank you for understanding our efforts.

Reviewer: Most of the references used are more than 6 years old. The author may look for some more studies recently done and include them in the write up.

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Competing Interests: No any competent interest

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