Effectiveness of social media for weight reduction on overweight undergraduate students in Thailand

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Abstract

Purpose – Addressing overweight in the population is an important public health challenge. Use of social media such as Facebook has been proposed as a platform to deliver weight loss interventions to influence behavior change to tackle obesity. The purpose of this paper is to compare the effectiveness of weight loss education and support interventions delivered through online social media (experimental group) vs conventional method (control group).

Design/methodology/approach – The six-month experimental study comprised of a four-month intervention and a two-month follow up from May 2016 to October 2016. All faculties in a university were randomly selected into the experimental or control group. Then, undergraduate students ($n = 66$) were randomly recruited from each faculty into the corresponding groups (experimental group = 33 and control group = 33). Both groups received health education and support services through either Facebook or the offline support system. The mean differences of main outcomes including body mass index (BMI) and waist to height ratio (WHtR) between groups at baseline and fourth month and baseline and sixth month were compared using *t*-test.

Findings – The results show those in the experimental group had significantly better outcomes in term of BMI and WHtR at the end of four-month intervention with the mean difference (95% CI) at 0.7 (0.1, 1.3) and 0.01 (0.00, 0.01), respectively. The differences at the end of the study, however, became insignificant.

Originality/value – The health education and support services through Facebook can be used in a weight loss promotion program for BMI and WHtR reduction. On a larger scale to replace conventional programs, a long-term continuous measure is needed.

Keywords Obesity, Social media, Facebook, Overweight, Weight loss, Weight reduction

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Introduction

The Asia-Pacific region has almost half of the world's population. The countries in the region are diverse in socio-cultural backgrounds and differ in economics and technologies. Increased economic development in many countries in this region has contributed to an increase in the prevalence of obesity[1]. Based on a study of the global trend of body mass index (BMI), underweight, overweight and obesity statistics from the years 1975 to 2016 analyzed 2,416 studies from 128.9m people and showed BMI in children and adolescents had increased in many high-income countries with a significant increase in parts of Asia[2]. Obesity is an increasing major global health problem, and every year, a large and increasing number of the obese population die or suffer from various medical complications[3]. The trend of self-health care in the modern age is dependent on health information and the internet is a major information source that could play a role as a medium for healthy lifestyle improvements[4]. Thailand is one of the countries with the highest obesity epidemic in Asia, ahead of other richer countries like Singapore, Korea and Japan[5].

Social media is gaining popularity globally and it has been used for health promotion and disease prevention. A systematic review of the effectiveness of online social network health behavior interventions by Maher *et al.*[6] showed limited evidence. The interventions were defined as behavioral change interventions for health improvement such as weight control, smoking control and drinking control. Some studies showed encouraging results such as a decrease in the study samples' weight. Another systematic review study looking at the role of social media on obesity by Patel *et al.*[7] found that the use of social media, especially Facebook for social support for chronic diseases such as obesity, is likely to improve patient care. From our search of PubMed, Scopus and Cochrane databases from 2005 to 2014 using Overweight, Obesity and Social Media as the keywords, there were two relevant articles that met the criteria on the social media effectiveness on obesity or overweight populace. The studies[8, 9] were small and the study population were mostly Caucasians from the USA. The interventions used in the two studies were quite specific to the American lifestyle that may not be relatable to Thai or Asian population.

In order to understand the effectiveness of social media on the Thai obese populace more research is needed. In Thailand, there were about 4m people who use Facebook regularly and the growth of Facebook users was ranked as the world's second highest (11 percent)[10]. It is among the first choice of media channels among the Thai population and a large number of people reportedly accessed health information from Facebook before finding information elsewhere[11]. Facebook has been used for health issue research purposes[12] but information on its effectiveness has been limited.

Given the significant interest in the national policy on the use of social media for health outcomes, this study intended to shed light on the debate over the benefit of such technology on the obesity and overweight situation, which is a public health concern that continues to increase in Thailand[5]. It is argued that social media activities require low budgets and can be more effective in comparison to old traditional solutions[6]. This study provided an aspect from an Asian (Thai) viewpoint and applied methods from previous research[8, 9] to provide outcomes. The objective of this study is to compare the effectiveness of weight loss education and support interventions delivered to university students through online social media (experimental group) vs conventional methods (control group). The findings from this study can help policymakers and public health practitioners in Thailand and abroad design and support policy implementation both in the public and private sectors.

Methods

The six-month experimental study comprised of a four-month intervention period and a two-month follow up. The study compared the effects of weight loss interventions on

overweight people through social media technology in the experimental group and through conventional methods in the control group. The target population was undergraduate students at a university in Phitsanulok Province in Thailand. Multistage sampling was used when recruiting the 66 students as study samples from all 16 faculties at the university. All faculties in the university were randomly selected into either the experimental or control group. Then, we randomly recruited the volunteers from each faculty into the corresponding groups, resulting in 33 samples in each group. The sample size was calculated using the formula to calculate sample size for continuous data, using data on mean weight in the treatment and control groups and their standard deviations in the calculation[13], with a design factor multiplier of 1.5 to compensate for the stratified sampling approach used.

All volunteers acknowledged the detail and the purpose of the research and signed the consent form voluntarily. A set of research tools including a nutrition and exercise curriculum, a basic information questionnaire, a knowledge attitude practice (KAP) assessment form and a satisfaction questionnaire were developed and revised by experts. The exercise demonstration videos were also created by the experts to simplify the understanding of the audience in the experimental group.

The basic information questionnaire had 21 questions to capture general characteristics of the volunteers including age, sex and education performance. A KAP assessment form was used to assess the knowledge, attitude and practice related to the nutrition and exercise activities of the volunteers. The KAP sections have 20, 10 and 15 items per section, respectively. The knowledge section used multiple-choice questions while the other two sections used rating scale questions, each item ranging from 1 to 5 (attitude section; 5: strongly agree, 4: agree, 3: neutral, 2: disagree, 1: strongly disagree; and practice section; 5: every day, 4: a few times a week, 3: a few times a month, 2: a few times a year, 1: never). The satisfaction questionnaire consisted of four sections, namely, project process, experts, project activities and project quality sections, with 5, 2, 3 and 5 items per section, respectively. The times in all section used a rating scale with the score from 1 to 5 (5: very satisfied, 4: satisfied, 3: neutral, 2: unsatisfied, 1: very unsatisfied).

The KAP assessment form was assessed for its level of validity using the index of item-objective congruence (IOC). It was also piloted and revised to ensure up to date validity. The value of IOC is 0.89. The Cronbach's α of the KAP assessment form was also assessed for reliability and was at 0.93.

At baseline, volunteers were measured for height, weight and waist circumference by a certified nurse. Before the start of the research project, the nurse was repeatedly trained on the standardized waist circumference measurement method based on the method used by the Faculty of Medicine, Khon Kaen University and WHO. A standard measuring tape was used to measure a volunteer's waist at the middle position of the waist between the lower edge of the last palpable rib and the top of the iliac crest. The nurse would ensure that the tape did not compress the skin but was snug around the waist and was parallel to the floor[14, 15].

Volunteers filled out a baseline assessment form and a KAP test. Subjects who were overweight or obese with BMI equal to or greater than 23 kg/m^2 without disease that cause weight gain were included. They had to also confirm their ability to use and access the internet daily. Those taking medicines or supplements to lose weight or participating in other weight loss programs were excluded from the study.

Interventions

The experimental group

Volunteers were invited to join a Facebook private group created by the researchers. The research team then sent a message to each participant's Facebook inbox to set a monthly weight loss goal. Health messages were published on the Facebook group's page

regularly. These included nutrition education messages from a nutritionist (four times a week in the morning), exercise education messages and exercise videos from an exercise expert (four times a week in the afternoon), questions about nutrition and exercise were posted twice a week and figures encouraging weight loss were posted once a week. The volunteers could consult with the nutritionist and the exercise expert who also joined the Facebook group and they could respond to the activities of the group. The volunteers reported their daily body weight using the scale provided by the project. Every month, the data on the volunteers' weight were assessed to set a new weight goal. At the fourth-month and sixth-month points, the volunteers' weight, height, waist circumference, KAP score and satisfaction scores were measured.

The control group

The volunteers in the control group received the same intervention as in the experimental group. The only difference was that the information on nutrition and exercise was provided via printed manuals instead of online with the Facebook group. The research team set a monthly weight loss goal and sent the goal to the volunteers in print. The volunteers were required to read the nutrition and exercise manual books, to report their daily weight, and monthly, to submit a paper form to consult with the nutritionist and exercise expert by sending the paper form via postal mail or leaving the paper form in a received box at the University Student Affairs Division. The volunteers received a reply from the experts via the postal mail.

Ethical considerations

This research protocol was reviewed and approved by the Institutional Review Board (IRB), Faculty of Medicine, Chulalongkorn University, IRB Number 346/58. All volunteers provided written informed consent before joining the program.

Data collection

At baseline, the volunteers were measured for weight, height, waist circumference, knowledge, attitude and practice with a KAP test form and completed the basic information questionnaire. In the fourth month (at the end of the intervention period) and in the sixth month (at the end of the follow-up period), the volunteers underwent the same physical measurement and completed the KAP test. They were also evaluated on their satisfaction with the program. All data were secured from unauthorized access. A list of interventions and data collection processes is shown in Figure 1.

Data analysis and statistics

Descriptive statistics were used to analyze baseline demographics. The differences in the mean level of the main outcomes of interest between the intervention and the control groups were compared using *t*-test statistics, including BMI and waist to height ratio (WHtR). The comparison between baseline and fourth month, and baseline and sixth month between groups was also tested. The summary scores for *K*, *A* and *P* sections and the summary satisfaction scores were calculated using a simple summation of all item scores in related categories, assuming equal weight. The trend of KAP and satisfaction scores was measured at baseline, fourth month, and six month to compare the improvement of both groups. The participant's activities data such as number of comments, consultations, questions, answers, posts, visiting counts and daily weight self-reports from both groups were analyzed by count, percentage, mean and standard deviation. Drop-out rates were collected (if any) and analyzed for the cause of withdrawal.

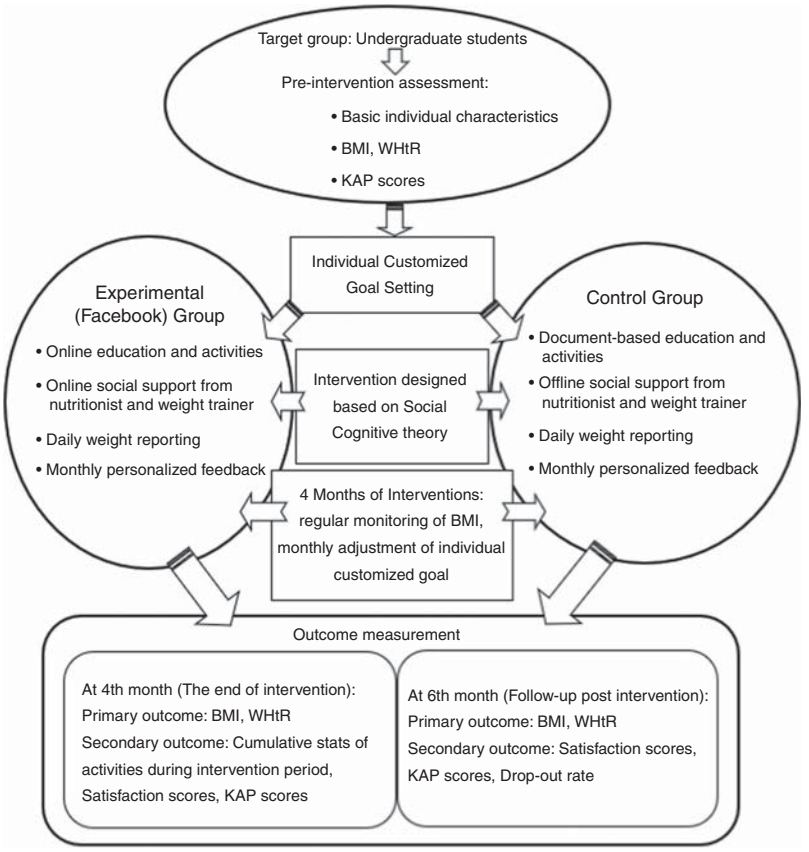

Figure 1.
Demonstrates the research activities of the experimental and control group

Results

There were no dropouts in both the experimental and control groups at the end of the study. The findings on descriptive statistics of baseline data to determine the difference between the two groups prior to the experiment are shown in Table I. This includes the baseline characteristics of the samples on age, grade point average (GPA), monthly income, BMI, WHtR (continuous data) and the ratio of each sex and academic year (category data).

At baseline, there were no statistically significant differences in characteristics between the groups except monthly income. The main measurements of interest such as BMI and WHtR were not different between groups.

For the volunteers' activity, the incidences of the Facebook group visiting online, by clicking, commenting, posting in the experimental group were 221 times per person visiting (98.6 percent), 189 times per person clicking (84.4 percent), 97 times commenting and 26 times posting. The number of consultations in the experimental group was 76 times and the number in the control group was 34 times. The average number of occasions, the experimental and control groups answered questions were 20 times/person (62.1 percent) and 16 times/person (48.5 percent), respectively. The number of days that the experimental group reported their weight was 108 days per/person (96.3 percent) and 112 days per/person in the control group (100 percent) (Table II).

There was no statistically significant difference in KAP between groups. However, the change in knowledge factor (*K*) from baseline (first) to sixth month (third) was significantly different between groups at *p*-value of 0.03, with mean difference (95% CI) of 1.7 (0.2, 3.3).

BMI

The mean difference of BMI comparison between baseline (first) and fourth month (second) was 1.1 ± 1.0 and 0.4 ± 1.4 for the experimental and control groups, respectively. The difference between the two groups was 0.7 (95% CI from 0.1 to 1.3) and was statistically significant at *p*-value of 0.02.

The comparison between baseline (first) and sixth month (third) period showed the mean difference and standard deviation of the experimental and control groups at 0.5 ± 0.9 and 0.1 ± 1.4, respectively. These results on BMI data are shown in Table III.

WHtR

The mean difference of WHtR compared between baseline (first) and fourth month (second) was 0.01 ± 0.01 and 0.00 ± 0.01 for the experimental and control groups, respectively. The difference between the two groups is 0.01 (95% CI from 0.00 to 0.01) and was statistically significant at *p*-value of 0.01.

Table I. Baseline characteristics of the sample: age, GPA, monthly income, BMI, WHtR for continuous data, sex and academic year for category data

Variables	Experimental group ($n = 33$)	Control group ($n = 33$)	*p*-value
Male, *n* (%)	9 (27.3)	10 (30.3)	0.79
Age, Mean ± SD	20.6 ± 1.4	20.2 ± 1.2	0.30
Academic year, *n* (%)			0.47
1	12 (36.4)	8 (24.3)	
2	9 (27.3)	13 (39.4)	
3	10 (30.3)	11 (33.3)	
4	2 (6.1)	1 (3.1)	
GPA, Mean ± SD	2.8 ± 0.5	2.9 (0.5)	0.27
Monthly income, Mean ± SD	5,690 ± 998	6,424 ± 1,803	0.046*
BMI, Mean ± SD	30.6 ± 4.5	30.3 ± 5.2	0.81
WHtR, Mean ± SD	0.57 ± 0.06	0.58 ± 0.08	0.55

Note: *$p < 0.05$

Table II. The difference between the average score per person of the KAP between the baseline in the fourth month and between the baseline in the sixth month

Group	Period	Knowledge (*K*) Mean diff. (95% CI) [min., max.]	Attitude (*A*) Mean diff. (95% CI) [min., max.]	Practice (*P*) Mean diff. (95% CI) [min., max.]	Combined KAP Mean diff. (95% CI) [min., max.]
Experimental group	4-month change	2.2 (1.1–3.4) [−5, 12]	1.1 (−0.3–2.4) [−5, 9]	6.5 (2.6–10.4) [−22, 24]	9.8 (5.5–14.1) [−18, 31]
Control group	1st–2nd	1.2 (0.3–2.2) [−4, 6]	−0.4 (−1.7–0.8) [−8, 5]	9.0 (5.6–12.4) [−9, 31]	9.8 (5.9–13.7) [−7, 34]
Experimental group	6-month change	2.7* (1.5–3.9) [−3, 11]	0.1 (−2.0–2.2) [−11, 14]	5.8 (3.4–8.2) [−5, 18]	8.7 (5.0–12.3) [−11, 27]
Control group	1st–3rd	1.0 (−0.1–2.1) [−6, 8]	1.0 (−0.2–2.2) [−7, 7]	9.2 (5.6–12.8) [−11, 33]	11.2 (6.9–15.4) [−12, 38]

Note: *$p < 0.05$

The comparison between baseline (first) and sixth month (third) periods showed the mean difference and standard deviation of the experimental and control groups at 0.01 ± 0.01 and 0.00 ± 0.01. These results on WHtR data are shown in Table III.

The results of the satisfaction score in the experimental and control groups were both categorized at a very good level of 87 and 85 percent, respectively. Daily weight self-reporting in the experimental and control groups was 96 and 100 percent, respectively.

Discussion

The results of BMI and WHtR reduction in the experimental group were statistically and significantly different in the first four months in comparison with the control group that supported the social cognitive theory[16–18], the fundamental theory in determining the intervention factors in this research that consisted of personal factors, environmental factors and behavioral factors. In addition, the frequency of stimulation from Facebook in the experimental group was daily, while the control group using manual books might be less stimulated relying on self-motivation. The results also supported previous literary reviews that found social media had the potential to be a medium for promoting healthy behaviors[19]. The knowledge gained from this study demonstrated that it is possible to use Facebook as a medium for intervention transfer to promote weight loss. It supports the result of previous research[7] showing that social media use, significantly promoted weight loss among volunteers. The experimental and control groups had the same basic activities, but they were different in terms of being online or offline. However, the experimental or online group had certain specific activities due to the nature of Facebook such as posting, commenting, sharing and liking. The experimental group had a significantly higher number of consultation activities with the experts than the control group. This might be because the experimental group could always consult with the experts immediately online. They received a response within 24 h by experts who were also members of the group. The control group had more limitations because they needed to write on a paper form for consultation making the response process lengthier and less immediate.

Facebook is a very popular social media platform compared to other social media[20]. This study shows that Facebook could be an alternative tool for solving public health issues. Online social media is generally cheaper to implement but further cost-effective analysis is needed to confirm this.

Regarding acceptance and participation, the intervention in this study, which was given to the undergraduate students, was well received as evidenced by the results of the satisfaction score, daily weight self-reporting and zero drop-out rate. The success of this aspect might be

Variables	Group	1st	2nd	3rd	4-month change (within group) 1st–2nd	4-month change (between group) 1st–2nd	6-month change (within group) 1st–3rd	6-month change (between group) 1st–3rd
		Mean ± SD			Mean diff. (95% CI)			
BMI	Experimental group	30.6 ± 4.5	29.5 ± 4.5	30.1 ± 4.3	1.1** (0.8, 1.4)	0.7* (0.1, 1.3)	0.5** (0.2, 0.8)	0.4 (−0.2, 1.0)
	Control group	30.3 ± 5.2	30.0 ± 5.0	30.2 ± 4.9	0.4 (−0.1, 0.9)		0.1 (−0.4, 0.6)	
WHtR	Experimental group	0.57 ± 0.06	0.56 ± 0.06	0.56 ± 0.06	0.01** (0.01, 0.01)	0.01* (0.00, 0.01)	0.01** (0.00, 0.01)	0.00 (−0.00, 0.01)
	Control group	0.58 ± 0.08	0.58 ± 0.07	0.58 ± 0.07	0.00 (−0.00, 0.01)		0.00 (−0.00, 0.00)	

Notes: CI, Confidence interval. *$p < 0.05$; **$p < 0.01$

Table III. Comparison of mean BMI and WHtR from baseline (first), fourth month (second) and sixth month (third) of the experimental and the control groups

due to the setting of the project, which was on campus and was organized in cooperation with the University Student Affairs Division which helped most volunteers to cooperate in the project with ease.

The result of KAP showed that only the Knowledge factor (K) found a statistically significant difference in the sixth month between groups. There are many potential explanations for this result. First, there may be some limitations in the measurement of A and P using the self-reported questionnaire. The measurement tool is perhaps not sensitive enough to the change. Second, there could be many factors influencing behavioral change that cannot be simply explained using K, A, P measurements[21, 22].

Bias that might appear in the project such as contamination bias where the volunteers might be sharing information between groups, and co-intervention bias where the research team might add what the volunteers did not actually receive from the other group, had been limited where possible. The research team created a volunteer understanding of the objectives and processes before the project commenced and the project was designed to provide intervention to the groups separately. In addition, the interaction of the research team toward the volunteers in both groups was equal.

In terms of sustainability, the effect of the reduction in both BMI and WHtR was seen during the intervention period (the first four months) in the experimental group, but there was no difference during the entire six months. In the long run, there could be many factors that are complex and that influence the change of BMI and WHtR that cannot be clearly explained in behavioral science[23].

This study has a number of limitations. The duration of the trial was held during the school break and each physical measurement appointment was held during the semester to collect the data. During the school break, when most students did not stay at the university or nearby, it was, therefore, necessary to choose a mutually appropriate time for the activities. If the project could have been held during both school semester time and school break time, a more pronounced change in behavior and weight loss might have been observed. Moreover, Facebook had some limitations on its use. Facebook could not record the duration of a member's activity in the group and the number of logins to the group directly. However, Facebook did record enough data to be measured. The restriction on Facebook was trivial and could be substituted by alternate measurement methods. Internet assessment for the experimental group showed that sometimes, volunteers could not join the Facebook group every day for various reasons such as traveling, poor internet reception, etc. However, there were no volunteers who could not access the internet for long periods of time.

The application of this research needs to be tailored to fit the target population in other groups and additional research should be done in parallel. Those who will apply these results such as government agencies, university administrators and health promoters will have to consider this information. Furthermore, the use of Facebook is likely to be a low-cost alternative tool for solving public health issues that will be beneficial to public health. This might reduce the budgets of old conventional methods of losing weight which take a relatively higher investment. However, cost-effective analyses will also need to be studied in more detail.

Conclusion

The study results prove that health education and support services through Facebook can be effectively used for weight reduction among students at a public university in Thailand. However, additional studies are needed to understand the mechanisms of action and the sustainability of the results in the long run. The application of this research needs to be tailored to fit each population group, and additional research should be done before it is implemented in other population.

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