Abstract of the thesis entitled

**An evidence-based family-based lifestyle modification program for overweight / obese children and adolescent**

Submitted by

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The series of adverse health effect come along with childhood overweight or obesity have been well documented in studies across different ethics and nations. Despite the resource and effort that have been put for years, the overall overweight included obesity rate of Hong Kong students is still ascending over decade. An innovative family-based lifestyle modification program is reported as an effective intervention in improving the weight status of the overweight and obese children.

A systematic review has been conducted and a total of five randomized controlled trials were found while four of them reported significant results in improving a number of their weight-related outcomes. An evidence-based guideline was formulated for nurses in conducting family-based lifestyle modification program for the youngsters aged 7-14. Implementation and evaluation plan were also developed to translate the evidence into practice.
An evidence-based family-based lifestyle modification program for overweight /obese children and adolescent

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Declaration

I declare that this dissertation represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

Signed -----------------------------------
Wong Ka Man, Carmen
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Chapter 1: Introduction

1.1 Background

1.1.1. Global and local situation

Overweight and obesity are defined as abnormal or excessive fat accumulation that may place harmful effect on an individual’s health (World Health Organization, 2014). According to World Health Organization (2014), overweight affected 35% of the worldwide adult population while among the overweight population, 10% of them were obese. Obesity is a global health issue not exclusive to adults but also affects children and adolescents. Overall prevalence of overweight youngsters who aged 5 to 17 was 10% (Gupta, Shah, Nayyar & Misra, 2013) while more than 40 million children under the age of 5 were reported as overweight or obese in year 2012 (World Health Organization, 2014). With the rapid economic development of the city, lifestyle and dietary habits of children and adolescents changed with increasing material prosperity. Hong Kong is without exception to this global trend. According to the latest statistics report from Department of Health (Primary Student Obesity Rate, 2013), the overweight included obesity rate of Hong Kong primary students in year 2012/2013 was 25.5% in boys and 15.8% in girls. Despite resources and effort that have been put over decades, the overall rate has still been ascended from 18.6% in year 2002/2003 to 20.8% in year 2012/2013. Approximately, one of five primary students in Hong Kong was
diagnosed as overweight or obesity. Statistics revealed an alarming situation in our younger generation.

1.1.2. Definition of overweight and obesity

According to World Health Organization growth reference for children and adolescents aged 5-19, overweight of school-aged children and adolescents is defined as one standard deviation body mass index for age and sex, whereas obese is of two standard deviations body mass index for age and sex (Onis et al., 2007). The Center for Disease Control and Prevention (CDC) 2000 defines overweight as Body Mass Index (BMI) $\geq 85\%$ to $94\%$ whereas obesity as BMI $\geq 95\%$ (Ogden & Flegal, 2010) and this definition is generally adopted in the United States. In Hong Kong, the only local reference used to define overweight or obesity for Hong Kong children is the Hong Kong Growth Survey charts (HKGS) which conducted in 1993 with sex-specific (Leung et al., 1996) and it has also been adopted by the Department of Health till present. Childhood overweight included obesity is defined as weight $> 120\%$ median weight for height (Primary Student Obesity Rate, 2013) while no definition of solely obesity is provided.
1.2 Affirming the Need

1.2.1. Current practice and local setting

In Hong Kong, the Student Health Service under the official health department is accountable of the health of non-clinical school age population. Under the Student Health Service, there are student health centers which are responsible for on health surveillance of all Hong Kong primary and secondary school students and the adolescent health promotion offices which focus on health education and promotion in secondary school students. Overweight or obesity children and adolescents identified in the student health centers will be referred to dietitians for individual nutrition counseling as a routine. Besides, weight management program namely, ‘恆常運動健體班’ conducts twice a year in each center for primary four to six students with non-compulsory participation of parents. The program consists of two sessions and focuses on causes and influences of obesity, introduction of nutrition and physical fitness knowledge. With the restriction on the class size, only eight students could be accommodated each time. Despite the high prevalence of overweight and obesity rate in children and adolescents, only 192 students could access to this service every year. Since no formal evaluation was conducted, effectiveness of the programs could not be assessed. For the secondary schools students, nutrition education program would be offered to schools with overall overweight and obesity detection rate more than 17.8 % every academic year. The nutrition program will be provided to all forms of students and the actual number of
participants depends on the school arrangement. Program mainly focuses on basic nutrition knowledge such as introduction of food pyramid, principle of dietary choice and food labelling. According to the available unpublicized information from the researcher’s organization, it was reported that the prevalence of overweight and obesity rate remained 14-16% of nearly 320 secondary schools in Hong Kong from the year 2009 to 2012. Despite years of effort put on current overweight and obesity programs, the overall overweight and obesity rate is still on ascending trend and secondary schools with high prevalence of overweight and obese students remains no improvement. It reveals that current overweight and obesity program provided does not pose sufficient positive influence towards overweight students.

1.2.2. Introduction of the innovation

The current intervention component consists of nutrition solely in secondary schools and a combination of physical and nutrition in primary schools. Moreover, the focal point of the current program design targets on child-only. Parents act as program assistants throughout the program without included parents or family as part of the intervention. It was reported that parents had great impact on their children's weight and eating behaviors (Johannsen, Johannsen & Specker, 2006). Dietary beliefs and behaviors of parents exerted influences in shaping their children’s eating habits (Lazarou, Kalavana & Matalas, 2008). Besides, family support was also reported to be crucial in maintaining physical activity level in children and
adolescents (Dowda, Dishman, Pfeiffer & Pate, 2007). In view of the noteworthy influence posed by parents and family on the two most remarkable factors that contributed to childhood overweight, an evidence-based family-based lifestyle modification program is proposed for overweight and obese children and adolescents.

Program designs on family-based which included both family and child. By involving parents in the pediatrics obesity intervention, parents would be more eager to adopt change in creating a non-obesogenic living environment than those who were not targeted for behavior change in treatment (Wrotniak, Epstein, Paluch & Roemmich, 2004). With family members engage in the intervention, it creates a supportive environment and improves the efficiency of childhood obesity treatments. Research study reported that family-based weight control intervention targeted on both parent and child achieved greater treatment effectiveness than child-only interventions (Epstein, Valoski, Wing & McCurley, 1990). Family-based intervention was recommended by NICE guideline (Brown, 2006) and SIGN Guidelines (Logue et al., 2010) stating that lifestyle interventions for overweight and obese children and adolescents should include parent/caregiver and the family. Among all the lifestyle intervention, intervention component varies. Oude Luttikhuis et al. (2009) conducted a systematic review and concluded that lifestyle interventions which consisted of dietary, physical activity and behavioral components were useful and provided significant weight reduction in overweight children and adolescents compared to the standard care in both short and the long-term. The three components were found to be consistent with the
recommendations of clinical guidelines for weight management in New Zealand and considered to be the first line of treatment for reducing overweight and obesity in children and adolescents. (Jull et al., 2009).

For that reason, the proposed program would adopt a comprehensive approach which consists of dietary, physical activity and behavioral strategy as the three main intervention components. Despite the effectiveness claimed by lifestyle interventions in treating obese and overweight children, the effectiveness of family-based approach lifestyle modification remains uncertain. A randomized controlled trial was conducted in examining the effectiveness of family-based lifestyle modification intervention and provided evidence in supporting the effectiveness and feasibility on the intervention for obese children with significant reduction of BMI in the obese children after active treatment (Coppins et al., 2011)

1.3 Significance and Objectives

1.3.1. Significance of the study

Obesity is the leading risk factor of global death and attributes to various kinds of fatal diseases (World Health Organization, 2014). It is a known cause to a number of chronic fatal diseases, such as diabetes, coronary heart disease, high blood pressure and stroke (Problems of obesity, 2014). Its related conditions occupied around 15% of all admissions in Hong Kong (Ko, 2010) and 776 in-patient discharges and deaths were related to obesity in 2012 (Hospital
Authority Statistical Report (2011-2012), (2013). Not only does it a public health issue but also a social economic issue. Among all the disease, obesity exclusively contributed 8.2–9.8% of total Hong Kong healthcare expenditure (Ko, 2008) and its related expenditure showed a 47% increment in 5 years' time in Hong Kong (Ko, 2010). Obesity itself is a great burden to the whole health care system and its prevalence as well as the expenditure show an alarming increasing trend in Hong Kong. In view of that, it is worthwhile to put effort on the prevention and treatment on obesity starting from our younger generation.

Childhood obesity causes significant undesired impact on children well being. Friedemann et al. (2012) stated that both overweight and obese children reported higher systolic blood pressure while obese children even reported significant higher total cholesterol and triglycerides level, fasting insulin and insulin resistance level compared to the control group. Besides general physical health, obesity also causes social and psychological impacts on children. Obese children reported lower quality of life and self-esteem (Buttitta, Iliescu, Rousseau & Guerrien, 2014; Lee, Cheah, Chang & Siti, 2012) plus in higher risk of being victims of bullying (Brixval, Rayce, Rasmussen, Holstein & Due, 2012). The adverse health effect on children is also reported to be persisting to adulthood. Overweight child was at double risk of becoming an overweight adult (Singh, Mulder, Twisk, Van Mechelen & Chinapa, 2008). Overweight children also reported in contributing to premature death and physical illness in adulthood (Reilly & Kelly, 2010). Moreover, Neumark-Sztainer et al. (2006) conducted a 5-year longitudinal study and reported that adolescents with unhealthy
dieting and weight-control behaviors were at approximately three times greater risk for being overweight adults five year later. Obviously, the eating and lifestyle habit develop in childhood would persist and continue when they grow up as adult. For that reason, it is necessary for health care professions to address appropriate strategy in helping our children to develop healthy lifestyle and maintain optimum weight status.

1.3.2. Objectives

The purpose of this translational nursing research study is to examine the effectiveness of family-based lifestyle modification intervention and develop an evidence-based family-based lifestyle modification program for overweight and obese children and adolescents in Hong Kong. The objectives of this study are as follows:

1. To conduct a systematic review on family-based lifestyle modification program.

2. To determine the implementation potential of a family-based lifestyle modification program in Hong Kong.

3. To develop an evidence-based family-based lifestyle modification program for overweight/obese children and adolescents in Hong Kong.

4. To develop an implementation plan of the family-based lifestyle modification program.

5. To develop an evaluation plan of the family-based lifestyle modification program.
Chapter 2: Critical Appraisal

2.1 Identification of Studies

Three electronic bibliographical databases were searched including PubMed, CINAHL and British Nursing Index by using the following keywords: Obesity, overweight, children, adolescents, and teen, family, family-based, parents, lifestyle, diet, physical exercise, behavioral and randomized controlled trial. Studies were screened by titles and abstracts. Potential studies were further screened by full paper and the reference lists. To retrieve additional studies, reference lists of identified study were carefully screened for further potential studies.

2.1.1 Types of Studies

Randomized controlled studies which compared family-based or parent/guidance/caregiver included lifestyle modification intervention for overweight and/or obese children with other active or waitlist control were included in this review. Randomized controlled studies were chosen as it was the best research design that avoided systematic bias occurred by selecting sample from a particular population and provided the unprejudiced evidence to the effectiveness and causative relationship of the intervention (Greenhalgh, 1997).

2.1.2 Types of participant

Studies designed for overweight or obese children and adolescents and their parents/guidance/caregivers were included. Overweight defined as BMI $\geq 85\%$ to $94\%$ whereas obesity as BMI $\geq 95\%$. In term of weight for height, weight $> 120\%$ median
weight for height was defined as overweight including obesity while no definition of solely obesity is provided. In order to match the potential population in this proposed intervention, exclusion criteria were as follows: 1) target population with clinical problems or intellectual disability 2) target population that was preschoolers 3) Target population was parent only without active involvement of child.

2.1.3 Types of intervention

Studies of lifestyle modification that involved the three main components, nutrition, physical exercise and behavioral modification were included. Studies of intervention that were internet-based, telemedicine –based or involved individual sessions solely were excluded.

2.1.4 Types of outcome measures

Studies of primary outcomes that were body mass index (BMI), body mass index z-score (BMI SDS) or weight for height percentile were included. There was no restriction of the secondary outcomes and that could be waist circumference; percent body fat, percent overweight, total fat mass, quality of life or physical activity level.

2.1.5 Appraisal strategy

The identified studies were critically appraised by the methodology checklist for randomized controlled trial of rating scheme of Scottish Intercollegiate Guidelines Network (SIGN) and attached as Appendix 1. Quality and methodology of the studies were assessed in the following criteria: 1) Study focus 2) Randomization procedure; 3) Concealment method; 4) Blinding procedure; 5) Similarity of the baseline data; 6) Treatment is the only difference
between group ;7) Reliability of the outcomes measurement; 8) Dropout rate; 9) Application of intention to treat analysis; 10) Outcomes consistency. The results of quality appraisal were summarized in Appendix 2.

2.2 Results

2.2.1 Search Result

Searching process began from 19th May, 2014 to 19th August, 2014. The result and searching flow chart were shown in Appendix 3 and 4 respectively. The search strategy retrieved 149 citations (PubMed 137, CINAHL 4, British Nursing Index 8). After initial screening of titles and abstract, 24 studies were identified. All 24 studies were carefully evaluated by full paper and reference list. After assessing the potential studies with inclusion and exclusion criteria, 5 studies were retrieved. Reference lists of these five identified studies were reviewed and no additional article identified. Data extracted from the five identified studies was summarized in a table of evidence (Appendix 5) and analyzed against their bibliographic citation, published year, participants’ characteristics, sample size, program component, description of intervention and control groups, length of follow up, outcome measures and effect size.

2.2.2 Study Characteristics

All studies were RCTs and conducted in western countries. No local study was found. Three of five identified studies (Arauz Boudreau, Kurowski, Gonzalez, Dimond & Oreskovic, 2013; Janicke et al., 2008, Kalavainen, Korppi & Nuutinen, 2007) were targeted on both overweight and obese children whereas other two studies were targeted on obese children only. BMI/
BMI z-score was the main outcome that measured in all studies while other outcome measures included weight, weight for height, waist circumference, physical activity, quality of life, percent of fat, percent overweight and fat mass.

### 2.2.3 Quality Appraisal

All the studies were carried out at single site and had a clear study focus with appropriate focus question addressed. Standardized and valid outcome measurements were also demonstrated in all studies.

Four of the studies had detailed description of the randomization method by using either a random permuted block design or via computer assignment. However, study of Arauz Boudreau et al. (2013) used ratio assignment method which considered being a poor randomization method. Lack reporting of concealment method was one of the common limitations of the studies. Only one study addressed the concealment detail properly by using sealed envelope method (Kalarchian et al., 2009). Failure of proper randomization and concealment methods might lead to risk of selection bias. It may reflect on the differences in baseline characteristics of participants between groups. Among all studies, no significant different of the baseline data with data listed in form of table and being statistically analyzed with p value>0.05.

Due to study design, blinding to participants was not feasible. All identified studies did not report presence of blinding. However, Kalarchian et al. (2009) mentioned means to minimize the observer bias by having data measurements taken independently by two researchers.
Since the prime outcomes were objective anthropometric measurements, researcher bias in assessments of outcomes shall be minimal.

All studies presented with detailed information concerning the data collection process and follow up period with no additional treatment provided in particular participants. The only difference between groups was treatment under investigation.

A higher attrition rate was expected in an educational program with extended follow up period. To minimize the non-response bias, intention to treat analysis (ITT) approach shall be used. Two studies (Kalarchian et al., 2009; Kalavainen et al., 2007) could generally manage to meet the common acceptable dropout rate (20%) and report details of the use of ITT. Other three studies reported with relatively high dropout rates, 39% from Arauz Boudreau et al. (2013); 27% from Janicke et al. (2008) and 30% from Sacher et al. (2010). It was mainly due to loss to follow up while Arauz Boudreau et al. (2013) reported cases of withdrawal from study as well. All studies had a 90% or above completion rate for active treatment. Two studies (Janicke et al., 2008 & Sacher et al., 2010) provided information on reasons of attrition and Arauz Boudreau (2013) reported means to handle missing data as well.

All studies presented with the power calculation. One study (Kalarchian et al., 2009) reported with sufficient sample size. Arauz Boudreau et al. (2013) and Sacher et al. (2010) recruited sufficient samples pre-treatment. However, control group in study of Sacher et al. (2010) was two participants less than the target sample size before study completed while Arauz Boudreau et al. (2013) was far under the target sample size according to its power calculation.
which may risk of committing type II error. Kalavainen et al. (2007) recruited little less than the estimated numbers before intervention. However, study was managed to obtain statistically significant results in the study due to the minimal dropout rate. Janicke et al. (2008) did not mention actual estimated number of participants required in study. It was unclear if statistical power was met with sufficient sample size or not.

The levels of evidence were ranked based on the criteria of Scottish Intercollegiate Guideline Network 2012 (Scottish Intercollegiate Guidelines Network, 2012) and summarized in appendix 2. According to the quality assessment, Kalarchian et al. (2009) met most of the criteria and was ranked 1++ considering being high quality RCT with very low risk of bias. Three studies committed few methodological flaws such as absence of binding and concealment method were ranked 1+. The high dropout rate and absence of reporting method in handling missing data led to downgrade of the study of Sacher et al. (2010). Kalarchian et al. (2009) reported 50% participants attending < 75 % of sessions. The sufficiency of treatment dosage remained unknown and hence it might affect the intervention outcomes. Study of Janicke et al. (2008) fulfilled numerous assessing items with detailed descriptions provided. However, it did not report the use of ITT and whether its sample size could meet the expected power analysis would be its main reason of downgrading. Study of Arauz Boudreau et al. (2013) was weak in methodology with most or major items not fulfilled ranked as 1-. Since randomization was the fundamental of RCT, absence of or poorly designed randomization method would definitely downgrade the studies besides, it had a high
dropout rate with participants withdrew from studies which might indicate flaw in intervention design. The high dropout rates also led to a reduction of sample size that could far reach the estimated power calculation to detect the change of outcome measures.

2.3 Summary and synthesis

2.3.1 Summary

2.3.1.1 Effectiveness of the programs

All studies reported that family based lifestyle modification program was effective in numerous weights-related outcomes of overweight and obese children. Three studies reported intervention effect post treatment. Kalavainen et al.(2007) reported a significant BMI reduction (-0.8 vs 0) (p=0.003) between groups and greater fall in weight for height (6.8%) than routine individual counseling (1.8%) (p=0.001). However, it is noted that both control and intervention groups reported significant results in weight related outcomes with p-value (p< 0.05). It might be related to the sample characteristics. Participating families were being interviewed on their willingness in taking part in the study and it was reported that these participants were more aware of the weight problems. Moore, Harris and Bradlyn(2012) reported that concerned parents were more prone to limit child screen time, improve child diet and increase child physical activity than those reported with no concern and hence, exerting an impact on obese child. Therefore, even control groups which received two individual routine counseling with a booklet provided to family reported with certain weight reduction. Although both groups reported significant results, the greater reduction
magnitude in all weight related aspects could still be used in supporting the effectiveness of the family-based intervention.

Arauz Boudreau et al. (2013) and Janicke et al. (2008) were failed to report statistical results in all weight status aspects between groups in post treatment measurement while Arauz Boudreau et al. (2013) reported a small reduction in BMI z-score (-0.030)(p=0.05) within intervention group. The discrepancy between studies was due to time of measurement. Although three studies (Arauz Boudreau et al., 2013; Janicke et al.s, 2008; Kalavainen et al., 2007) measured outcomes post treatment, program design of Kalavainen et al. (2007) was different from the other two studies as it consisted of two phases. First phase was conducted in fall term and acted as main theme while the second phase was conducted in spring term and acted as reinforcement. The post treatment measurement was conducted after second phase in which was already two terms beyond the main phase. The post treatment measurement was less immediate compared to the other two studies. Besides study of Arauz Boudreau et al. (2013) which was absence of any follow up measurement, the other two studies were reported with significant weight status reduction in 6 months follow up measurements. It was likely that the effectiveness of the intervention was not powerful enough to be detected post treatment. Since behavior change required certain time to transform from pre-contemplation to contemplation and from preparation to action (Prochaska & Velicer, 1997), the effect of weight loss in related to change in lifestyle was difficult to detect post treatment.
Three studies showed a short term benefit of the intervention in 6 months measurement (Kalarchian et al., 2009; Kalavainen et al., 2007; Sacher et al., 2010). All studies reported a significant treatment effect in BMI between groups, however, Sacher et al. (2010) and Kalarchian et al. (2009) reported a consistent but greater BMI reduction (-1.2 to -1.22) than that of Kalavainen et al. (2007) (-0.7). A difference was noted in program design between these studies. Behavioral sessions were attended by parent and child together in the study of Sacher et al. (2010) and Kalarchian et al. (2009) while that in Kalavainen et al. (2007) was in separated groups. Although it was reported that behavioral modification interventions targeted children and parents together or separately were effective in weight-loss in both parents and children (Berry, Sheehan, Heschel, Knafl, Melkus & Grey, 2004), studies in this review targeted behavioral session with children and parents together showed a stronger effect than that in separated group. Besides, study of Kalarchian et al. (2009) and Sacher et al. (2010) also reported positive results in their secondary weight related outcomes. In comparing these two studies, Kalarchian et al. (2009) reported a stronger effect in reducing percentage fat (-2.13) compared to insignificant result in Sacher et al. (2010) and 0.5 greater reduction in fat mass in study of Kalarchian et al. (2009). There was a discrepancy regarding outcomes between studies. Among these studies, program components were similar. However, in study of Kalarchian et al. (2009), lifestyle coach meetings were arranged before or after group sessions in setting weekly goal individually and reviewing self-monitoring records while goal setting was taught in groups in study of Sacher et al. (2010). Individualized goal
setting sessions appeared to exert a greater effect on the weight related status reduction in obese children and it was consistent with the finding of Ries et al. (2014). It was reported that health behavior change was influenced by goal setting components that were unique individually and suggested tailor made goal setting strategies in achieving a sustainable behavior change (Ries et al., 2014). Tailoring goal setting would better fit into individual’s need and better facilitate health behavior changes.

Three studies reported long term effect in 10 month (Janicke et al., 2008), 12 months (Kalarchian et al., 2009; Sacher et al., 2010) and 18 months (Kalarchian et al., 2009). There was no single outcome that could compare the effect of these three studies. By comparing them, Janicke et al. (2008) and Sacher et al. (2010) both reported significant results in BMI z-score but Sacher et al. (2010) reported 0.1 greater reduction than Janicke et al. (2008). Kalarchian et al. (2009) did not use BMI z-score as outcomes, instead it reported in BMI score. Kalarchian et al. (2009) and Sacher et al. (2010) both failed to report a significant reduction in BMI. However, they reported similar waist circumference reduction significantly between groups from -3.1 to -3.41. Three outcomes, weight, BMI and percentage overweight were assessed at 18 months. A trend of weight related status reduction was noted within group but failed to report a significant difference between groups.

Based on the best available research evidence, family-based lifestyle modification program was shown most effective in 6 months and fairly effective up to 12 months in overweight and obese children. However, only one study reported outcomes measures beyond 12 months.
Further research studies would be required in examining the effectiveness and sustainability of intervention in long term.

2.3.1.2 Participants of the programs

Target populations of all studies were children aged 7-14 with most studies targeted on children with the age of 8-12. Only one study (Kalavainen et al., 2007) targeted on younger age group from 7 to 9. Among all, only Janicke et al., 2008 reported the difference between younger and elder children with the effect of intervention. It was reported that children aged 11 years old and above experienced an approximately 50% greater weight loss in family based group than those in the parent-only group. However, it was reported that its sample size was too small to detect a moderating effect of age on weight status outcomes and further research was required in support with such findings. There were some common exclusion criteria in all studies such as free from physical and mental problems, not taking drugs that affect body weight and not participated in other weight loss program before.

2.3.1.3. Duration and intensity of the programs

Most studies conducted programs for around 5 to 6 months (Arauz Boudreau et al., 2013; Janicke et al., 2008; Kalavainen et al., 2007). While the program of Sacher et al. (2010) lasted for 9 weeks only and followed by a 12 weeks free family swim pass offered to participants. The whole program finished in around 5 month time as well. Kalarchian et al. (2009) held program in two phases which would be separated in fall and spring terms. The whole program would last for around 9 month time. In general, intervention duration was commonly
lasted for five to six months. Among all review studies, only study of Arauz Boudreau et al. (2013) was in rather low intensity which consisted of 6 sessions with 9 hours in total and reported with insignificant result. Other four studies (Janicke et al., 2008; Kalarchian et al., 2009; Kalavainen et al., 2007; Sacher et al., 2010) consisted of 15 to 26 sessions with 22.5 to 36 hours in total. All four studies were reported with significant reducing effect in weight related status such as BMI/ BMI z-score. Programs general held either weekly or biweekly over months with 60 to 120 minutes each session. Though the association between intervention intensity and effectiveness remained unclear, all studies with intensive intervention reported with effective outcomes.

2.3.1.4 Outcome measures of the program

All studies included BMI/BMI z-score as the outcome measure. Other weight status related outcomes included waist circumference, percent fat and weight, percentage overweight and total fat mass. For other outcomes, physical activity, sedentary activity, self-esteem, quality of life was used in assessing the effect of the intervention. It was suggested to be included BMI as the primary outcome. Other common outcomes measures would be picked as interventionist’s interests such as waist circumference, percent fat as other weight related outcomes to evaluate the program.

2.3.2. Synthesis of the programs

To improve weight status and develop a healthy lifestyle of the overweight and obese children and adolescents in Hong Kong, a family-based lifestyle modification program was
proposed by translating the best available evidence to local current practice.

Since developmental stage was different in ages, the intervention would be solely effective on the age group as the evidences adopted. Therefore, the proposed program would be targeted on overweight or obese children aged 7-14. Exclusion criteria such as free from physical and mental problems, not taking drugs that affect body weight and not participated in other weight loss program before would be adopted.

Program would consist of three main components which were nutrition, physical exercise and behavioral modification. Same program structure would be adopted as the evidence reported.

In order to achieve the greatest benefit from the program, behavioral sessions were suggested to be attended by parent and child together and individual meeting was suggested in goal setting to achieve the optimum strategy to facilitate behavioral change. The duration of the program would be lasted for around six months and proposed to consist of 15 to 26 sessions weekly or biweekly over months with 60 to 120 minutes each session.

Primary outcome measure would be BMI. Other weight status related outcome such as waist circumference, percentage overweight and total fat mass could be taken as consideration as secondary outcomes. The outcomes measure should be performed for at least two follow up sessions in 6th month and 12th month in order to evaluate the effectiveness of the intervention for both short term and long term.
Chapter 3: Translation and Application

By reviewing literatures in previous chapters, it was reported that family-based lifestyle modification program had significant improvement in weight related outcomes of overweight and obese children and adolescents. Prior to putting the innovation into practice, assessment would be done on its transferability and feasibility potential. Following this, an evidence-based protocol would be set in line with the best available evidence and current working practice in order to formulate a high quality guideline that is mostly adapted to the local practice.

3.1. Implementation Potential

3.1.1. Transferability of the findings

The innovation is proposed for non-morbidity overweight and obese primary and secondary students in Hong Kong. When compared with the reviewed studies, the target population in all studies is overweight and obese children aged 7-14 with most studies targeted on children with the age of 8-12 (Arauz Boudreau et al, 2013; Janicke et al, 2008; Kalarchian et al, 2009; Kalavainen et al, 2007; Sacher et al, 2010). The demographic background between local setting and reviewed studies is similar in terms of age, weight related status and health status. The major demographic difference is the race of the population. The local target population is mostly Asian with limited percentage of South Asians, African, White and Biracial. Only two
among four reviewed studies (Janicke et al, 2008; Kalarchian et al, 2009) reported such information. The target population of Janicke et al (2008) is White majority followed by African American, Hispanic and Biracial while that of Kalarchian et al (2009) consisted of White, Black and low percentage of Native Asian. Although the race of population is different and no Asian study is found, all of the reviewed studies are done in developed countries which share a similar social background with the targeted population in Hong Kong. Together with similar physical conditions of the target population, it is believed that the intervention is transferrable to the local setting. Besides, two out of five reviewed studies (Arauz Boudreau et al, 2013; Janicke et al, 2008) are targeted on low-income population. Since the proposed target population is all non-morbidity overweight and obese students with no limitation on their social and family backgrounds, the two reviewed studies aim at low-income population would still fit the proposed population and provide a more comprehensive picture on the effectiveness of the innovation in tackling the overweight and obese problems of children coming from different economic backgrounds. The innovation is proposed to be held in one of the student health centers which is also consistent with the community or school settings in the reviewed studies.

The philosophy of care for family-based lifestyle modification program is to engage family into the child’s weight management program and create a supportive environment for overweight and obese child to develop a healthy lifestyle and maintain an optimum weight
status. This belief certainly meets the core values of the Student Health Service which is to safeguard both the physical and psychological health of school children (About Student Health Service, 2014). Its main aim is to enable the school age children to gain the most benefit from the education system and develop their full potential (About Student Health Service, 2014). Both groups are about to meet the target in upholding the health of students and promoted well-being.

There are 12 student health centers in Hong Kong. Taking current setting, one of the student health centers, as reference, 37979 primary and secondary school children attended the student health services in the year of 2012-2013. Since there was no publicized information available, the overweight and obesity students were estimated by the average overweight included obesity rate in Hong Kong in year 2012-2013 that were 20.8% for primary students and 15% for secondary students. The estimated target population who aged 7-14 is around 4,500 students in one center. The innovation is proposed to be held twice a year with 25 pairs of parent and children included each time. A total of 50 students in each center and a total of 600 students will be benefit from the program each year. With the limited resources, not all anticipated children could be included in the program at one time. However, the program could provide a long term benefit to overweight and obese students and help them in developing healthy lifestyle and maintaining optimal weight which could ease the tense of uprising overweight rate in long run.
Based on the reviewed literatures, the proposed program will be conducted in 15 sessions with 90 minutes each over 5 months with 6th month and 12th month post intervention follow-ups. Program will consist of three main components. Each component consists of 5 session. Nutrition and physical exercise sessions will be held on weekly basis while the behavioral sessions will be held in the form of individual meetings biweekly. Since similar format is being used in the current educational program conducted by the center, it is believed this mode of education program is well adapted to our staff and potential participants. In order to minimize the disturbance of participants and routine working schedule, the follow up sessions will be integrated into the annual health checkup appointments.

To conclude, the setting of reviewed studies is similar to the current setting. There is a high transferability potential in implementing the innovation into the local practice.

3.1.2. Feasibility

With the transferability potential assessed, feasibility will be another issue to be assessed. In public health aspects, nurses act as the majority working force and play an important role in health education and disease prevention works. Nurses have high autonomy in initiating health education programs. The major concern would be extra workload added on the staff and interference of daily center operation. Since at least two staff would be occupied each time and responsible staff would be required to work on weekends, compensation off on their working days would be required in which other colleagues might require finishing the daily
routine work with the absence of two staff and hence, daily center function might be slightly affected. Resistance may also be encountered from staff in adapting the change particularly with additional duties to be fulfilled. Since the innovation is proposed to replace the current weight management program. Skills and knowledge are fully equipped by our nursing staff already. It is optimistic that the resistance will be reduced once they get into knowing more about the innovation. Furthermore, reassurance shall be given with the successful previous experience in organizing pilot child weight management program ‘Keep Fit 行動小組-Keep Fit 計劃’ in the year of 2006-2007 showing that the acceptance and operation logistics of launching a new program are manageable by both staff and center operation.

Since the proposed program is family-based which involved both the child and the family members which is different from the conventional child-only program, additional concern should be given in recruitment and retention of parents in the program. Gerards, Dagnelie, Jansen, De Vries and Kremers (2012) conducted a study in examining the barriers to recruit parents in an childhood obesity prevention intervention. It was reported that the main barriers were parents’ denial of the overweight problem of their child and their resistance of discussing the weight related issues with the health care professions (Gerards, Dagnelie, Jansen, De Vries & Kremers, 2012). Nursing staff will be given training on how to discuss the child’s overweight problems with the parents and motivate them for active participations in
the program. Besides, the program is proposed to be held on weekends and wish it could be better facilitated the participation of the family.

As the program will consist of nutrition and behavioral aspect, collaboration will be done with dietitians and clinical psychologists within department in designing the program as well as offering training to the nursing staff. However, the consensus of support from other disciplines will remain uncertain since it will involve resources and manpower of other disciplines. The consensus may not be able to obtain as simple as those with the nursing staff.

Nevertheless, obstacles arisen did not mean mission impossible. Collaboration is made among different disciplines in other programs before. One of the example is the cooperation of nurses and clinical psychologists in organizing health program for addictive behavior namely, Junior Health Pioneer workshop, which is currently conducted to every primary three students who attended the student health services. The key to success is to gain their recognition to the benefits brought by the program.

The support of administrator would be another crucial factor. Since the outcomes and effectiveness of the current weight management program namely, ‘恆常運動健體班’ for primary four to six students are not significant, the evidence based family-based lifestyle modification program could act as a replacement to the current program. Since the program structure, resources and skill required of the proposed innovation were comparable with the current weight management program, with evidence and significant outcomes reported in
research studies, there is by no means the administrator would reject a program that require little resources and modification but able to maximize the benefit to our clients.

In support with the proposed program, main resources included manpower; venue and health education material will be needed. Most resources are well-equipped in the local setting including the facilitators and venue. Facilitators would be trained nursing staff while the entire center could be fully utilized as the program site. Health education material such as computer, projector, and stationery is available in the health centers. Certain materials such as food for teaching healthy snack preparation and balls for physical exercise would be required. Moreover, as the major evaluation outcomes would be BMI and waist circumference, the evaluation tools required like stadiometer and soft measuring tape are all available in health centers. For that reason, health centers are definitely the optimum place to implement the proposed program.

3.1.3. Cost/benefit ratio of the program

Research studies reported family based lifestyle modification program achieved significant weight related outcomes reduction on overweight and obese children and adolescents. It was reported significant reduction in BMI (Kalarchian et al, 2009; Kalavainen et al, 2007; Sacher et al, 2010), percentage fat (Kalarchian et al, 2009) and fat mass (Sacher et al, 2010). Besides, it helped the children in adopting healthier lifestyle by increasing their levels of physical
activities along with self-esteem and reducing their sedentary behavior at the same time (Sacher et al., 2010). It is remarkable that family-based weight management program was reported with greater treatment effectiveness when compared with the current child-only weight management program (Epstein, Valoski, Wing & McCurley, 1990). It was reported that children in the child and parent group showed extensively greater result of 7.0% reduction in percentage overweight in 10 years while there were only 4.7% and 13.6% increase in child-only group and control group respectively. (Epstein, Valoski, Wing & McCurley, 1990). Unexpected beneficial change such as reduction in parent BMI was reported as well (Kalarchian et al., 2009).

The lifestyle modification program is an educational program consists of experimental learning such as healthy snack preparation and physical exercise. There are potential risks concerning food allergy of the participants and physical complications arisen from the physical activity. To minimize the risk, comprehensive medical history should be obtained from participants before commencing the program. Besides, emergency medical equipment is available in each center in case of any unanticipated emergency situation occurs. Furthermore, there is potential risk of additional stigmatization for the participants by attending the weight management program (Janicke et al., 2008). This undesirable feeling might hinder them from active participant in treatment and their readiness in adapting healthy lifestyle change (Janicke et al., 2008; Zeller et al., 2004). To reduce the stigma that might arise, the program
will be conducted on weekend with no unauthorized person allowed to be presence during the program conduction. Moreover, individual invitation is preferred while interviewing in routine checkup rather than public recruitment to ensure adequate privacy.

Since the current program has been conducted over decade, a descending figure is expected in the overall overweight and obesity rate. However, the rate was reported to be climbing from 18.6% in year 2002/2003 to 20.8% in year 2012/2013 (Primary Student Obesity Rate, 2013). Since the current program did not pose an adequate magnitude in reducing the number of overweight and obese children in Hong Kong as shown in the figure, the undesirable results on both physical and psychological aspects which related to overweight and obesity will be persist. Moreover, as evidence shows that childhood obesity would continue in adulthood (Singh, Mulder, Twisk, Van Mechelen & Chinapa, 2008), persistent high prevalence in childhood obesity rate would undeniably pose a burden to Hong Kong healthcare system and healthcare expenditure in long run.

Even a program could bring ten times benefit would be in vain if the program required resources with an unaffordable cost. The cost effectiveness of an innovation should be carefully reviewed. The overall cost calculation is shown in Appendix 6. For set up cost, the total expenditure will be HK$ 7870.4 while the operation cost will be HK$12478.6 per program. The program will be conducted twice per year which made up a total of HK$24957.2 per year. The detail of setup and operation cost is presented in appendix 6, table
1 and 2 respectively. Since 50 participants is expected to be served each year, the average operation cost for each participant would be HK$499.1. To compare the cost now spent on the current program, the average operation cost for each participant is HK$230.7 of a total of 16 participants involved per year and the detail calculation is listed in appendix 6, table 3. Although the cost of the proposed program is around double the cost of the current program, however, taking the cost spent on each overweight or obese child every year into consideration, the total cost is indeed reducing. Without an effective weight management strategy, the overweight or obese child keeps on routine doctor consultation and dietitian counselling every year. The cost spent on each overweight and obese student every year is HK$443 and detail calculation is attached in appendix 6, table 4. With an effective weight management program, the child will require no further follow ups the year after in which saving the consultation fee spent every year. The proposed program will be a cost saving measures in long term.

3.2. Evidence-Based Practice Guideline/Protocol

After reviewing the transferability, feasibility and cost effectiveness of the reviewed studies, it is reported that the family-based lifestyle modification program is beneficial to our target population and feasible in local setting. To implement the program, an evidence-based practice guideline shall be developed based on the reviewed studies in the systematic review. The levels of evidence and grades of recommendation were ranked based on the grading system of Scottish Intercollegiate Guideline Network (SIGN) 2012 (Scottish Intercollegiate
Guidelines Network, 2012) and attached in appendix 7 respectively as reference. According to the pervious systematic review, there is one study ranked as 1++ (Kalarchian et al, 2009), three studies ranked as 1+. (Janicke et al, 2008; Kalarchian et al, 2009; Sacher et al, 2010) and one study ranked as 1- (Arauz Boudreau, 2013). The evidence-based guideline is given recommendation on the definition of overweight and obesity, the inclusion and exclusion criteria of target population, the major components of the program and the grouping method in different session, the duration and frequency of the program, the number of follow up sessions for effective evaluation to conduct family-based lifestyle modification program. The detail of the guideline is attached in Appendix 8.
Chapter 4: Implementation Plan

4.1 Communication Plan

4.1.1. Stakeholders identification

Stakeholders are people who affect or are affected by the proposed program (Polit & Beck, 2008, p. 320). The key stakeholders of this innovation are the administrators, supervisors, executors and the target population. The administrators are the consultant, senior medical officers and senior nursing officers who positioned at the head office, the highest hierarchy of the student health service unit. They generally support any evidence-based innovation which would be beneficial to the clients and are responsible in approving the new proposed program and providing support with resources required. Down to the center level, there are center-in-charges, the medical officers and nursing officers, who are accountable in supervising the proposed program, handling potential difficulties and monitoring the compliance of the frontline staff. The frontline staff, registered nurses and enrolled nurses, is the executor of the proposed program. They conduct and evaluate the innovation and lastly, the target population, the overweight/obese children and their parents, who are the recipients of the family-based program.
4.1.2. Communication process

To initiate the program, a working schedule is made to guide the process. It includes preparation phase, pilot study plan and implementation and evaluation phase. The detailed timeline of the working schedule is attached in Appendix 9. Preparation phase is initiated by communicating with the senior frontline staff members as they would be the program implementers of the innovation, their invaluable comment will help refine the innovation. The refined innovation could then be easier in getting support from other staff and that would act as a stronger power of the changing process. Informal peer group discussion would be conducted in presenting the proposed innovation and its benefit of which made it outweighed the current program. After polishing the innovation, the proposal could present to the supervisory level, the center-in-charges, for their support. A formal presentation would be held in providing evidence of the significance and necessity of the proposed innovation and addressing the limitation of the current program. Highlight would be given to the effectiveness and benefits of the innovation, the expected outcomes, manpower and resources required and interference of the center operation. After gaining the support of center-in-charges, the innovation could pass on to the administrators. A comprehensive proposal would be written with related reviewed literature studies, table of evidence, the implementation potential, evidence-based practice guideline, working schedule and preliminary budget plan. The cost-effectiveness of the proposed innovation and resources required would be specially addressed in responding to their main concern. The proposal
would be presented by the center-in-charge and supplemented by the proposer. With the approval of the administrators, an operation team comprised of three registered nurses including the proposer, one nursing officer and one medical officer could be formed. The main role of the team is to provide training, conduct pilot program, coordinate and prepare the program, formulate program manual according to the evidence-based guideline and lastly, evaluate and revise the program. To guide the change, program operation manual and the evidence from literature reviewed would be given to all program implementers and training session would be conducted by the team to introduce the innovation. Reassurance would be given that there would be sufficient training and minimal extra workload. Lastly, to communicate with our potential target population, overweight children and their parents, posters and leaflets which illustrated the aim and objective of the program, enrollment detail and program summary would be made and post around the waiting area of the student health center. Leaflet would be ready in the nurses’ and doctors’ interview rooms and about to distribute to potential clients.

To sustain the changing process, nurses’ compliance with the new evidence-based guideline would be assessed regularly by auditing checklist. The weight related outcomes of the overweight/obese children would be monitored in follow-up sessions. Success stories would also be shared among staff in regular office meeting to reinforce positive results.
4.2 Pilot Study Plan

4.2.1. Aim and objective

The objective of the pilot study is to determine the feasibility of the program in local setting and provide data in supporting the full scale implementation. It aims at evaluating

i. staff compliance of the program

ii. staff satisfaction level

iii. Participants satisfaction level

iv. the time and cost required for the program and

v. Any unexpected adverse effect for the target population.

4.2.2 Recruitment of target population

The target population recruited would follow the same inclusion and exclusion criteria as the evidence based guideline mentioned in the previous chapter. Ten overweight/obese children and adolescents and their parents would be recruited one month before implementing the pilot program. Convenient sampling would be used. Eligible participants located during routine health checkup would be given invitation and referred to the communication team. The team would be responsible in explaining the detail and objective of the pilot program and obtaining consents.
4.2.3. Design and Data Collection

The program would last for around six months and propose to consist of 15 sessions weekly for the first 6 weeks and biweekly afterwards with 60 to 90 minutes each session. Different data would be collected at different time points. Participants’ demographic data and weight-related outcomes would be collected post intervention. For staff compliance, staff and participants satisfaction level, they would be collected after every session of the program. Auditing checklist attached in Appendix 10 would be used to evaluate staff compliance. Staff and participants’ satisfaction level would be evaluated by the questionnaire attached in Appendix 11 and 12 respectively. Lastly, any adverse event arisen during the program would require written report for further discussion among the communication team for any potential need in refining the program.

4.2.4. Evaluation of the pilot study

The quantitative data obtained in the participant’s weight-related outcomes would be analyzed by statistical method. It aimed at trying the statistical analysis process and familiarizing the team members with the SPSS software. All the textual data collected would be considered and discussed in the communication team meeting. Discussion would be focus on problems and issues reported. Positive feedback would also be addressed as a kind of positive reinforcement. Lastly, evaluation among the communication team would be
conducted to discuss for any difficulties encountered during the preparation and pilot study. Moreover, the process time of data analysis and cost spent on pilot study would be evaluated to give a more precise estimation for full-scale implementation. The evaluation obtained from the pilot study would be used to modify and finalize the proposed program.

4.3 Evaluation Plan

4.3.1. Outcomes

4.3.1.1. Patient Outcomes

To evaluate the weight status of participants, change in Body Mass Index (BMI) is chosen as the primary outcome. Merely change in weight could not reflect the actual weight status due to variation growth and puberty stages. Although weight for height could take the variance of height into consideration when reviewing weight status, the data output is a percentile showing the weight status of an individual compared to the other of the same height and thus, the actual change in weight status would be less explicit by just having a percentile differences. Moreover, exclusive software is needed to convert the graphical data in weight for height growth charts into numerical data for computerization which also implies extra investment and training are required. For BMI, not only could it take the height into calculation by the formula (weight (kg)/[height (m)]^2) but also facilitate the comparison of the intervention effectiveness with the reviewed studies as BMI are the outcome of most of the
reviewed studies while weight for change is only chosen for one of the five studies. In addition, BMI is recommended and supported by the research study of Cole, Faith, Pietrobelli and Heo (2005) as the best and practical measure in assessing adiposity change in growing children. More important, BMI is the current measurement tool to evaluate the weight status change in current weight management program for obesity children in the Department of Health. Not only would the system and protocol be familiarized by staff members, the software required to handle BMI related data is also ready in the existing computer program. Since the evaluation focuses on the change of the weight status instead of the figure itself, it is not necessary to be consistent with the participants’ recruitment criteria. BMI is definitely the most appropriate and user-friendly primary outcome in the current setting for its easy data management and explicit display of weight status differences.

Waist circumference is taken as the secondary outcome as it is reported to be an optimal predictor of cardiovascular disease (Savva et al, 2000) and to identify undesired blood-lipids profile and hypertension of pre-pubertal children (Maffeis, Pietrobelli, Grezzani, Provera & Tatò, 2001). It is agreed that waist circumference is the easiest and simplest way to assess the cardiovascular disease risk (Maffeis, Pietrobelli, Grezzani, Provera & Tatò, 2001) and central fat estimation of overweight children (Sung et al, 2008). Moreover, reference values and percentile curves for waist circumference of Hong Kong Chinese children in respect of age and sex are available (Sung et al, 2008) which made it practically used in the current setting.
In order to reserve the accuracy and consistency with the reference values, the waist circumference measurement site would be measured in midway between lowest rib and superior iliac crest which made it consistent with the study of Sung et al (2008).

4.3.1.2. Healthcare provider outcomes

Staff compliance is crucial in determining the quality of the program especially in a newly developed education program. Therefore, staff compliance is taken as the primary healthcare provider outcome. An auditing checklist is used in assessing the compliance of staff in terms of achieving the main objective, delivering explicitly of the core message and following the protocol of program and activities arrangement. The auditing checklist is attached in Appendix 10. Besides, staff satisfaction is also important in related to the program sustainability and therefore, it is taken as the secondary outcome. The satisfaction level is evaluated by the questionnaire attached in Appendix 11 and rated in four levels. It mainly targets on staff’s level of satisfaction towards the use of program manual, support and resources provided, workload and perceptive towards beneficence of clients and overall satisfaction level. The auditing checklist and satisfaction questionnaire is done after each session in which 15 set of data would be collected at the end of all sessions completed.

4.3.1.3. System outcomes

Cost effectiveness is regarded as the primary system outcome. Since it is the prime concern of the administrator, this outcome could help provide evidence in supporting the continuation
of the innovation. The cost spent on the innovation for each participant is expected to be higher than that of the current program. Although an ideal system outcome should be considered with a lesser expenditure compared with the current spending, solely viewing the minimized expenditure could not truly reflect the cost-effectiveness of the program. Therefore, using expenditure spent per each BMI reduction is more appropriate in reviewing the program’s cost-effectiveness.

4.3.2. Nature and number of clients to be involved

Target clients would be overweight or obese children aged 7-14 years and their parents/guidance/caregivers. The target population is based on the inclusion and exclusion criteria of the evidence-based guideline mentioned in the previously chapter. Convenience sampling would be adopted three months before the program implementation. The primary outcome is the participants’ changes of BMI. To compare the BMI differences before and after the program, one sample paired t-test is used. Among all reviewed studies, three of them used BMI as their primary outcomes. Out of that three studies, the target population of Kalavainen et al’s study (2007) is mostly matched with the proposed program and therefore, its data is used for sample size estimation. With the power of 80% at a statistical level of significance of 0.05, mean difference as 0.7 , standard deviation of 1.3 and 20 % dropout rate, the sample size should be 35 (Lenth,2006-9).
4.3.3. Time and frequency of measurement taking

Data is taken at baseline, 6\textsuperscript{th} month and 12\textsuperscript{th} month follow up. According to the reviewed studies, the treatment is most effective at post-treatment and 6\textsuperscript{th} month follow up while the measurement in 12\textsuperscript{th} month follow up is taken to estimate the potential long-term treatment effect. The 12\textsuperscript{th} month follow up is incorporated with the annual check up to minimize the disturbance of the children and parents. For the healthcare provider outcomes, staff compliance is assessed after each session which makes up a total of 15 assessments for one program. Compliance is planned to be done every session due to the unique program content of each single session. Team members of communication team would be served as the program assistants as well as the auditors. Regarding the staff satisfaction level, self-reported questionnaire would be collected after each session to obtain the most updated comment. For the system outcome, an expenditure report would be done for the completed program for overall review of the cost–effectiveness.

4.3.4. Data analysis

For patient outcomes, intention-to-treat analysis would be performed. The patient outcome would be analyzed by one sample paired t-test for each follow up with statistical significance \( p < 0.05 \) to determine if the outcomes could be achieved. It aimed at determining if the BMI and waist circumference of the children would be reduced after participating in the innovation. All the data collected from recruited subjects would be put on analysis pre intervention and at month 6 and 12. Concerning the health care provider outcomes, in order
to examine the staff compliance of the program, McNemar test would be performed. To estimate the staff satisfaction level, 95% confidence interval would be reported. All the quantitative data is analyzed by using the Statistical Package for the Social Sciences (SPSS) Version 21 and the minimum significance level set to 5 percent. For qualitative data obtained, a qualitative descriptive design with phenomenological approach is used. All textual descriptions are categorized into different themes for analysis. Lastly, for the system outcome, the cost for manpower and resource expenditure would be computerized for comparing with the expenditure used in the current child-only weight management program.

4.3.5. Determination of the guideline effectiveness

The innovation is considered effective if the primary outcome, BMI of the overweight/obese children, could reduce for 0.8 or above at 6\textsuperscript{th} month follow up when taking an average reduction as reference from the reviewed studies (Kalarchian et al, 2009; Kalavainen et al, 2007; Sacher et al, 2010). For waist circumference, both short and long term treatment effect is reported from the reviewed studies. The average waist circumference reduction is 3.96 cm at 6\textsuperscript{th} month follow up while that at 12\textsuperscript{th} month follow up is 3.83cm (Kalarchian et al, 2009; Sacher et al, 2010). Therefore, a 3.8 cm waist circumference reduction at 6\textsuperscript{th} month and 12\textsuperscript{th} month follow up respectively would be considered as an effective patient outcome. For the healthcare provider outcomes, the training and support provided to staff would be considered as effective when staff compliance level could achieve 90\% passing rate in auditing checklist
and 75% satisfaction rate in staff satisfaction questionnaires. Concerning the system outcomes, it is considered as effective for a lower expenditure spent per each BMI reduction of the overweight children after participating in the innovation than that of the current child-only weight management program.
Reference


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Primary Student Obesity Rate (2013). Retrieved July 28, 2014 from The Government of the Hong Kong Special Administrative Region, Department of Health Web site:


# Appendix 1: Methodology Checklist 2: Randomized Controlled Trials

## SIGN

### Methodology Checklist 2: Randomized Controlled Trials

<table>
<thead>
<tr>
<th>Study Identification</th>
<th>(Include author, title, year of publication, journal title, pages)</th>
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<th>Guideline topic:</th>
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## SECTION 1: INTERNAL VALIDITY

**In a well conducted RCT study.....**

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<th>Not addressed</th>
<th>Not reported</th>
<th>Not applicable</th>
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<td>1.1 The study addresses an appropriate and clearly focused question.</td>
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<td>1.2 The assignment of subjects to treatment groups is randomized</td>
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<td>1.3 An adequate concealment method is used</td>
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<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation</td>
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<td>1.5 The treatment and control groups are similar at the start of the trial</td>
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<td>1.6 The only difference between groups is the treatment under investigation</td>
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<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way</td>
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<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
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<td>1.9 All the subjects are analyzed in the groups to which they were randomly allocated (often referred to as intention to treat analysis)</td>
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<td>1.10 Where the study is carried out at more than one site, results are comparable for all sites</td>
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## SECTION 2: OVERALL ASSESSMENT OF THE STUDY

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<tbody>
<tr>
<td>2.1 How well was the study done to minimize bias? Code +, +, or –</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2 If coded as +, or – what is the likely direction in which bias might affect the study results?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

© Scottish Intercollegiate Guidelines Network, March 2004
<table>
<thead>
<tr>
<th>Section</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
</tr>
<tr>
<td>2.4</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
</tr>
<tr>
<td><strong>SECTION 3: DESCRIPTION OF THE STUDY</strong> (The following information is required to complete evidence tables facilitating cross-study comparisons. Please complete all sections for which information is available). <strong>PLEASE PRINT CLEARLY</strong></td>
<td></td>
</tr>
</tbody>
</table>
| 3.1 | How many patients are included in this study?  
*Please indicate number in each arm of the study, at the time the study began.* |
| 3.2 | What are the main characteristics of the patient population?  
*Include all relevant characteristics – e.g. age, sex, ethnic origin, comorbidity, disease status, community/hospital-based* |
| 3.3 | What intervention (treatment, procedure) is being investigated in this study?  
*List all interventions covered by the study.* |
| 3.4 | What comparisons are made in the study?  
*Are comparisons made between treatments, or between treatment and placebo/no treatment?* |
| 3.5 | How long are patients followed-up in the study?  
*Length of time patients are followed from beginning participation in the study. Note specified end points used to decide end of follow-up (e.g. death, complete cure). Note if follow-up period is shorter than originally planned.* |
| 3.6 | What outcome measure(s) are used in the study?  
*List all outcomes that are used to assess effectiveness of the interventions used.* |
| 3.7 | What size of effect is identified in the study?  
*List all measures of effect in the units used in the study – e.g. absolute or relative risk, NNT, etc. Include p-values and any confidence intervals that are provided.* |
| 3.8 | How was this study funded?  
*List all sources of funding quoted in the article, whether Government, voluntary sector, or industry.* |
| 3.9 | Does this study help to answer your key question?  
*Summarize the main conclusions of the study and indicate how it relates to the key question.* |
### Appendix 2 Quality Appraisal of identified studies

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear focus question</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Randomization</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Adequate Concealment</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>+++</td>
<td>NR</td>
</tr>
<tr>
<td>Blinding</td>
<td>-</td>
<td>NR</td>
<td>-</td>
<td>NR</td>
<td>-</td>
</tr>
<tr>
<td>Similarity between groups</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Treatment as only differences</td>
<td>+++</td>
<td>++</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Valid outcomes measures</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Dropout rate</td>
<td>39%(I)</td>
<td>27%(FB)*</td>
<td>22.7%(I)</td>
<td>2.9%(I)</td>
<td>30% (I)</td>
</tr>
<tr>
<td></td>
<td>33%(C)</td>
<td>24%(PO)^</td>
<td>17.9%(C)</td>
<td>0%(C)</td>
<td>32%(C)</td>
</tr>
<tr>
<td>Intention-to-treat analysis</td>
<td>+++</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Comparable results for all sites</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Minimize bias</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Bias affect results</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Overall effect due to intervention</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Results applicable to target group</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Level of evidence</td>
<td>1-</td>
<td>1+</td>
<td>1+</td>
<td>1++</td>
<td>1+</td>
</tr>
</tbody>
</table>

+++ Well covered ++ Adequate covered + Poorly covered – Not covered NR Not reported N/A Not Applicable

*Fb= Family-based intervention ^PO=parent only group I= Intervention group C= Control group
Appendix 3  Search result of identified studies

By keyword search:
1. obesity OR overweight
2. family OR family led OR parent
3. children OR adolescent OR youth
4. lifestyle OR (diet AND exercise AND behavioral)

Limits: human, randomized controlled trials, Age: child 6-12 years AND adolescent 13-18 years

PubMed: 1599 articles
CINAHL: 37 articles
British Nursing Index: 52 articles

Limits: randomized controlled trials

PubMed: 137 articles
CINAHL: 4 articles
British Nursing Index: 8 articles

Reviewed by titles

PubMed: 58 articles
CINAHL: 4 articles
British Nursing Index: 5 articles

Reviewed by abstracts

PubMed: 21 articles
CINAHL: 1 article
British Nursing Index: 2 articles

Reviewed by full papers and reference lists

PubMed: 5 articles
CINAHL: 0 article
British Nursing Index: 0 article

Total articles for review after elimination of duplication: 5

Date of search; 19th Aug, 2014
Records identified searching through database: PubMed, CINAHL and British Nursing Index (n = 1688)

Additional records identified through other sources

Records after duplicates removed (n = 1265)

Records excluded by limiting to RCT and aged 6-18 (n = 1116)

Records screened by titles and abstracts (n = 149)

Records excluded (n = 125)

Full-text articles assessed for eligibility (n = 24)

Full-text articles included (n = 5)

Studies included in qualitative synthesis (n = 0)

Studies included in quantitative synthesis (meta-analysis) (n = 0)

Full-text articles excluded by the following reasons:

1. Target population with clinical problems (n = 1)
2. Target population was preschoolers (n = 1)
3. Intervention included parents only without active involvement of child (n = 3)
4. Studies is internet-based/telemedicine –based (n = 5)
5. Intervention consists of individual session only (n = 2)
6. Intervention consists of nutrition/exercise/behavioral component respectively only (n = 7)
**Appendix 5 Table of evidences**

<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study Type</th>
<th>Participants characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Time of measurement</th>
<th>Outcome measures</th>
<th>Effect size (Mean difference)</th>
</tr>
</thead>
</table>
| Arauz Boudreau et al. (2013) | RCT | • Overweight and obese Children aged 9-12 and parent(s)  
• BMI ≥ 85% *  
• No chronic disease other than asthma (n=41) | • 5 weekly sessions  
• 1 session 3 months later  
• 1.5 hour each.  
• Held for 6 months  
• Sessions held in parent group, child group and parent-child group  
• Culturally sensitive coaching monthly (n=23) | Waitlist control (n=18) | Post treatment | Primary:  
1. Health related quality of life (HRQoL)  
2. BMI z-score | Intervention group; control group  
1. +5.6;+0.4 (p=0.48)  
2. -0.03;-0.05 (p=0.31) |

*Overweight as BMI ≥ 85% to 94% whereas obesity as BMI ≥ 95% or overweight including obesity as weight > 120% median weight for height based on age and sex.
**Bibliographic citation**  
Janicke et al. (2008)

<table>
<thead>
<tr>
<th>Study Type</th>
<th>Participants characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Time of measurement</th>
<th>Outcome measures</th>
<th>Effect size (Mean difference, CI)</th>
</tr>
</thead>
</table>
| RCT        | • Overweight and obese children aged 8-14 and parent(s)  
• BMI $\geq 85\%$ *  
• No medical condition that contraindicated mild energy restriction or moderate physical activity  
• No use of prescription weight loss drugs  
• Not enrolled in other weight loss program (n=93) | Family-based intervention (FB)  
• 8 sessions weekly and biweekly for the next 8 sessions.  
• Held for 4 months  
• 90 minutes each  
• Sessions held in parent group, child group and parent-child group  
• Parent-child group mainly emphasis on goal setting (n=34) | Parent only group (PO)  
• Similar to parent group in FB  
• Emphasis on how to work with children to set goals (n=34) | • Post treatment  
• 10th month | Primary: BMI z-score Post treatment (4th month)  
• PO to WLC  
-0.127, 0.027 to 0.226 ($p<0.05$)  
• FB to WLC  
-0.065, -0.027 to 0.158 ($p=0.16$)  
• PO to FB  
-0.061, -0.039 to 0.162 ($p=0.23$)  
10th month follow up  
• PO to WLC  
-0.115, 0.003 to 0.220 ($p=0.04$)  
• FB to WLC  
-0.136, -0.018 to 0.254 ($p=0.03$)  
• PO to FB  
Not reported ($p=NS$)  
• PO overall mean  
-0.09 (0.039)*  
• FB overall mean  
-0.115 (0.046)* |
| Family-based intervention (FB)  
• 8 sessions weekly and biweekly for the next 8 sessions.  
• Held for 4 months  
• 90 minutes each  
• Sessions held in parent group, child group and parent-child group  
• Parent-child group mainly emphasis on goal setting (n=34) | Waitlist control group (WLC) (n=26) | | | | |

*Overweight as BMI $\geq 85\%$ to $94\%$ whereas obesity as BMI $\geq 95\%$ or overweight including obesity as weight $>120\%$ median weight for height based on age and sex.
<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study Type</th>
<th>Participants characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Time of measurement</th>
<th>Outcome measures</th>
<th>Effect size (Mean difference±/ SE)</th>
</tr>
</thead>
</table>
| Kalarchian et al. (2009) | RCT | - Obese children aged 8-12 with parents  
- BMI ≥ 97%*  
- No mental retardation, pervasive developmental disorder or psychosis  
- No psychiatric symptoms  
- No genetic obesity syndrome  
- Not currently having obesity treatment  
- Not Inability to engage in prescribed daily activity  
- No medical conditions contraindicating usual care  
- No use of medication to affect body weight (n=192) | - 20 group meetings  
- Held for 6 months  
- 60 minutes each  
- Meeting with lifestyle coach weekly for goals setting  
- 6 booster sessions (3 group session and 3 telephone calls) between 6th month and 12th month  
- Sessions held in parent group, child group and parent-child group  
- Parent-child group mainly emphasis on goal setting (n=97) | - 2 sessions of individual nutrition consultation (usual care) (n=95) | 6th month  
12th month  
18th month | Primary:  
1. Weight  
2. BMI  
3. Percentage overweight  
4. Waist circumference  
5. Percent body fat  
6. Total fat mass | Treatment effect (mean± SE)  
After 6 months follow up  
1. -3.2±0.89 (p=0.0003)  
2. -1.22±0.36 (p=0.0007)  
3. -6.92±1.98 (p=0.0005)  
4. -3.83±1.04 (p=0.0003)  
5. -2.13±0.63 (p=0.0008)  
6. -2.91±0.94 (p=0.021)  
After 12 months follow up  
1. -2.3±0.94 (p=0.014)  
2. -0.61±0.38 (p=0.11)  
3. -3.92±2.10 (p=0.12)  
4. -3.41±1.36 (p=0.014)  
5. -1.58±0.69 (p=0.024)  
6. -2.46±1.03 (p=0.051)  
After 18 months follow up  
1. -1.58±0.89 (p=0.077)  
2. -0.21±0.36(p=0.56)  
3. -0.99±2.01(p=0.62)  
Other outcomes did not carry out at month 18 |

*Overweight as BMI ≥ 85% to 94% whereas obesity as BMI ≥ 95 % or overweight including obesity as weight >120 %median weight for height based on age and sex.
<table>
<thead>
<tr>
<th>Bibliographic citation</th>
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<th>Participants characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Time of measurement</th>
<th>Outcome measures</th>
<th>Effect size (Mean difference)</th>
<th></th>
</tr>
</thead>
</table>
| Kalavainen et al. (2007) | RCT        | • Obese children aged 7-9 with parent  
• Weight for height 120-182% *  
• No disease or medication causing obesity, obvious movement disturbance  
• No major mental problems in either children or parents  
• No family member participates in other weight management program (n=70) | • 10 sessions weekly and biweekly in the next 5 sessions  
• Held for 6 months  
• 90 minutes each  
• Sessions held in parent group, child group and parent-child group (n=35) | • 2 sessions of routine individual counseling for children  
• 30 minutes each  
• Booklet for family (n=35) | • Post treatment  
• 6th month | Primary:  
1. Weight for height(%)  
1.1 ≥5% reduction(n)  
1.2 ≥10% reduction(n)  
Secondary:  
2. BMI  
3. BMI SDS | After treatment Intervention group  
1. -6.8 (p=0.001)  
1.1 22 (p=0.004)  
1.2 13 (p=0.054)  
2. -0.8 (p=0.003)  
3. -0.3 (p=0.022)  
Control group  
1. -1.8 (p=0.001)  
1.1 9 (p=0.004)  
1.2 5 (p=0.054)  
2. 0 (p=0.003)  
3. -0.2 (p=0.022) | After 6 months follow up Intervention group  
1. -3.4 (p=0.008)  
1.1 15 (p=0.015)  
1.2 5 (p=0.259)  
2. +0.1 (p=0.016)  
3. -0.2 (p=0.081)  
Control group  
1. +1.8 (p=0.008)  
1.1 6 (p=0.015)  
1.2 2 (p=0.259)  
2. +0.8 (p=0.016)  
3. -0.1 (p=0.081) |

*Overweight as BMI ≥ 85% to 94% whereas obesity as BMI ≥ 95% or overweight including obesity as weight > 120% median weight for height based on age and sex.
<table>
<thead>
<tr>
<th>Bibliographic citation</th>
<th>Study Type</th>
<th>Participants characteristics</th>
<th>Intervention</th>
<th>Comparisons</th>
<th>Time of measurement</th>
<th>Outcome measures</th>
<th>Effect size (Mean difference, CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sacher et al. (2010)</td>
<td>RCT</td>
<td>• Obese children aged 8-12 with parent &lt;br&gt;• BMI ≥ 98% * &lt;br&gt;• No apparent clinical problems, co-morbidities, physical disabilities or learning difficulty &lt;br&gt;• (n=116)</td>
<td>• 18 sessions held twice weekly &lt;br&gt;• 120 minutes each &lt;br&gt;• Held for 5 months &lt;br&gt;• 12- weeks free family swim pass &lt;br&gt;• Sessions held in child group and parent-child group (n=60)</td>
<td>Waitlist control (n=56)</td>
<td>6th month &lt;br&gt;12th month</td>
<td>Primary: &lt;br&gt;1. Waist circumference &lt;br&gt;2. BMI &lt;br&gt;3. BMI z-score &lt;br&gt;4. Lean body mass &lt;br&gt;5. Fat mass &lt;br&gt;6. Percent of body fat &lt;br&gt;7. Physical activity &lt;br&gt;8. Sedentary activity &lt;br&gt;9. Global self-esteem score</td>
<td>Difference between groups &lt;br&gt;Change 0-6 months &lt;br&gt;1. -4.1,-5.6 to -2.7 (p&lt;0.0001) &lt;br&gt;2. -1.2,-1.8 to -0.6 (p&lt;0.0001) &lt;br&gt;3. -0.24,-0.34 to -0.13 (p&lt;0.0001) &lt;br&gt;4. -0.8,-2.6 to 0.9 (p=0.3) &lt;br&gt;5. -2.4,-4.8 to 0.0 (p=0.05) &lt;br&gt;6. -1.6,-5 to 1.9 (p=0.7) &lt;br&gt;7. 3.9 ,0.1 to 7.8 (p&lt;0.04) &lt;br&gt;8. -5.1,-9.0 to -1.1 (p=0.01) &lt;br&gt;9. 0.3 ,0.0 to 0.7 (p=0.004)</td>
</tr>
</tbody>
</table>

*Overweight as BMI ≥ 85% to94% whereas obesity as BMI ≥ 95 % or overweight including obesity as weight >120 %median weight for height based on age and sex.
Appendix 6

Table 1. Setup cost of family-based lifestyle modification program

<table>
<thead>
<tr>
<th>Material</th>
<th>Items name</th>
<th>Item no.</th>
<th>Cost (HK$)</th>
<th>Total cost (HK$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balls</td>
<td>25</td>
<td>$5 each</td>
<td>$125</td>
<td></td>
</tr>
<tr>
<td>Kitchen utensils</td>
<td>25</td>
<td>$10 each</td>
<td>$250</td>
<td></td>
</tr>
<tr>
<td>Photocopy of staff manual</td>
<td>3</td>
<td>$10 each</td>
<td>$30</td>
<td></td>
</tr>
<tr>
<td>Pens</td>
<td>52</td>
<td>$1 each</td>
<td>$52</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>(paper, correction pen, scissors ,binder, clips, cardboard ,etc)</td>
<td></td>
<td>$200</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>$657</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-material (Staff cost)</th>
<th>Staff</th>
<th>Staff no.</th>
<th>Time / person</th>
<th>Cost (HK$)</th>
<th>Total cost (HK$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing officer (planning)</td>
<td>1</td>
<td>1</td>
<td>2hrs x4=8hrs</td>
<td>$ 281.2/ hr</td>
<td>$ 2249.6</td>
</tr>
<tr>
<td>Registered nurse (planning)</td>
<td>2</td>
<td>2</td>
<td>2hrs x4=8hrs</td>
<td>$ 177.3 / hr</td>
<td>$ 2836.8</td>
</tr>
<tr>
<td>Registered nurse (teaching)</td>
<td>1</td>
<td>1</td>
<td>2hrs</td>
<td>$177.3 / hr</td>
<td>$ 354</td>
</tr>
<tr>
<td>Registered nurse (training)</td>
<td>5</td>
<td>5</td>
<td>2hrs</td>
<td>$177.3 / hr</td>
<td>$ 1773</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$7213.4</td>
</tr>
</tbody>
</table>

Total set up cost: HK$657 + HK $ 7213.4= HK $7870.4
Table 2. Operation cost of family-based lifestyle modification program

<table>
<thead>
<tr>
<th>Material</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Items name</td>
<td>Item no.</td>
</tr>
<tr>
<td>Photocopy of notes</td>
<td>25</td>
</tr>
<tr>
<td>Food</td>
<td>25</td>
</tr>
<tr>
<td>Miscellaneous (paper, souvenirs, disposable microphone cover, sterile hand rub, etc)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-material (Staff cost)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff</td>
<td>Staff no.</td>
</tr>
<tr>
<td>Registered nurse</td>
<td>1</td>
</tr>
<tr>
<td>Enrolled nurse</td>
<td>1</td>
</tr>
<tr>
<td>Workman</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

Total operation cost each time: HK $1075 + HK $11403.6 = HK$12478.6
Total operation cost per year (Twice per year): HK$12478.6 x 2 = HK$24957.2
Total cost per participants: HK$24957.2/ 50 = HK$499.1
Table 3. Operation Cost of current child based weight management program

### Material

<table>
<thead>
<tr>
<th>Items name</th>
<th>Item no.</th>
<th>Cost (HK$)</th>
<th>Total cost (HK$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photocopy of notes</td>
<td>25</td>
<td>$ 5 each</td>
<td>$ 125</td>
</tr>
<tr>
<td>Miscellaneous (paper, souvenirs, disposable microphone cover, sterile hand rub, etc)</td>
<td></td>
<td></td>
<td>$ 200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>$ 325</strong></td>
</tr>
</tbody>
</table>

### Non-material (Staff cost)

<table>
<thead>
<tr>
<th>Staff</th>
<th>Staff no.</th>
<th>Time / person</th>
<th>Cost (HK$)</th>
<th>Total cost (HK$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered nurse</td>
<td>1</td>
<td>2 hrs x2sessions= 4hrs</td>
<td>$ 177.3 / hr</td>
<td>$709.2</td>
</tr>
<tr>
<td>Enrolled nurse</td>
<td>1</td>
<td>2 hrs x2sessions= 4hrs</td>
<td>$138.9 / hr</td>
<td>$555.6</td>
</tr>
<tr>
<td>Workman</td>
<td>1</td>
<td>2hrs x2 sessions =4hrs</td>
<td>$ 63.9 / hr</td>
<td>$255.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$1520.4</strong></td>
</tr>
</tbody>
</table>

Total operation cost each time: HK $325 + HK $1520.4 = HK$1845.4

Total operation cost per year (Twice per year): HK$1845.4 x 2 = HK$3690.4

Total cost per participants: HK$3690.4 / 16 = HK$230.7

Table 4: Expenditure for each overweight and obese student every year

### Non-material (Staff cost)

<table>
<thead>
<tr>
<th>Staff</th>
<th>Staff no.</th>
<th>Time / person</th>
<th>Cost (HK$)</th>
<th>Total cost (HK$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietitian</td>
<td>1</td>
<td>0.5 hrs x2sessions= 1hr</td>
<td>$ 234.1 / hr</td>
<td>$234.1</td>
</tr>
<tr>
<td>Doctor</td>
<td>1</td>
<td>0.5hrs</td>
<td>$ 417.8 / hr</td>
<td>$208.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$443</strong></td>
</tr>
</tbody>
</table>
Appendix 7:
Grading system of Scottish Intercollegiate Guideline Network (SIGN) 2012

A. Grading system of the Level of Evidences

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1++</td>
<td>High quality meta-analyses, systematic reviews of randomized controlled trials (RCTs), or RCTs with a very low risk of bias</td>
</tr>
<tr>
<td>1+</td>
<td>Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias</td>
</tr>
<tr>
<td>1-</td>
<td>Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias</td>
</tr>
<tr>
<td>2++</td>
<td>High quality systematic reviews of case control or cohort studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal</td>
</tr>
<tr>
<td>2+</td>
<td>Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal</td>
</tr>
<tr>
<td>2-</td>
<td>Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal</td>
</tr>
<tr>
<td>3</td>
<td>Non-analytic studies, e.g. case reports, case series</td>
</tr>
<tr>
<td>4</td>
<td>Expert opinion</td>
</tr>
</tbody>
</table>

B. Grading system of the Grades of Recommendations

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade A</td>
<td>At least one meta-analysis, systematic review of randomized controlled trials (RCTs), or randomized controlled trial rated as 1++ and directly applicable to the target population; or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results</td>
</tr>
<tr>
<td>Grade B</td>
<td>A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or extrapolated evidence from studies rated as 1++ or 1+</td>
</tr>
<tr>
<td>Grade C</td>
<td>A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or extrapolated evidence from studies rate as 2++</td>
</tr>
<tr>
<td>Grade D</td>
<td>Evidence level 3 or 4; or extrapolated evidence from studies rated as 2+</td>
</tr>
<tr>
<td>Good Practice Points</td>
<td>Recommended best practice based on the clinical experience of the guideline development group.</td>
</tr>
</tbody>
</table>
Appendix 8. An Evidence based Guideline

**Clinical guidelines of family-based lifestyle modification program**

A. Introduction

In order to eliminate the potential hazardous effect to our overweight or obese children and adolescents in Hong Kong, there is necessity for health care professions to address appropriate strategy in helping our children to develop healthy lifestyle and maintain an optimum weight status. Among all the child weight management strategies, family-based lifestyle modification program is reported to be an effective and feasible intervention that could be applied in local situation. This clinical guidelines is aim at providing guideline with the best available evidence in conducting the program.

B. Background

Childhood obesity causes significant undesired impact on children’s wellbeing. Both overweight and obese children report higher systolic blood pressure while obese children even report with significant higher total cholesterol and triglycerides levels, fasting insulin and insulin resistance levels compared with normal weight children (Friedemann et al, 2012). The adverse health effect on children would not only stay in childhood but even persist to adulthood (Singh, Mulder, Twisk, Van Mechelen & Chinapa, 2008). Research studies reported family based lifestyle modification program achieved significant weight related outcomes included BMI, percentage fat and fat mass reduction on overweight and obese children and
adolescents (Kalarchian et al, 2009; Kalavainen et al, 2007; Sacher et al, 2010). Besides, it helps the children in adopting a healthier lifestyle by increasing their levels of physical activity along with self-esteem and reducing their sedentary behavior at the same time (Sacher et al, 2010). When compared to the current child-only weight management program, research study shows that family-based weight management program has greater treatment effectiveness (Epstein, Valoski, Wing & McCurley, 1990). It is reported that by involving parents in the obesity intervention, parents will be more eager to adopt change in creating a non-obesogenic living environment than those who are not targeted for behavior change in treatment (Wrotniak, Epstein, Paluch, & Roemmich, 2004). For that reason, an evidence-based guideline of family-based lifestyle modification program is developed for the sake of the overweight and obese children.

C. Aim

To help overweight and obese children and adolescents achieve optimum weight status by lifestyle modification.

D. Objectives

1. To describe evidence-based recommendations for conducting family-based lifestyle modification program.

2. To promote healthy lifestyle and optimum weight status to overweight and obese children and adolescents.
E. Intended Users of the Guideline

Nursing staff in the Student Health Service center.

F. Target Population

Non-morbidities overweight or obese children and adolescents who aged 7-14 years in which overweight and obesity defines as weight >120 % median weight for height based on age and sex according to local reference and their parent/guidance/caregivers.

G. Methodology

1. Methodology in assessing the levels of evidence

The identified studies were critically appraised by the methodology checklist for randomized controlled trial of rating scheme of Scottish Intercollegiate Guidelines Network (SIGN) 2012 (Scottish Intercollegiate Guidelines Network, 2012). Quality of the study were assessed in the following criteria: 1) Study focus 2) Randomization procedure; 3) Concealment method; 4) Blinding procedure; 5) Similarity of the baseline data; 6) Treatment is the only difference between group; 7) Reliability of the outcomes measurement; 8) Dropout rate; 9) Application of intention to treat analysis; 10) Outcomes consistency

2. Methodology in assessing the grades of recommendation

The recommendations were ranked based on the grading system of Scottish Intercollegiate Guideline Network (SIGN) 2012 (Scottish Intercollegiate Guidelines Network, 2012). The
grading system weighs the recommendations in five levels, from Grade A to D and Good Practice Points

H. Recommendations

<table>
<thead>
<tr>
<th>Recommendation 1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>In children and adolescents, overweight including obesity defined as weight &gt;120 % median weight for height based on age and sex.</td>
</tr>
<tr>
<td>Grade of recommendation:</td>
</tr>
<tr>
<td>Evidences:</td>
</tr>
<tr>
<td>• Different countries develop their own diagnostic criterion. It is widely adopted the definition of the Centers for Disease Control and Prevention (CDC) 2000 in various countries whereas overweight as BMI ≥ 85 % to 94% whereas obesity as BMI ≥ 95 % (Ogden &amp; Flegal, 2010) (3). In Hong Kong, there is no definition of solely overweight or obesity was provided. The only local reference uses to define overweight including obesity in Hong Kong children would be the Hong Kong Growth Survey charts (HKGS) which conducted in 1993 with sex-specific that is weight &gt; 120% median weight for height (Leung et al ,1996) (2+). As there is no local BMI reference available, using weight for height is more appropriate in Hong Kong local setting.</td>
</tr>
</tbody>
</table>

*Parentheses referred to level of evidence

<table>
<thead>
<tr>
<th>Recommendation 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight and obese children aged 7-14 who are free from physical and mental problems and not taking drugs that affect body weight should be recruited in the program.</td>
</tr>
<tr>
<td>Grade of recommendation:</td>
</tr>
<tr>
<td>Evidences:</td>
</tr>
<tr>
<td>• Evidences suggest that overweight and obese children who aged 7-14 with no physical and mental complications demonstrates significant improvement in weight status after the program. (Janicke et al, 2008 ;(I+)Kalarchian et al, 2009(I+++); Kalavainen et al, 2007(I+);Sacher et al , 2010(I+))</td>
</tr>
</tbody>
</table>

*Parentheses referred to level of evidence
**Recommendation 3:**
To ensure program effectiveness, family-based lifestyle modification program should be conducted in same class but separated groups which are parent group, children group and parent child group.

<table>
<thead>
<tr>
<th>Grade of recommendation:</th>
<th>B</th>
</tr>
</thead>
</table>

**Evidences:**
- Evidences suggest that parent and child with separated and joint sessions demonstrated significant improvement in weight status. (Janicke et al, 2008 ;(1+)Kalarchian et al, 2009(1++); Kalavainen et al, 2007(1+);Sacher et al, 2010(1+))
- The program focus is different for parent and child, attending the program in separate groups could better respond the needs of both parents and children.
  - Participating adults are taught to set goals for and to model healthy lifestyle changes in physical exercise and eating.( Kalarchian et al, 2009)(1++)
  - Parents are responsible for inducing changes at home for the entire family.( Kalavainen et al, 2007)(1+)
  - Parent group aims at developing strategies for changing the eating and exercise habits. (Janicke et al, 2008 ) (1+)
  - Child group aims at motivating them to increase recreational physical activity. ( Kalavainen et al, 2007)(1+)
  - Child group aims at demonstrate strategies to keep active and prepare healthy snack.( Janicke et al, 2008 ) (1+)
  - Some sessions required both parties to work on together.
    - Parent and child are required to develop goals for the week and specific plans in achieving the goals together. ( Janicke et al, 2008 ) (1+)
    - Parent and child group is focused on teaching both parent and child to apply behavioral techniques. (Sacher et al , 2010)(1+)

*Parentheses referred to level of evidence
**Recommendation 4:**
Program should consist of three major components which are nutrition, behavioral and physical exercise.

Grade of recommendation: **A**

Evidences:
- The interventions with significant results share the same three main components which consist of nutrition, physical exercise and behavioral. (Janicke et al, 2008; Kalarchian et al, 2009; Kalavainen et al, 2007; Sacher et al, 2010)
- The three components are recommended by clinical guidelines for weight management in New Zealand and consider to be the first line of treatment for reducing overweight and obesity in children and adolescents. (Jull et al, 2009)

*Parentheses referred to level of evidence

**Recommendation 5**
- Behavioral sessions are suggested to be attended by parent and child together and individual meeting is suggested in goal setting to achieve the optimum strategy to facilitate behavioral change.

Grade of recommendation: **B**

Evidences:
- Behavioral sessions with children and parents together show a stronger effect than that in separated group (Kalarchian et al, 2009; Sacher et al, 2010)
- Individualized meetings for goal setting report stronger effect in reducing percentage fat and fat mass than those meeting in groups (Kalarchian et al, 2009)

*Parentheses referred to level of evidence
**Recommendation 6:**
The program consists of at least 15 sessions with 22.5 hours in total.

| Grade of recommendation: | B |

Evidences:
- Studies report with significant reducing effect in weight related statuses are in various duration and intensity of 15 to 26 sessions with 22.5 to 36 hours in total.
- Minimum effective program intensity is at least 15 sessions with 22.5 hours in total. (Janicke et al, 2008(1+); Kalarchian et al, 2009(1++); Kalavainen et al(1+), 2007; Sacher et al, 2010(1+))

*Parentheses referred to level of evidence

**Recommendation 7:**
The outcomes measures should be performed for at least two follow up sessions in 6th month and 12th month in order to evaluate the effectiveness of the intervention.

| Grade of recommendation: | A |

Evidences:
- Based on the best available research evidence, family-based lifestyle modification program is shown most effective in 6 months and fairly effective up to 12 months in overweight and obese children. (Kalarchian et al, 2009(1++); Kalavainen et al(1+), 2007; Sacher et al, 2010(1+))

*Parentheses referred to level of evidence
Reference:


## Appendix 9 Timeline of the working schedule of family-based lifestyle modification program

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Preparation phase</th>
<th>Pilot Study Plan</th>
<th>Implementation &amp; Evaluation phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5</td>
<td>6 7 8 9 10 11 12 13</td>
<td>14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34</td>
</tr>
<tr>
<td>Preparation of the program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discuss with senior frontline nurses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication with supervisors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate with administrators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forming communication team</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modification of the guideline &amp; formulate user’s manual</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recruit pilot study participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff training session</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of pilot study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Collection of pilot study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation of pilot study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modification of guideline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recruit study participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementing new guideline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Collection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing report of the study</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix 10

The auditing checklist in evaluating staff compliance (Pilot study use and Program use)

Staff name and title: ____________________________

<table>
<thead>
<tr>
<th>Checklist items</th>
<th>Pass (✓)</th>
<th>Fail (x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achieve the main objective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Deliver explicitly of the core message</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Follow the program protocol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Follow activities arrangement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Overall performance (pass will be granted only if all 4 items pass)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment: (compulsory if any item is failed)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Auditor name: _______________________________________________________________________
Auditor title: _____________________________________________________________________
Date: ____________________________________________________________________________
Appendix 11

Staff satisfaction questionnaire on family-based lifestyle modification program
(Pilot study use and Program use)

Staff name and title:  ________________________________

Please kindly “tick” the following items to express your level of satisfaction towards the program: (1) very
dissatisfied, (2) dissatisfied, (3) satisfied and (4) very satisfied

<table>
<thead>
<tr>
<th>Items</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Content of program manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Design on program arrangement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Support and resources provided</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Workload</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Beneficence of clients.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Overall satisfaction level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment : (Please kindly give comment if any item is ranked 2 or above)

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

Reporter name:  ________________________________
Reported title:  ________________________________
Date:  ________________________________
Appendix 12

Participants’ satisfaction questionnaire on family-based lifestyle modification program
(Pilot study use)

Name: ____________________________________________  Parent  Child
Date: ____________________________________________

Please kindly “tick” the following items to express your level of satisfaction towards the program: (1) very much disagree, (2) disagree, (3) agree and (4) very much agree

<table>
<thead>
<tr>
<th>Items</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Content is easy to understand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Content is practical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 The activities are easy to handle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Duration and frequency of the program sessions is appropriate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 The message is explicitly delivered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 It is an effective program</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment : (Please kindly give comment if any item is ranked 2 or above)

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________