UNIVERSITI PUTRA MALAYSIA

EVALUATION OF HEALTHY LIFESTYLE PROGRAM AMONG MALAYSIAN ADOLESCENTS LIVING IN DAY-SCHOOL HOSTELS

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By

TENG CHIAN YI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

September 2016

Abstract

Objective: To evaluate the Healthy Lifestyle Program among Malaysian adolescents living in day-school hostels.
Methods: This study was conducted in 2012 to 2014 and one hundred schools (50 intervention and 50 control schools) were randomly selected based on urban to rural ratio in six regions in Malaysia. Quantitative data were gathered at three time points using a cluster randomized controlled trial. Intervention was conducted at two phases. At Phase I, a four-month intervention was conducted while at Phase II, a six-month intervention was conducted among intervention respondents. Intervention schools received intervention while control schools received none. The school teachers in the intervention group used the modules of Healthy Eating and Be Active among Teens (HEBAT) to educate the intervention respondents. The Knowledge, Attitude and Practice on Healthy Lifestyle Questionnaire, Eating Behaviours Questionnaire, Eating Attitudes Test-26, 24-hour dietary and physical activity recall, Physical Activity Questionnaires for Children, Body Weight Status Perception Questionnaire, Contour Drawing Rating Scale and Depression, Anxiety and Stress Scale were used in impact evaluation. Anthropometric measurements were measured to determine the body composition of respondents.
Results: A total of 4277 Form One respondents participated in this study, given an overall response rate of 82.5%. The mean age of the respondents in both groups are comparable and a majority of the respondents were female, Malay and from rural area. After the program, the intervention group had higher knowledge, attitude and practice on healthy lifestyle; total energy, macronutrient and micronutrient intakes; lunch, dinner and morning tea consumptions; physical activity; correct perception of actual body weight status; and percentage of thinness than their control counterparts. Niacin and iron intakes; supper consumption; breakfast, lunch, dinner and overall skipping behaviours; low physical activity level; incorrect perception of actual body weight status; depression; height; and percentage of overweight were lower in the intervention group than their control counterparts. There was no difference in breakfast and afternoon tea consumptions; snacking behaviors; disordered eating, total daily energy expenditure, percentage of body size satisfaction, stress and anxiety, BMI-for-age, waist circumference and body fat percentage between groups.
Conclusion: The Healthy Lifestyle Program could promote healthy lifestyle effectively among Malaysian adolescents.

(352 words)

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EVALUATION OF HEALTHY LIFESTYLE PROGRAM AMONG MALAYSIAN ADOLESCENTS LIVING IN DAY-SCHOOL HOSTELS

By

TENG CHIAN YI

September 2016

Chair: Chin Yit Siew, PhD
Faculty: Medicine and Health Sciences

This study aimed to evaluate the Healthy Lifestyle Program (*Program Cara Hidup Sihat*) among Malaysian adolescents living in day-school hostels. This study was conducted in 2012 to 2014 and one hundred schools (50 intervention and 50 control schools) were randomly selected based on urban to rural ratio in six regions in Malaysia. A total of 4277 Form One respondents (Intervention group: n=1885; Control group: n= 2392) participated in this study in 2012. Quantitative data were gathered at three time points, namely Pre-Intervention (Year 2012), Post-Intervention I (Year 2013) and Post-Intervention II (Year 2014) using a cluster randomized controlled trial. Intervention was conducted at two phases, namely Phase I intervention and Phase II intervention; whereby at Phase I, a four-month intervention was conducted while at Phase II, a six-month intervention was conducted among intervention respondents. Intervention schools received intervention while control schools received none. The school teachers in the intervention group used ten topics of the modules of Healthy Eating and Be Active among Teens (HEBAT) to educate the intervention respondents.

At Phase I intervention, the HEBAT module (Phase I) consisted of four topics which introduced the concept and basic knowledge of healthy eating and active living, while at Phase II intervention, the HEBAT module (Phase II) consisted of six topics which trained intervention respondents to develop healthy lifestyle skills. This enabled the application of knowledge learned in the first phase of intervention among the intervention respondents. Each topic of HEBAT modules consisted of teaching guidelines, topic notes or power point slides, goal card, program feedback and tutorial forms. Moreover, each topic comprised two main learning objectives with various interactive learning activities. The UPM research team allocated one month for teachers to introduce one topic of HEBAT modules to the intervention respondents. One topic of HEBAT modules took one hour to deliver its content to the intervention respondents. After Phase I of intervention (four months), the UPM research team went to each school to collect data (Post-Intervention I) and after Phase II of intervention

(six months), the UPM research team went to each school to collect data (Post-Intervention II).

Assessment of the effectiveness of the Healthy Lifestyle Program was assessed using two evaluation components namely, process evaluation and impact evaluation. Attendance lists, tutorial and program feedback forms in the intervention group were used in process evaluation. The Knowledge, Attitude and Practice on Healthy Lifestyle Questionnaire, Eating Behaviours Questionnaire, Eating Attitudes Test-26, 24-hour dietary and physical activity recall, Physical Activity Questionnaires for Children, Body Weight Status Perception Questionnaire, Contour Drawing Rating Scale and Depression, Anxiety and Stress Scale were used in impact evaluation to determine knowledge, attitude and practice on healthy lifestyle, dietary practices, disordered eating behaviour, physical activity, body image and psychological distress of respondents. Anthropometric measurements were measured to determine the body composition (body weight status, waist circumference and body fat percentage) of respondents.

A total of 4277 Form One respondents participated in this study, given an overall response rate of 82.5%. The mean age of the intervention group (n= 1885) was 12.98 (95% C.I.: 12.97, 12.99) years while for the control group (n= 2392) was 12.97 (95% C.I.: 12.96, 12.98) years. A majority of the respondents were female, Malay and from rural area in both groups. Almost 50.0% of the intervention respondents attended all topics of HEBAT modules and about 35.0% of the intervention respondents submitted all topics of tutorial and program feedback forms. There was 99.2% of the intervention respondents satisfied with the program sessions and agreed the sessions were interesting, easily understood and well-liked.

After the program, the intervention group had higher knowledge, attitude and practice on healthy lifestyle; total energy, macronutrient and micronutrient intakes (except niacin and iron intakes); lunch, dinner and morning tea consumptions; physical activity; correct perception of actual body weight status; and percentage of thinness than their control counterparts. Niacin and iron intakes; supper consumption; breakfast, lunch, dinner and overall skipping behaviours; low physical activity level; incorrect perception of actual body weight status; depression; height; and percentage of overweight were lower in the intervention group than their control counterparts. However, there was no difference in breakfast and afternoon tea consumptions; snacking behaviors; disordered eating, total daily energy expenditure, percentage of body size satisfaction, stress and anxiety, BMI-for-age, waist circumference and body fat percentage between groups. In conclusion, the Healthy Lifestyle Program could promote healthy lifestyle effectively among Malaysian adolescents.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Sarjana Sains

PENILAIAN PROGRAM CARA HIDUP SIHAT DI KALANGAN REMAJA MALAYSIA YANG TINGGAL DI SEKOLAH MENENGAH ASRAMA HARIAN

Oleh

TENG CHIAN YI

September 2016

Pengerusi: Chin Yit Siew, PhD
Fakulti: Perubatan dan Sains Kesihatan

Kajian ini bertujuan untuk menilai Program Cara Hidup Sihat (*Healthy Lifestyle Program)* di kalangan remaja Malaysia yang tinggal di Sekolah Menengah Asrama Harian. Kajian ini dijalankan pada tahun 2012 sehingga tahun 2014 dan 100 buah sekolah (50 buah sekolah intervensi dan 50 buah sekolah kawalan) dipilih secara rawak berdasarkan nisbah bandar luar bandar di enam kawasan di Malaysia. Seramai 4277 responden Tingkatan Satu (Kumpulan intervensi: n= 1885; Kumpulan kawalan: n= 2392) terlibat dalam kajian ini pada tahun 2012. Data kuantitatif dikumpulkan pada tiga titk masa iaitu Sebelum Intervensi (Tahun 2012), Selepas Intervensi I (Tahun 2013) dan Selepas Intervensi II (Tahun 2014) dengan menggunakan kelompok percubaan terkawal rawak. Intervensi dijalankan pada dua fasa di mana pada Fasa I, satu intervensi sepanjang empat bulan dijalankan dan pada Fasa II, satu intervensi sepanjang enam bulan dijalankan di kalangan responden intervensi. Responden dari sekolah intervensi menerima intervensi tetapi responden dari sekolah kawalan tidak menerima intervensi. Guru-guru dari kumpulan intervensi menggunakan sepuluh topik di dalam Modul *Healthy Eating and Be Active among Teens (HEBAT)* untuk mengajar responden intervensi.

Pada Intervensi Fasa I, modul HEBAT (Fasa I) mempunyai empat topik yang memperkenalkan konsep dan ilmu asas tentang pemakanan secara sihat dan kehidupan secara aktif, dan pada Intervensi Fasa II, modul HEBAT (Fasa II) mempunyai enam topik yang mengajar responden intervensi cara untuk membina kemahiran kehidupan yang sihat. Hal ini membenarkan ilmu pengetahuan yang diperlajari pada Intervensi Fasa I diaplikasikan di kalangan responden intervensi. Setiap topik di dalam HEBAT modul mempunyai panduan pengajaran, nota mengikut topik, kad sasaran, borang maklum balas dan borang tutorial. Malahan, setiap topik mempunyai dua objektif pembelajaran yang utama dengan pelbagai aktiviti pembelajaran yang interaktif. Kumpulan penyelikan UPM memperuntukkan satu bulan kepada guru-guru untuk memperkenalkan satu topik di dalam modul HEBAT kepada para responden intervensi.

Satu topik di dalam modul HEBAT mengambil masa satu jam untuk menyampaikan isi kandungannya kepada para responden intervensi. Selepas Intervensi Fasa I (empat bulan), kumpulan penyelidikan UPM pergi ke setiap sekolah untuk mengumpulkan data (Selepas Intervensi I) dan selepas Intervensi Fasa II (enam bulan), kumpulan penyelidikan UPM pergi ke setiap sekolah untuk mengumpul data (Selepas Intervensi II).

Penilaian keberkesanan Program Cara Hidup Sihat dijalankan dengan menggunakan dua komponen penilaian iaitu penilaian proses dan penilain kesan. Senarai kehadiran, borang tutorial dan maklum balas program dalam kumpulan intervensi digunakan dalam penilaian proses. Borang soal selidik Pengetahuan, Sikap and Amalan tentang Cara Hidup Sihat, borang soal selidik Tingkah Laku Pemakanan, Ujian Sikap Pemakanan-26, 24 jam peringatan semula pemakanan dan aktiviti fizikal, borang soal selidik aktiviti fizikal untuk budak, borang soal selidik tanggapan status berat badan, Skala *Contour Drawing* dan Skala Kemurungan, Kebimbangan dan Tekanan telah digunakan dalam penilaian kesan untuk menentukan pengetahuan, sikap dan amalan cara hidup sihat, amalan pemakanan, tingkah laku makan bercelaru, aktiviti fizikal, imej badan dan tekanan psikologi daripada responden. Pengukuran antropometri diukur untuk menentukan komposisi badan (status berat badan, lilitan pinggang dan peratusan lemak badan) responden.

Sejumlah 4277 responden Tingkatan Satu terlibat dalam kajian ini, memberikan kadar tindak balas keseluruhan sebanyak 82.5%. Min umur untuk kumpulan intervensi (n= 1885) adalah 12.98 (95% *C.I.*: 12.97, 12.99) tahun manakala bagi kumpulan kawalan (n= 2392) adalah 12.97 (95% *C.I.*: 12.96, 12.98) tahun. Kebanyakan responden daripada kedua-dua kumpulan adalah perempuan, Melayu dan dari kawasan luar bandar. Hampir 50.0% responden intervensi menghadiri semua topik di dalam modul HEBAT dan kira-kira 35.0% responden intervensi menghantar semua topik untuk borang-borang tutorial dan maklum balas program. Terdapat 99.2% responden intervensi berpuas hati dengan sesi-sesi program dan bersetuju bahawa sesi-sesi adalah menarik, mudah difahami dan disukai.

Selepas program, kumpulan intervensi mempunyai pengetahuan, sikap dan amalan terhadap cara hidup sihat; jumlah pengambilan tenaga, makronutrien dan mikronutrien; pengambilan makan tengah hari, malam dan minum pagi; fizikal aktiviti; persepsi status berat badan sebenar yang betul; dan peratusan kekurangan berat badan yang lebih tinggi berbanding dengan kumpulan kawalan. Pengambilan niasin dan ferum; makan lewat malam; tingkah laku ponteng makan sarapan, tengah hari, malam, dan makan secara keseluruhan; tahap aktiviti fizikal yang rendah; persepsi status berat badan sebenar yang tidak betul; kemurungan; ketinggian; dan peratusan berat badan berlebihan adalah lebih rendah dalam kumpulan intervensi. Tiada perbezaan dalam pengambilan sarapan, snek dan minum petang; makan secara bercelaru; jumlah perbelanjaan tenaga harian; peratusan kepuasan saiz badan; tekanan dan kebimbangan; BMI-untuk-umur; lilitan pinggang; dan peratusan lemak badan di antara kumpulan. Kesimpulannya, Program Cara Hidup Sihat dapat menggalakkan cara hidup yang sihat secara berkesan di kalangan remaja Malay

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I certify that a Thesis Examination Committee has met on 9 September 2016 to conduct the final examination of Teng Chian Yi on her thesis entitled "Evaluation of Healthy Lifestyle Program among Malaysian Adolescents Living in Day-school Hostels" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P. U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the degree of Master of Science.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
BMR	Basal Metabolic Rate
CG	Control Group
CHO	Carbohydrate
CI	Confidence Interval
cm	Centimetre
DASS	Depression, Anxiety and Stress Scale
DE	Disordered Eating
EAT-26	Eating Attitudes Test
EBQ	Eating Behaviour Questionnaire
e.g.	Example
HEBAT	Healthy Eating and Be Active among Teens
hr	Hour
IG	Intervention Group
IPH	Institute for Public Health
KAP	Knowledge, Attitude and Practice
kg	Kilogram
LOFC	Last Observation Carried Forward
MET	Metabolic Equivalent
NCCFN	National Coordinating Committee on Food and Nutrition
NHMS	National Health and Morbidity Survey
PAL	Physical Activity Level
PAQ-C	Physical Activity Questionnaire for Children
PRO	Protein
RM	Ringgit Malaysia
RMR	Resting Metabolic Rate
RNI	Recommended Nutrients Intake
TDEE	Total Daily Energy Expenditure
TOT	Training-of-Trainers
UPM	Universiti Putra Malaysia
WHO	World Health Organization

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Malnutrition is well-defined as a phenomenon where undernutrition and overnutrition coexist in a population (Varela-Silva et al., 2012). This phenomenon is often referred to as "dual burden of malnutrition". Undernutrition includes being underweight with continuously insufficient food intake to meet energy requirement as well as poor absorption of nutrients consumes. Meanwhile, overnutrition includes being overweight and obese with frequent or habitual overconsumption of nutrients by eating too much food (World Health Organization [WHO], 2005).

According to the World Health Organization (2005), 170 million children were underweight globally. At least 20 million children under five years of age and more than a billion of adults were overweight. In recent years, malnutrition became prevalent not only among the adults but also among the adolescents (Institute for Public Health [IPH], 2015). In many developing countries, prevalence of undernutrition and overnutrition among the adolescents was high (IPH, 2013; IPH, 2015; Laus, Miranda, Almeida, Costa, & Ferreira, 2012; Zhang, Shi, Huang, Feng, & Ma, 2012). In Brazil, among adolescents who aged 14 to 19 years old, 2.8% of adolescents had undernutrition while 21.4% of adolescents had overnutrition (Laus et al., 2012). In China, 34.2 % of adolescents aged 7 to 18 years old were either severely thin or thin and 4.0% of the adolescents were overweight and obese (Zhang et al., 2012).

In Malaysia, rapid economic and industrial development has led to a nutritional and lifestyle transition, resulted in dual burden of malnutrition (Mohd Ismail, 2002). A study by Zalilah et al. (2006) showed that among adolescents aged 13 to 15 years old, 22.5% were being underweight and 34.7% were being overweight. In the recent MyBreakfast study in Malaysia, among adolescents aged 10 to 12 years old, 12.2% were being underweight and 14.5% were being overweight or obese (Hamid et al., 2015). In the Nutrition Survey of Malaysian Children (SEANUTS Study), among children and adolescents aged 7 to 12 years old in Malaysia, 7.6% were underweight and 30.9% were being overweight or obese (Poh et al., 2013).

In the National Health and Morbidity Survey (NHMS) 2012, using the classification of BMI-for-age by the World Health Organization (de Onis et al., 2007), the prevalence of thinness (BMI for age <- 2SD) and obesity (BMI for age > +2SD) among adolescents who aged 10 to 12 years old were 6.4% and 14.9%, respectively. Among adolescents who aged 13 to 17 years old, prevalence of thinness and obesity were 5.7% and 10.6%, respectively (IPH, 2013). In the recent NHMS 2015, among adolescents aged 10 to 14 years old, the prevalence of thinness was 6.9% and the prevalence of obesity was 14.4% (IPH, 2015). Among adolescents aged 15 to 17 years old, the prevalence of thinness was 7.0% and the prevalence of obesity was 9.6% (IPH, 2015). The

prevalence of thinness and obesity remained high among the adolescents. Actions should be taken to combat malnutrition especially obesity problems among the adolescents.

Malnutrition during adolescence can contribute to adverse health consequences that may persist into adulthood. Undernutrition may increase the risk of morbidity and mortality, impair physical, cognitive as well as sexual function (Lazzeri et al., 2008; Luder & Alton, 2005). On the other hand, overnutrition may associate with sleep disordered breathing, asthma, Type 2 diabetes, cardiovascular disease, hypertension, menstrual abnormality and other physical and psychological health problem (Lobstein, Baur, & Uauy, 2004). The costs of malnutrition include the economic burden on the national health system to manage obesity-related comorbidities. For example, in the United States, children who were obese required higher medical expenditure compared to those who were of normal weight (Trasande, Liu, Fryer, & Weitzman, 2009). This is because obese children associated with a variety of health complications and thus increased their frequency of outpatient visit, prescription of drug and emergency room expenditures which ranged from $12 (RM37.20) to $194 (RM601.40) (Trasande et al., 2009). However, according to Capogrossi (2012), the medical expenditure involved in childhood underweight was not estimated. Taking as a whole for malnutrition, it could contribute to approximately 2-3% loss in the national income (WHO, 2008). Given the costly consequences and high prevalence of underweight and overweight among the adolescents, effective healthy lifestyle intervention program is needed to combat malnutrition among the adolescents.

Healthy lifestyle can be defined as a way of living that lowers the risk of being seriously ill or dying early (WHO, 1999). A Healthy Lifestyle Program is a health education intervention that can promote the health status of a population. As recommended in previous interventions targeting on adolescents, findings suggested that healthy eating and active living should be the key components of a healthy lifestyle intervention program (Bonsergent et al., 2013; Neumark-Sztainer, Story, Hannan, & Rex, 2003; Singh et al., 2006; WHO, 1999). Energy balance should be achieved through practicing of active living and healthy eating to promote healthy body weight status among adolescents as well as to combat malnutrition.

1.2 Problem Statement

Adolescence is a period in human growth and development which occurs after childhood and before adulthood from the ages of 10 to 19 years old (WHO, 1995). It is characterized by dramatic changes in physical, emotional and cognitive functions (Stang, Feldman & Story, 2008). Adolescence appears to be a crucial stage in the life cycle as it is the second opportunity for adolescents to catch up with growth and development before adulthood (WHO, 2008). Hence, the needs of adolescents for energy, protein, vitamins and minerals increased to support their pubertal growth and development (National Coordinating Committee on Food and Nutrition [NCCFN], 2005; Stang & Story, 2005).

While the nutrient needs are high in adolescence, adolescents struggle to gain independence over many aspects in their life (Henry, 2006). For example, in terms of their daily dietary intake and physical activity, adolescents may want to skip meals to lose weight so that they can cope with their heightened concern about physical appearance (Brown, 2011; Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011). To gain peer acceptance, they may prefer to play computer games with their friends at home rather than doing exercises outside home (McCurdy, Mphill, Winterbottom, Mehta, & Roberts, 2010). These often lead to the development of poor eating behaviours such as meal skipping, excessive dieting or fast food consumption and physical inactivity that can increase their risk of getting body weight status problem (Stang et al., 2008).

In Malaysia, there was a higher prevalence of malnutrition among secondary school adolescents (37.9%) compared to pre-school children (15.7%) and primary school children (23.8%) (IPH, 2015). However, very few intervention studies have been conducted among secondary school adolescents. Many studies focus only on pre-school children, primary school children as well as adults (Heng, Hazizi, Mohd Nasir, Hejar, & Chan, 2013; Sharifah Intan et al., 2014; Zalilah et al., 2008). For example, in a study by Ruzita et al. (2007), a Nutrition Education Program was conducted for three weeks among 8-year-old children in Malaysia. The intervention highlighted the importance to improve knowledge, attitude and practice on nutrition among the children. The nutrition practice score did not increase among the intervention respondents throughout the study period (Ruzita et al., 2007). A more comprehensive module such as the HEBAT modules, that highlighted both "healthy eating" and "active living" should be developed to achieve energy balance; and a comprehensive intervention program with longer study period such as the Healthy Lifestyle Program, should be conducted to develop the skills to practice healthy lifestyle among the adolescents.

Schools appear to be an ideal setting for intervention among adolescents. Schools provide natural learning environment, reach out to large population of adolescents (Katz, O' Connell, Njike, Yeh, & Nawaz, 2008), and offer opportunities of peer interaction (Neumark-Sztainer & Story, 1997). Numerous evidences have indicated that school-based interventions can be effective in promoting lifestyle of the adolescents (Bonsergent et al., 2013; Ruzita, Wan Azdie, & Ismail, 2007; Zalilah et al., 2008). In Malaysia, several topics related to nutrition and physical activities are incorporated into the syllabus of Science, Biology or Physical Education subjects (Ministry of Education Malaysia [MOE], 1998). These subjects introduced nutrients and their functions to students. However, there was limited information on nutrition and physical activity in these syllabuses. For example, the Malaysian Food Guide Pyramid was not introduced to the students. Students did not know how to eat healthily based on the correct serving size; and did not know the importance to eat a variety of foods in a balanced and moderate diet. Besides, the BMI-for-age calculation was not introduced to the students. Students did not know how to calculate their BMI-for-age and hence did not know their current body weight status. Students might not understand on how to achieve healthy body weight status based on what they learned in the current syllabus.

Even though some efforts have been done by the Ministry of Education to promote good health among the students, for example, improve infrastructure for students to do

sports, improve professionalism among the teachers to improve quality in education system, organize some inter-school sports or games as well as co-curriculum activities in schools, however, these seem to be not enough to promote healthy lifestyle among the adolescents in Malaysia (Ministry of Education, 2012). Obviously, there is lack of a comprehensive module and an intervention program that highlight the importance of nutrition and physical activity to promote healthy lifestyle among adolescents. The HEBAT modules used in the current study comprised ten topics that highlight the importance of "healthy eating" and "active living" to achieve energy balance and healthy lifestyle among the adolescents. Hence, with the HEBAT modules developed by the research team from UPM, teachers from the intervention schools can train the adolescents the correct ways to practice healthy lifestyle.

According to Lee, Tsang, Lee and To (2003), successful health promotion in school also depends on teacher. It is believed that teacher's training can positively influence health promotion practices of teachers. Teachers hence can act as a role model in promoting healthy lifestyle to their students. The health promoting school can also enhance the social, emotional, dietary habits and physical well-being of both students and teachers (St-Leger, Kolbe, Lee, McCall, & Young, 2007). In Malaysia, teachers received little training in the aspect of nutrition. There is also lack of appropriate and comprehensive module to guide teachers in promoting healthy lifestyle of adolescents. This calls for an urgency to implement a school-based teacher-led effective healthy lifestyle program among Malaysian adolescents living in day-school hostels to combat malnutrition.

In Germany, Fischer and Klieme (2013) assumed that all-day-school which offered extra-curricular activities and extended daily hours, could promote development in at least three areas namely family-life, school effectiveness and student learning among the students. In Malaysia, the *Pelan Pembangunan Pendidikan Malaysia* 2013-2025 (PPPM) indicated that Malaysian students spent about 52% of their time at home or in the community, 33% for sleeping and 15% in the school. For students living in day-school hostels, they spent only 23% at home or in the community, 33% for sleeping, 15% in the school and 29% of time were spent in the school hostels (MOE, 2013). There were fewer distractions for students living in day-school hostels and hence they would be able to focus on studies and activities (MOE, 2013). Students living in day-school hostels needed to follow strict timetables and were required to be punctual for all classes including academic and co-curricular activities (Klieme, Leutner, & Wirth, 2005). This helped students to be discipline and be physically fit. Living in day-school hostels enabled students to interact with teachers. Most of the day-school hostels had excellent infrastructure for sports (MOE, 2013). Hence, an intervention should target students living in day-school hostels rather than students in schools to promote healthy lifestyle.

Moreover, day-school provides a structured environment to the students living in the hostels whereby their meals are prepared and activities are arranged. Students living in day-school hostels have greater autonomy in making choice about their lifestyle compared to students living at home (Afsheen, Allah, Arshad, & Mehar, 2013; Smetana, Campione-Barr, & Daddis, 2004). Thus, they are more likely to practice healthy lifestyle such as eating main meals on time or being physically active.

Day-school hostel hence appeared to be an ideal setting for implementation of a healthy lifestyle intervention program among adolescents (Afsheen et al., 2013). While adolescents were found to practice unhealthy lifestyle (Stang et al., 2008) and had high prevalence of malnutrition problem (IPH, 2013), there is also limited healthy lifestyle intervention program conducted among Malaysian adolescents living in day-school hostels. Most of the studies were conducted among University students living in the hostels (Anigo, Owolabi, Sule, & Oluloto, 2013; Lua, Wan, & Shahril, 2012; Muhammad Muzaffar, Samsul, Alam, & Muhammad Usman, 2012). These call for an effective Healthy Lifestyle Program among adolescents living in day-school hostels to promote healthy lifestyle.

A three-year Healthy Lifestyle Program was conducted among Malaysian adolescents living in 100 day-school hostels from 2012 to 2014 by trained research team from Universiti Putra Malaysia in collaboration with the *Bahagian Pengurusan Sekolah Harian,* Ministry of Education. This study was funded by Nestle Products Sdn. Bhd. It highlighted the importance of energy balance through practicing of healthy eating and active living to achieve healthier body weight status among the adolescents. From the beginning of this study, the modules of Healthy Eating and Be Active among Teens (HEBAT) were developed and a comprehensive intervention using the HEBAT modules was run among the intervention respondents, whereby their knowledge, attitude and practice on healthy lifestyle, dietary practices, disordered eating behaviour, physical activity, body image, psychological distress (depression, anxiety and stress) and body composition (body weight status, waist circumference and body fat percentage) was determined in impact evaluation since previous studies showed that these variables were vital to be included in the evaluation of a healthy lifestyle intervention program (Maynard, Baker, Rawlins, Anderson, & Harding, 2009; Moreno et al., 2007; Neumark-Sztainer et al., 2003; Roszanadia & Norazmir, 2011; Walker et al., 2002; Zieff, Guedes, & Wiley, 2006). The data were collected by the research team from Universiti Putra Malaysia at Post-Intervention I and Post-Intervention II assessments.

I was allowed to use the data in this Healthy Lifestyle Program, collected by the research team from Universiti Putra Malaysia (UPM). Hence, this Master's study is a secondary quantitative data analysis to evaluate the effectiveness of Healthy Lifestyle Program among Malaysian adolescents living in day-school hostels. This intervention study therefore attempts to acquire answers for the research questions listed below:

1. What are the attendance rate, submission rate of tutorial and program feedback forms and program feedback in process evaluation among the intervention respondents?

2. What are the changes in knowledge, attitude and practice on healthy lifestyle, dietary practices, disordered eating behaviour, physical activity, body image, psychological distress and body composition in impact evaluation between intervention and control respondents before and after the intervention program?

1.3 Significance of the Study

The results from the current study can be used by future researchers, nutritionists and school authorities to improve the overall well-being of Malaysian adolescents or to prevent serious consequences of malnutrition among Malaysian adolescents living in day-school hostels in the future. The current study is important as it may raise awareness of the public to give more concerns towards the importance of healthy lifestyle among Malaysian adolescents. Furthermore, policy makers, health agencies, program planners and community leaders can use the data obtained from this study as a reference for planning and implementing of effective policies as well as other intervention programs for Malaysian adolescents to promote healthy lifestyle.

The HEBAT modules in the current study can be incorporated into the current syllabus and the Healthy Lifestyle Program can be a supplement program to the current co-curriculum activities in schools to promote healthy lifestyle among the adolescents. The current study has been conducted among adolescents living in day-school hostels and it can be introduced to students in other schools to benefit all Malaysian adolescents.

1.4 Research Objectives

1.4.1 General Objective

To evaluate the Healthy Lifestyle Program (*Program Cara Hidup Sihat*) among Malaysian adolescents living in day-school hostels.

1.4.2 Specific Objectives

- To determine socio-demographic background of Malaysian adolescents living in day-school hostels at baseline.
- To determine the attendance rate, submission rate of tutorial and program feedback forms and program feedback among intervention respondents.
- To determine the effectiveness of the Healthy Lifestyle Program on:
    - Knowledge, attitude and practice on healthy lifestyle
    - Dietary practices
    - Disordered eating behaviour
    - Physical activity
    - Body image
    - Psychological distress (depression, anxiety and stress)
    - Body composition (body weight status, waist circumference and body fat percentage) between intervention and control groups before and after the intervention program.

1.5 Research Null Hypothesis

H_o1: There is no significant difference in knowledge, attitude and practice on healthy lifestyle between intervention and control groups before and after the intervention program.

H_o2: There is no significant difference in dietary practices between intervention and control groups before and after the intervention program.

H_o3: There is no significant difference in disordered eating behaviour between intervention and control groups before and after the intervention program.

H_o4: There is no significant difference in physical activity between intervention and control groups before and after the intervention program.

H_o5: There is no significant difference in body image between intervention and control groups before and after the intervention program.

H_o6: There is no significant difference in psychological distress (depression, anxiety and stress) between intervention and control groups before and after the intervention program.

H_o7: There is no significant difference in body composition (body weight status, waist circumference and body fat percentage) between intervention and control groups before and after the intervention program.

1.6 Conceptual Framework

Figure 1.1 shows the dependent variables in this intervention study. The dependent variables include knowledge, attitude and practice on healthy lifestyle, dietary practices, disordered eating behaviour, physical activity, body image, psychological distress and body composition among Malaysian adolescents living in day-school hostels. Previous studies showed that these variables were evaluated in a healthy lifestyle intervention program (Maynard, Baker, Rawlins, Anderson, & Harding, 2009; Moreno et al., 2007; Neumark-Sztainer et al., 2003; Roszanadia & Norazmir, 2011; Walker et al., 2002; Zieff, Guedes, & Wiley, 2006). Changes in these dependent variables within each group of respondents were determined and the differences between intervention and control groups before and after the intervention program were also compared.

Process evaluation was done so that adherence of intervention sessions and satisfaction of intervention respondents towards the intervention program can be determined. The modules of Healthy Eating and Be Active among Teens (HEBAT) were used to implement the intervention program among the intervention respondents. This Healthy Lifestyle Program was conducted at two phases. At Phase I, the HEBAT module (Phase I) was used and it consisted of four topics which introduced the concept and basic knowledge of healthy eating and active living. Phase I intervention was conducted from October 2012 to February 2013.

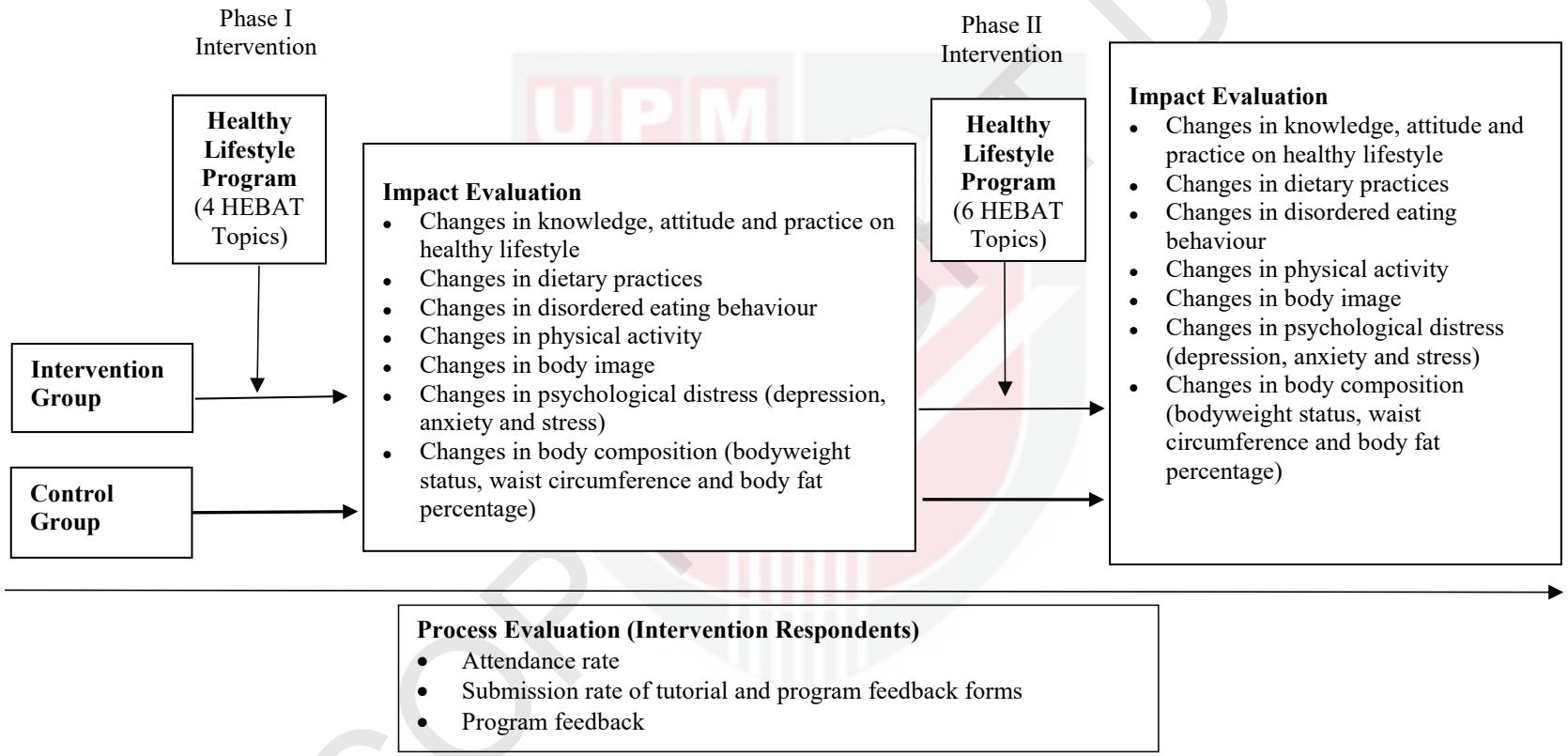

Figure 1.1: Conceptual Framework of the Study

At Phase II, the HEBAT module (Phase II) consisted of six topics which trained intervention respondents to develop healthy lifestyle skills. This enabled the application of knowledge learned in the first phase of intervention among the intervention respondents. Phase II intervention was conducted from June 2013 to February 2014. The intervention group received intervention whereas control group received none. Impact evaluation was carried out after each phase of intervention to determine effectiveness of Healthy Lifestyle Program on studied variables between intervention and control groups before and after the intervention.

1.7 Definition of Terms

Socio-demographic Background: Socio-demographic background characterized by a combination of factors related to sociology and populations characteristics (Merriam-Webster, 2016). In the current study, socio-demographic background referred to age, gender, ethnicity, area, number of siblings, monthly pocket money, parental monthly income and educational level of father and mother of respondents.

Process Evaluation: Process evaluation refers to an evaluation designed to document the delivery of an intervention, to determine the degree to which the program was implemented as planned by researchers and to measure: which program activities were delivered and when; which program participants received the intervention and how much they received; and satisfaction with the program (Hawe, Degeling, & Hall, 1992). In the current study, process evaluation comprised the evaluation of attendance rate, submission rate of tutorial and program feedback forms and program feedback of intervention among the intervention group.

Attendance Rate: In this study, attendance rate referred to the percentage of intervention respondents attended the intervention by topic of modules.

Submission Rate: Submission rate referred to the percentage of intervention respondents submitted the tutorial and program feedback forms by topic of modules.

Program Feedback: Program feedback in this study referred to the percentage of intervention respondents who agreed the intervention sessions by topics of modules were interesting, easily understood and well-liked.

Impact Evaluation: Impact evaluation refers to an assessment of how the intervention being evaluated affects outcomes, whether these effects are intended or unintended (Ravallion, 2008). In the current study, impact evaluation comprised the evaluation of knowledge, attitude and practice on healthy lifestyle; dietary practices, disordered eating behaviour, physical activity, body image, psychological distress and body composition of respondents before and after the intervention program.

Knowledge, Attitude and Practice on Healthy Lifestyle: Knowledge refers to a set of understandings; attitude refers to a tendency or constant tendency towards certain objects, individuals or situations; while practice refers to an observable action towards the stimulus (Baranowski, Cullen, Niklas, Thompson, Baranowski, 2003; Mucchielli, 1970). Knowledge, attitude and practice on healthy lifestyle referred to understanding, tendency and observable action in the practice of active living and healthy eating.

Dietary Practices: Term "practice" refers to "a habitual or customary action or way of doing something" (Merriam-Webster, 2016). Using the definition for term "practice", dietary practices refers to habits of an individual and choices he or she makes regarding food composition. In this study, dietary practices referred to energy, macronutrient and micronutrient intake, mean number of days of main meal and snack consumptions, meal skipping and snacking.

Disordered Eating Behaviours: Disordered eating behaviours refer to abnormal eating behaviours which were not clinically diagnosed and these included behaviours seen in eating disorders, restrained eating, skipping meals, compulsive eating as well as unhealthy and extreme weight control behaviours that could lead to eating disorders (Haines, Kleinman, Rifas-Shiman, Field, & Austin, 2010; Neumark-Sztainer et al., 2011; Pereira & Alvarenga, 2007). In this study, disordered eating behaviours comprised dieting, bulimia and food preoccupation and oral control of respondents.

Physical Activity: Based on WHO definition, physical activity refers to "any bodily movement produced by skeletal muscles that requires energy expenditure" (Caspersen, Powell & Christensson, 1985; Thompson et al., 2003). In the current study, physical activity referred to summary activity score, total daily energy expenditure and physical activity level.

Body Image: Body image refers to one's perception of his or her body which included feelings, attitudes, and perceptions towards weight, size, shape, and satisfaction of various body parts (Cheung, Ip, Lam, & Bibby, 2007). In this study, body image comprised body size satisfaction and perception of actual body weight status of respondents.

Psychological Distress: Psychological distress refers to unpleasant feelings or emotions that could impact level of functioning (Ridner, 2004). In this study, psychological distress referred to depression, anxiety and stress.

Body Composition: Body Composition refers to quantification of body components, the quantitative relationships between components and component alterations related to various influencing factors (Wang, Pierson, & Heymsfield, 1992). In this study, body composition referred to body weight status, abdominal obesity and percentage of body fat of respondents.

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