

Full Length Research Paper

Perceived healthy eating and eating behavior: Evidence-based information for effective strategies to promote healthy eating behavior among undergraduate students

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Accepted 12 January, 2012

The objectives of this study were to investigate the perception of healthy and unhealthy eating, eating behavior, and the opinion about how to promote healthy eating among undergraduate students. Eight structured focus groups and 382 self-administered questionnaires were performed in four faculties of a university in Bangkok, Thailand. The variables measured were undergraduate students' self-report of perceptions of healthy and unhealthy eating; their explanation for the importance of healthy eating to them; nutritional knowledge, self-efficacy, eating of breakfast, fruits, vegetables, Western fast food, and drinking water. Data analysis was accomplished by general and specific content coding for qualitative research. Quantitative analysis was employed both descriptive and analytical statistics. The qualitative study revealed that undergraduate students had a significant amount of nutritional knowledge regarding healthy foods and considered that eating involves moderation, balance and variety. Despite this knowledge, they found it was difficult to follow healthy eating recommendations and frequently consume foods that they perceived as unhealthy. Barriers to healthy eating were a lack of time, limited availability of healthy food in the canteen, and a general lack of concern regarding following healthy eating recommendations. The first, second and third strategies they proposed to promote healthy eating among them were to increase the availability of healthy food in canteens, to raise awareness, and to increase skills in healthy eating behaviors. "Dream Canteen" was proposed to increase access to healthy food on campus. Integrated Marketing Communication (IMC) was prescribed for use in a social marketing approach. These results were confirmed with the outcomes from the quantitative study. Of 382 respondents, only 53.7% had a normal body-mass-index (BMI), while 25.0% of male undergraduate students had a BMI higher than normal, but 35.2% of female undergraduate students had a BMI below normal. Undergraduate students had moderate nutritional knowledge (\bar{x} =12.58, SD =2.51, score range 0-20) and moderate self-efficacy (\bar{x} =2.74, SD=0.42, score range 1-4). For eating behavior, 51.5% of respondents skipped some meals (35.1% skipped breakfast). Only 22.1 and 29.6% of respondents consumed vegetables and fruits at the recommended amount. These findings suggest that undergraduate students have enough nutritional knowledge, but nutritional interventions are needed to assist them with the translation of their knowledge into healthy eating behaviors. The intervention programs should promote healthy eating more easily for undergraduate students to practice according to dietary recommendation, apply and explain the consequences of unhealthy eating in terms that they value, with special emphasis on short-term benefits and harm rather than long-term effects. Only knowledge that is new and useful for them is accepted.

Keywords: Healthy eating, nutritional knowledge, undergraduate students, eating behavior.

INTRODUCTION

At present, the main concern for both developed and developing countries is the growing epidemic of chronic disease (World Health Organization, 2002). In Thailand, the leading cause of death is non-communicable diseases. Cancer and cardiovascular diseases play a major role in both mortality and morbidity (Ekachampaka and Wattanamano, 2008). It is now well-recognized that poor eating habits and limited physical activities are major causes of these health problems (Bazzano, 2006; Hallal et al., 2006; World Health Organization, 2003).

The undergraduate student year, a period of transition from late adolescence to young adulthood, and is a phase of significant change in the lifestyles of individuals. Food patterns established during this period are likely to be maintained for life and may have a long-lasting influence on the undergraduate's future health and the health of their families (Brown et al., 2005). In addition, an inadequate diet during the undergraduate years could result in unfavorable physiological consequences that could lead to diet related-chronic diseases (Winkleby and Cubbin, 2004). Chulalongkorn University is considered one of the best educational institutions in the country. The undergraduates come from every part of Thailand with various socio-economic backgrounds. They form a dynamic community for studying which has specific characteristics of culture, norms and values. In addition, Chulalongkorn University is located in the centre of Bangkok and is surrounded by famous department stores with numerous food outlets. Students are thus inundated with a great variety of food inducements to consume through the influence of the mass media.

The aims of this study were to examine the perceptions of undergraduate students regarding "healthy eating" and the importance of healthy eating to them, to explore eating behavior, and to probe strategies to promote healthy eating. Evidenced-based information from this study will shed light on the development of effective interventions for promoting healthy eating among undergraduate students.

MATERIALS AND METHODS

Setting

The community which was the focus of this study comprised students enrolled in the Faculty of Education, Faculty of Communication Arts, Faculty of Law, and Faculty of Science, of Chulalongkorn University. All these faculties are located in an adjacent area. In the 2010 Academic Year, there were 6,391 undergraduates

enrolled in regular curricula.

Study design, study population, data collection, and data analysis

This study employed a mixed methodology using both qualitative and quantitative methods in order to address the research objectives.

Qualitative study

Eight focus groups were conducted with 29 female and 28 males undergraduate students enrolled in Year 1 to Year 4 grade levels. The groups sessions lasted 45-60 minutes, were IC recorded, and were moderated and facilitated by the researcher and research team respectively. Focus group question guidelines consisted of four parts as follows: Part 1: Introduction. This part aimed to create friendly atmosphere, and started with informing the participants of the objectives and procedures of the discussion, and the rational of the project. Part 2: Undergraduate student characteristics such as age, faculty of study, weight, and etc. This part was completed by participants before starting the group discussion. Part 3: Discussion guidelines to obtain the perception of undergraduate students on healthy food and healthy eating. Part 4: Discussion guidelines for undergraduate students' opinion about how to promote healthy eating among students in Chulalongkorn University. The guidelines were reviewed by a expert team for content validity and were tested for reliability. Immediately after each focus group, the project researcher and research team discussed and recorded their impressions of the group, including content, atmosphere, nonverbal communication, and group dynamics. Focus group discussions were transcribed verbatim from an IC recorder and were then coded and analyzed using a content analysis two-step method: general content coding and specific content coding.

Quantitative study

A personal interview survey using a self-administered questionnaire was conducted during November 21 – December 3, 2010. A total of 382 systemic stratified, randomly sampled respondents according to sex, program study, faculty and year of study completed the questionnaire. The name lists of undergraduate students from four faculties obtained from the Office of Student Affairs were used as a population sampling frame. Questionnaires were distributed to undergraduate students who were sampled. Those who opted to not

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participate in this survey were skipped and the next in order was selected.

The self-administered questionnaire was developed by the researcher after extensive review of published articles and research reports and eight focus group discussions. The content and questions in the questionnaire were verified through consultation with five experts in order to ensure the appropriateness and validity of the questionnaire. Face and content validity determined whether the questionnaire measured the intended response and was primarily based upon the logical link between the questions and the objectives of this study.

To ensure clarity, pilot testing was performed with 15 undergraduate students from the Faculty of Political Science and 15 undergraduate students from the Faculty of Architecture. After pretest, the questionnaire was then revised based on the results of the pilot survey. Some words and the order of the questions were adjusted following feedback from the respondents.

The questionnaire was divided into five parts for the specific measures in relation to breakfast, vegetable, fruit, Western fast and beverage. Part 1: Personal information. Part 2: Health status: this part included weight, height, history of personal illness, food allergy, vitamins and minerals for dietary supplement, and other supplement products. Part 3: Nutrition knowledge: this part comprised 20 questions. Each question had four response options. The difficulty index of the knowledge measure was between 0.23-0.71. This instrument measured knowledge at four levels; 1) recall, 2) comprehension, 3) application, and 4) analysis. Part 4: Perceived self-efficacy: This included 15 successive questions measuring the confidence of undergraduates in having breakfast, consuming vegetables and fruit, refraining from Western fast food, and drinking water instead of sweet beverages and soda. The level of confidence was divided into four levels: Very confident, confident, less confident and least confident with scores 4, 3, 2, and 1 for positive messages respectively. The mid-point category from the Likert scales was eliminated to minimize social desirability bias arising from respondents' desire to please the interviewer or appear helpful or not be seen to give what they perceive to be a socially unacceptable response (Garland, 1991). Cronbach's Alpha of the test on overall perceived self-efficacy of healthy eating was 0.78; Part 5: Eating behavior: This part measured eating of breakfast, fruits, vegetables, fast food, and drinking water during the past 30 days. Thai recommended guidelines (Nutritional Flag) were used as the reference for interpreting the eating behavior of undergraduates.

Ethical considerations

Prior to entering the study community, permission to carry out the study was obtained from the deans of the four faculties. Ethical consent from the Health Sciences

Review Board Committee, Chulalongkorn University was obtained prior to starting the project. Written informed consent was obtained from all participants. Confidentiality and privacy of the participants and subjects were highly respected throughout the study.

RESULTS

Qualitative results

The results reveal a compilation of information gathered from eight focus group discussions. Three overarching themes emerged: Perceptions of healthy and unhealthy foods and eating behaviors, the importance of healthy eating, and how to promote healthy eating among undergraduates. Under the main item of perceptions of foods and behaviors as healthy and unhealthy, four sub-themes emerged: Food characteristics; situations, places, and processes; eating behaviors, and benefits and barriers. Demographic data and each of the themes and sub-themes that emerged from the analysis of focus group transcripts are described below.

Demographic data

Of the 57 participants, 28 were male and 29 were female. The age ranged from 18 to 22 years. Only 25.9 and 55.2% of male and female students had a normal body-mass index (BMI), while 19.6% of male had a BMI above normal, whereas 44.8% of females had BMIs lower than normal.

Perceptions of healthy and unhealthy foods and eating behaviors

Before eliciting the perceptions of healthy eating from participants, the meanings of healthy food and unhealthy food were clarified. Healthy food and unhealthy food hold multiple meanings for undergraduates. They elucidate foods in terms of characteristics, situations, place and process, behaviors and perceived benefits of and barriers to healthy eating.

Food characteristics

Most participants describe healthy eating in terms of foods that were essential to healthy eating using either summary statements, such as "total five food groups" and "natural stuff," or naming specific foods or food groups, such as "fruit", "bio-organic foods," "vegetarian foods" and "cereal." Fruits and vegetables were the most commonly mentioned healthy foods. Other foods considered healthy were salad, beans, fish, rice, embryo or germ of rice, and

lean meats. Also mentioned were natural foods, specific vegetables, such as pumpkin, broccoli, corn juice, and soy bean. Only one participant included milk in her description of healthy foods, but low fat and fat-free foods were mentioned frequently. Some descriptions of healthy foods from the participants included “it is not junk food”, “(it is not) Western fast food and soda.” One male undergraduate mentioned Japanese food as follows: “I think of P (name of food) at Q restaurant which selects fresh vegetables and lean meat. However, one must add milk and fruits too.”

Participants recommended numerous foods that they believed to be unhealthy such as sweetened soda drinks, fried meat balls, sweet desserts and cake. Also considered unhealthy were pizza, and other Western fast food. These kinds of foods were described more globally as “like artificially made”. In addition, foods that were baked or fried until it turned black were believed to contain carcinogens. Foods that were cooked two or three days ago were considered unhealthy. Allergy-prone food, salty food, hot food, oily food, saturated fat food and sweet food were considered unhealthy. Monosodium glutamate was considered unhealthy. Beer and liquor were determined unhealthy food too. Many participants considered food by the amount consumed: “I think we eat too much food.” Western fast food was considered healthy or unhealthy based on the frequency and amount of eaten. Most participants concluded that unhealthy foods are much more readily available than healthy foods and generally look much more appealing.

Situations, places and processes

Some participants described healthy foods with regards to places and in situations, such as food that is cooked at home. Healthy foods were also described by place of purchase. One male student expressed this as “Yeah, like food at China Town.” Healthy eating and foods were often mentioned in connection with family members, parents or older relatives, and less with friends and in other social situations, i.e., “food that my mom or my grandmother wants me to eat.” Boiled or steamed food, homemade food and food approved by the FDA were considered healthy food.

Eating behaviors

Undergraduates explained healthy eating in terms of dietary practices and emphasized some behaviors such as slow chewing, completing three main meals, not eating often, eating until full for every main meal, and watching fat and calories. Students also emphasized “eating less junk food” and “not eating roast chicken with skin”. Additional behaviors discussed included consuming all five food groups, eating breakfast, and eating less Western fast

food. While many discussed specific behaviors to describe healthy eating, some participants used more global terms such as “eating at the right time and right amount,” “eating a lot of vegetables,” “eat a variety of foods instead of the same kinds of food,” and “eating nutritious foods.” Some participants, both male and female pointed out that healthy eating is connected with emotions and satisfaction: “If I eat and feel happy, that is healthy eating. We should not restrict ourselves with theory,” and “When I eat, I feel delicious, that is healthy eating too.” But some said “We eat for life not live for eating.” Of interest, no one mentioned the Nutritional Flag in the description of healthy eating.

The concept of balance with regard to eating behavior was discussed. The majority of participants explained healthy eating as eating food in moderation, with variety and balance. They described balance and moderation as “Eating three meals a day,” “Eating food in the right amount,” “Eating when you’re hungry and not eating when you’re not hungry,” and “Eating from all of the five food groups.” Other pictures of moderation and balance were mentioned “Like having a balanced food, not eating too much of one thing and not enough of another.” and “Three balanced meals a day”. Some students traded off unhealthy foods against healthy foods. This idea allowed them to include all types of foods, while still maintaining what they considered a healthy eating pattern. Students described balancing unhealthy foods as “It’s not as bad to eat Western fast food if you mix it with fruits and vegetables.”

Breakfast, fruits and vegetable, fast food, water and beverage

Participants that live with parents eat breakfast more than those who live in a dormitory. Frequency of breakfast among undergraduates student ranges from 2-7 days per week. Some participants reported that they do not eat breakfast on school holidays because they get out of bed very late. Senior undergraduates had less breakfast than the younger students. A male student reported that he eats vegetables every day: “If I have no vegetables, I feel like my body lacks something. I have to buy vegetable juice from convenience store even if I know that this juice is artificial.” Many participants do not eat some vegetables such as onion, coriander, garlic, cucumber, Chinese broccoli, eggplant, and bitter cucumber. Some participants do not eat green vegetables but eat pumpkin and tomato. Some do not eat vegetables at all but eat fruits. All participants had difficulty with the unit of fruits and vegetables according to the standard recommendations (Nutritional Flag). Western fast food was popular among undergraduates because of the availability, quickness, promotion and flavor. Most are knowledgeable on fast food. The favorite beverages of participants were green tea, fruit juice in a box, vegetable juice in box, cold tea, mixed fruit smoothie, and syrup.

The reason they drank sweetened soda was to quench their thirst.

Benefits and barriers

Some male and female participants described healthy eating in terms of how they benefit from eating. Specific benefits they mentioned were eating that prevents five major diseases: Liver disease, kidney, cancer, cerebrovascular disease and cardiovascular disease. A strengthened immune system is a benefit of eating healthy food. One male student said that "Foods that prevent acne are healthy." Healthy eating was also perceived to be time consuming and characterized by limited availability at food shops, especially in the student canteens. Most participants agreed that available vegetables in the canteen were not appealing. Many students complained that healthy eating was too difficult to incorporate into their lives because of the way of the convenience of buying cooked food rather than having to prepare it at home.

Important of healthy eating

The majority of undergraduates pointed out that healthy eating was important for everyone, but that there was not enough concern about it. They said only the elderly talked about healthy eating. Except for academic learning, healthy eating was ranked last compared to fashion, photography, computer and technology. Some students reported that they have learned about and seen the Nutritional Flag but they could not remember the details of food recommendations in it. The five food groups were more easily recalled by them. Like the Nutritional Flag, the BMI was not of interest. One participant said he knew that there is a BMI measurement but he did not care to learn about it. One male said "I don't really care about healthy eating. This is my life. Now, I am strong, I will eat what I want. When I am old, I will control my food consumption." One female student reported that healthy eating was important to her because she experienced hemorrhoids because of consuming too few vegetables. One said that her friend got sick from not consuming fruits and vegetables. Most participants observed that food shops in the canteens did not support healthy eating behavior among undergraduates. Some canteens have no fruit shop. Available fruits in canteen are not myriad. Undergraduates buy fruit from "Uncle Fruity" a man that sells a variety of fruits in a cool box on motorcycle and rides around the campus. Fresh vegetables in canteens are rare and not tasty either.

How to promote healthy eating among undergraduate students?

When asked to discuss how to promote healthy eating among undergraduates, participants seemed not interested in this question. The majority indicated that knowledge is not important. Some said it was not possible while others suggested creating strong trends like the campaign to use cloth shopping bags to combat global warming. A male undergraduate student from the Faculty of Communication Arts raised the idea of public relations to build awareness of healthy eating among students rather than health education. Later, participants brainstormed and proposed the idea for a campaign which includes advertising and public relations. They proposed to use several media including both online media and social media that are available on campus such as cut-outs, posters, Chula radio broadcasts, canteen TV, journal of undergraduates, Facebook, roadshows, point of purchase advertising, etc. Concerning the message, the participants proposed two ideas: hard messages (like the campaign on to show ghastly effects of cigarette smoking on cigarette packages) and soft message. A campaign mascot was preferred for the role of messenger. A more conducive environment was raised by one participant who said: "I think only public relations will not be enough. Collaboration from all partnerships is very important. If we raise awareness but there is no healthy food available for consumer. How can we be successful in promoting healthy eating?" Participants also suggested holding contests for creating a campaign to promote healthy eating. They said that the contest would create a greater sense of ownership of the project. In developing the campaign, they will conduct research and gain knowledge in the process of developing the message. This is the way to implant healthy eating to their mind.

"Dream canteen"

The compilation of information from 57 participants in eight focus groups and 382 open-end self-administered questionnaires reflected the undergraduates' notion of a "dream canteen". Four overarching characteristics emerged; location, food, seller, and miscellaneous, as described below.

Location

The building should be spacious and have enough seats for undergraduates at lunch time. It must be clean and neat with strict queuing and no loud noise. There should

be enough light and ventilation with air conditioning or enough fans. There should be no smoke, no dogs or birds. Effective management of rubbish would be required. Fruit shops are the most common request of every focus group. A coffee corner is preferred if possible. Every food shop in the canteen must reach the standard. The proposed operating hours are 8.00 am. - 8.00 pm.

Food

The food should be clean with no chemical substances, no cockroaches or any parts of it in the plate. There should be no addition of monosodium glutamate or preservatives. The food should be prepared using high quality recipes. A healthy menu with appetizing vegetables is highly requested including international food sections, salad, fruit smoothies; and Herald food. An option for dishes which are cooked to order should be available. Price of food should be reasonable. There should be a variety of foods.

Seller

The vendor should display hospitality, cleanliness, proper attire, and show an awareness of consumer health priority. are qualities of sellers proposed by undergraduate students.

Miscellaneous

There should be a strainer, clean toilets, a TV showing health promotion programs developed by the undergraduates from the Faculty of Communication Arts.

Quantitative results

Demographic data

Of 382 respondents, there were 136 (35.6%) males and 246 (64.4%) females. The ratio of males to female was 1:1.8. The age range in the sample was 18 to 24 years. Most of respondents (47.8%) lived with parents while 22.0 and 17.6% lived in on-campus dormitory and off-campus dormitories respectively as shown in table 1.

Health status

Only 55.9 and 52.5% of male and female undergraduates had normal BMIs, while 25.0% of male undergraduates had BMI above normal level, but 35.2% of female undergraduates had BMI below normal. During three months prior to data collection, female undergraduates

took vitamins, minerals, and other supplements more than male undergraduates as shown in table 2.

Knowledge and self-efficacy

Based on the criteria set forth by the Ministry of Education, undergraduates had moderate nutritional knowledge (\bar{x} =12.6, SD=2.5). There was a statistically significant difference in knowledge between males and females ($p>0.05$). Perceived self-efficacy to perform healthy eating was also at moderate level (\bar{x} =2.7, SD=0.4). There was no statistical difference in self-efficacy between male and female undergraduates as shown in table 3 and table 4.

Eating behavior

Table 5 shows data for eating behavior of undergraduates during the month prior to data collection. Fully 41.9 and 31.3% of male and female students reported skipping breakfast, while 27.2 and 41.6% of male and female undergraduates had breakfast every day. There were 77.9 and 74.1% of male and female undergraduates who consumed less than four portions of vegetables. Only 23.5 and 32.9% of male and female undergraduates reported consuming up to four portions or more of fruit. Most undergraduates (72.8%) had Western fast food once per week. During the last seven days, 18.5 and 13.3% of respondents drank 7-8 glasses and greater than 8 glasses of water respectively.

DISCUSSION

The perception of "healthy eating" was literally consistent among undergraduates and was generally described in terms of specific foods, food groups and behaviors that led to eating these types of foods. Like the study of perceived healthy eating among adolescence by Croll and others (2001), the situations, places, and process; benefits and barriers; balance and variety were discussed in relation to healthy and unhealthy food and eating behavior. Healthy food and healthy eating was sometimes discussed with a negative connotation. No previous study in this area with undergraduates has been documented in Thailand. Several studies in the United State of America, Canada and European countries focusing on or including adults, adolescents, and youth (Croll, Neumark-Sztainer, and Story, 2001; Harrison and Jackson, 2009; Martinex-Gonzalex, Lopez-Azpiazu, Kearney, Kearney, Gibney, and Martinez, 1998; Paquette, 2005). In these studies, perceptions of healthy eating were based on food choice. Fruits and vegetables were consistently recognized as healthy eating, while chips (French fries), burgers, sausages, and sweet foods, including cake, sweets and chocolate were considered unhealthy food. Concepts related to healthy eating,

Table 1. Demographic characteristics of undergraduate students (n = 382, male =136, female =246)

Characteristics	Male N(%)	Female N(%)	Total N(%)
Age (years)			
Median (Min, Max)	20 (18, 24)	20.0 (18, 22)	20 (18, 24)
Mean (SD)	19.8 (1.3)	20.0 (1.2)	20.0 (1.2)
Program			
Social science program	64(47.1)	139(56.5)	203(53.1)
Science program	72(52.9)	107(43.5)	179(46.9)
Faculty			
Education	32(23.5)	72(29.3)	104(27.2)
Communication Arts	11(8.1)	27(11.1)	38(9.9)
Law	21(15.4)	40(16.3)	61(16.0)
Science	72(53.0)	107(43.5)	179(46.9)
Year of study			
1 st	43(31.6)	61(24.8)	104(27.2)
2 nd	40(29.4)	62(25.2)	102(26.7)
3 rd	32(23.5)	65(26.4)	97(25.4)
4 th	21(15.5)	58(23.6)	79(20.7)
Religion			
Buddhism	132(97.1)	230(93.5)	362(94.8)
Christianity	4(2.9)	7(2.8)	11(2.9)
Other	0(0)	9(3.7)	9(2.5)
Residence			
Living with parent(s)	70(51.5)	112(45.7)	182(47.8)
Living with relative(s)	11(8.1)	17(6.9)	28(7.3)
Living with sibling(s)	5(3.7)	6(2.4)	11(2.9)
Living in on- campus dormitory	26(19.1)	58(23.7)	84(22.0)
Living in off-campus dormitory	20(14.7)	47(19.2)	67(17.6)
Other	4(2.9)	5(2.1)	9(2.4)

Table 2. Health status of undergraduate students (n = 382, males =136, females =246)

Characteristics	Male n (%)	Female n (%)	Total n (%)
Body mass index (Kg/mm ²)			
<18.5 (Underweight)	26(19.1)	86(35.3)	112(29.5)
18.5-22.9 (Normal weight)	76(55.9)	128(52.5)	204(53.7)
≥23.0-24.9 (Overweight)	19(14.0)	14(5.7)	33(8.7)
25.0-29.9 (Obesity level 1)	13(9.6)	13(5.3)	26(6.8)
≥30.0 (Obesity level 2)	2(1.4)	3(1.2)	5(1.3)
History of having disease			
No	112(82.4)	200(81.3)	312(81.7)
Yes	24(17.6)	46(18.7)	70(18.3)
Have food allergy			
No	122(89.7)	224(91.1)	346(90.6)
Yes	14(10.3)	22(8.9)	36(9.4)
Taken any vitamins and minerals during the last 3 months			
No	103(75.7)	172(69.9)	275(72.0)
Yes	33(24.3)	74(30.1)	107(28.0)
Taken any supplements during the last 3 months			
No	111(81.7)	193(78.5)	304(79.6)
Yes	25(18.3)	53(21.5)	78(20.4)

Table 3. Mean and standard deviation of nutritional knowledge and, self-efficacy of undergraduate students (n = 382, males =136, females =246)

Variables	\bar{x}	S.D.	Level
Nutritional knowledge	12.6	2.5	Moderate
Perceived self-efficacy	2.7	0.4	Moderate

Table 4. Mean and standard deviation of nutritional knowledge and, self-efficacy of undergraduate students classified by sex (n = 382, males =136, females =246)

Characteristics	Knowledge				Self-efficacy			
	\bar{x}	S.D.	t	Sig	\bar{x}	S.D.	t	Sig
Sex								
Male	12.0	2.6	-3.641	.001	2.7	0.4	-1.648	0.10
Female	12.9	2.4			2.8	0.4		
Total	12.6	2.5			2.5	0.4		

Table 5. Undergraduate students' consumption of breakfast, fruit, vegetables, fast food and water during last month (n = 382, males =136, females =246)

Eating behavior	Male N (%)	Female N (%)	Total N (%)	Test of group difference
Eating behavior of main meal				
• Eat total of 3 meals	67(49.3)	120(48.8)	187(49.0)	$\chi^2 = 0.506$, df =1, P =0.008
• Skip some meals	69(50.7)	126(51.2)	195(51.0)	
- Skip breakfast	57(41.9)	77(31.3)	134(35.1)	$\chi^2 = 10.829$, df =4, p =0.029
- Skip lunch	3(2.2)	9(3.67)	12(3.1)	
- Skip supper	8(5.9)	27(11.0)	35(9.2)	
- Others	1(0.7)	13(5.3)	14(3.7)	
Eating breakfast				
• Not consume	22(16.2)	21(8.6)	43(11.4)	$\chi^2 = 13.628$, df =4, p=0.009
• 1-2 days/week	21(15.4)	48(19.8)	69(18.2)	
• 3-4 days/week	29(21.3)	41(16.9)	70(18.5)	
• 5-6 days/week	27(19.8)	32(13.2)	59(15.6)	
• Every day	37(27.2)	101(41.6)	138(36.4)	
Consuming vegetables				
• Less than 4 portions	106(77.9)	177(74.1)	283(77.9)	$\chi^2 = 1.637$, df =1, p=0.123
• 4 portions and above	30(22.1)	69(22.9)	99(22.1)	
Consuming fruits				
• Less than 4 portions	104(76.7)	165(67.1)	269(70.4)	$\chi^2 = 3.713$, df =1, p=0.034
• 4 portions and above	32(23.5)	31(32.9)	113(29.6)	
Consuming Western fast food				
• Not consume	27(19.8)	42(17.1)	69(18.1)	$\chi^2 = 0.918$, df =2, p=0.632
• 1 time/week	95(69.8)	183(74.4)	278(72.8)	
• 2 times or more/week	14(10.4)	21(8.5)	35(9.2)	
Drinking water				
• Less than 4 glasses/day	85(62.5)	174(70.3)	259(67.8)	$\chi^2 = 2.718$, df =1, p=0.063
• 4 glasses and over/day	51(37.5)	72(29.3)	123(32.2)	

such as balance, variety, and moderation, were often mentioned, but they were found to have myriad meanings depending on age, sex, culture, and level of education.

The population in this study had a significant amount of nutritional knowledge and perception of confidence to perform healthy eating behaviors. These results reflect the level of education of the study population. However, the study participants considered their eating behavior unhealthy. Barriers to healthier eating include unavailability of healthy food in the University canteen especially fruits and vegetables, the limited duration of lunch time, and the lack of concern. Similar to other studies in Thailand and the U.S. (Huang, Song, Schemmel, and Hoerr, 1994; Liebman, Cameron, Carson, Brown, and Meyer, 2001), undergraduates in this study skipped breakfast and consumed fruits and vegetables below the recommended amount.

Traditional health education and previous interventions were not effective in promoting health eating behavior among undergraduates. It is noteworthy that participants in focus groups proposed using integrating marketing communication (IMC) as a new approach to behavior change in this area. Media available on campus include social media such as cut-outs, posters, TV, and the student magazine. Use of on-line media was proposed to raise awareness of healthy eating. Currently, the concept of a social marketing approach for health promotion is widely recognized in the U.S., the U.K., and New Zealand (Committee on communication for behavior change in the 21st century, 2002; Quigley and Watts Ltd., 2007). IMC is widely used instead of traditional marketing communication. It employs both public relations and advertising tools to manage customer relationships that drive brand value (Duncan, 2002). IMC could be used as part of a social marketing strategy, as it is in commercial marketing (Hawkins, 2010).

The strength of this study was the rich, in-depth information gathered from undergraduates using both qualitative and quantitative methods. Strategies expected to be effective in promoting healthy eating behavior among this hard-to-reach populations must be fitted with their norms, values, and lifestyle. Steps of the intervention should be taken into account for sustainable behavior change. Other strengths of the study include gender, faculty, study program (social science and science programs) and grade-year diversity among participants. A limitation of this study was that the cross-sectional survey of eating behavior may not reflect seasonal variation of fruits and vegetables resulting in different amounts consumed. Although this information is not representative of all undergraduates in Thailand, the ideas presented here were collected from undergraduates of varying faculties, university grade, program of study, sex, and age. The procedures of data collection and analysis were conducted carefully to maintain the validity of findings.

CONCLUSION

Data from eight focus group discussions and 382 self-administrative questionnaires revealed that healthy and unhealthy eating hold multiple meanings among undergraduates. They had a significant amount of nutritional knowledge. Female undergraduates had higher knowledge than male undergraduates. There was no statistical difference between male and female undergraduates in their confidence to practice healthy eating. Although they had appropriate nutritional knowledge, many still had the poor eating habit of skipping breakfast, (35.01%), consuming fruits and vegetables below the recommended amount, (77.9% and 70.4% respectively). About one-tenth (9.2%) of respondents consumed Western fast food more than once per week. Drinking water in this study group was limited among the 259 respondents who reported that during the last 7 days, they drank water less than 4 glassed/day. Unavailability of healthy food in university canteens is a barrier to healthy eating, including short duration of the lunch break, and a general lack of concern regarding the need to follow healthy eating recommendations. Undergraduates proposed the innovative strategies and steps to promote healthy eating behavior among their peers and discouraged using traditional health education.

IMPLICATIONS FOR RESEARCH AND PRACTICE

These findings are salient for policy makers and other health professionals working for promoting healthy eating among undergraduates. To develop effective nutrition interventions, it is important to understand the context of food among undergraduate students according to their perceptions, norms, and values. In addition, it is important to involve undergraduates in planning intervention activities.

ACKNOWLEDGEMENTS

This study was supported by Thai Health Promotion Foundation, under the project on "Bann Nee Me Suk." We would like to thank all undergraduate students, staff at the Office of Student Affairs in the community study for participating and supporting this study.

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