REVIEW

Recommendations to develop an intervention for Japanese youth on weight management

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Abstract : In the last 20 years the average change in BMI among Japanese youth is minimal, but significant changes appear when the categories of overweight/obesity and underweight are investigated within gender. Now intervention programs for Japanese youth on weight management need to be developed. To address the issue, there are a series of steps that could be undertaken utilizing theory of behavior change. Using the Transtheoretical Model-Stages of Change as the health promotion theory an intervention could be developed that would tailor messages to the level of the stage of readiness to weight change that exists among youth. Different aspects of the intervention could be developed and targeted to groups of youth by their needs. To assist with planning and development of the intervention principles of Intervention Mapping could be used to guide development using data from a needs assessment survey to : a) determine youths' knowledge, attitudes and beliefs about body size, b) determine youth's barriers to change in body size, c) determine parental knowledge, attitudes and beliefs about body size, d) determine parental barriers to change in youth body size, e) determine the prevalence of health problems from low and high BMI of young females and males, f) determine which youth are at risk-rural/urban areas, socioeconomic status. J. Med. Invest. 51 :154-162, August, 2004

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BODY WEIGHT AMONG JAPANESE YOUTH

The overall change in BMI among Japanese youth reported from the National Nutrition Survey in Japan from 1979 to 1998(1) is minimal among females, from 21.0 to 20.6 and has increased among males, from 20.9 to 21.2. However, more significant differences in BMI change appear when the categories of underweight (BMI<18.5) and overweight/obesity (BMI≥25.0) are investigated within gender. In the last 19 years the prevalence of overweight/obesity among Japanese males age 15-19years has increased from 6.0% to 11.4%. For Japanese females age 15-19 years the prevalence of overweight/obesity has increased less, rising from 4.5% to 6.1%. This percentage increase in overweight among Japanese youth in the last 19 years is less than that of US children ages 12-19 years over the last 20 years. The prevalence of overweight among US youth has increased from 5.3% to 15.5% among females and from 4.8% to 15.5% among males (2). In both countries the male youth have the greater increase in prevalence of overweight.

At the other end of the spectrum of body weight from overweight are the youth classified as underweight with a BMI<18.5. The increase in the prevalence of underweight Japanese youth offsets the increase in overweight/obese youth, thus the average BMI changes among Japanese youth are deceiving. In the last 18 years data indicate that the prevalence of underweight among Japanese youth ages 15-19 years has increased among males from 15.3% to 16.3% and among females

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from 13.5% to 20.4%. As well, this pattern of increasing prevalence of underweight is seen among females in the adjacent age group of 20-29 years where the prevalence has increased from 14.4% to 20.3%, respectively.

There is also data from the Japanese Nutrition Survey to support that across all age groups people report a desired BMI much lower than their actual BMI with females desiring on average about a 2BMI decrease from their actual weight and males varying across the age span from1 to 2BMI less than their actual weight. Further investigation of these data indicates that large proportions of Japanese youth who are normal weight perceive themselves as being overweight. In the 1998 Japanese survey the average BMI among males age 15-19 years was 21.2, however they reported a desired BMI of 20.7. The females average BMI was 20.6 and they reported a desired BMI of 18.7. Among female youth who were normal weight (BMI 18.5-24.9) 50.8% perceived that their actual weight was too high and that they should be smaller. Perhaps more alarming was that among Japanese females who were already underweight (BMI<18.5) 38.8% felt that they should weigh less.

Unlike the US that is facing an epidemic of overweight among its youth, it appears that Japan is facing a more serious problem of rising prevalence of underweight among its youth. However, the rise in prevalence of overweight/obesity among Japanese males ages 15-19 years should not be left unnoticed and also deserves attention. A comprehensive study of both ends of the body weight distribution of Japanese youth, both underweight and overweight, should be undertaken to better understand the determinants of this behavior such that appropriate interventions can be taken.

RATIONALE

The figures reflecting actual changes in Japanese youth body size coupled with the data to support the desire to have a very low body size suggest that there are some environmental or societal issues that are altering the self image of Japanese youth. It is noteworthy that across the entire age range Japanese men and women report the desire to have a smaller BMI. This supports that there may be societal or environmental factors motivating all Japanese people to have a small body size. It is unclear at this time what the Japanese societal image of appropriate or desirable weight is based on. Societal images might include movie stars or famous people in the media. On the other hand, these desires may be motivated from a desire to avoid obesity which is discussed widely in the American literature or perceptions about the attractiveness of males and females to one another based on body size. The desire of such large numbers of youth to be very thin needs to be investigated. As well, the determinants of the rise in overweight/obesity among Japanese male youth need investigation.

The reasons that have motivated the youth to alter their perceptions about appropriate body size and alter their food intake and/or physical activity need to be identified. As indicated in the following discussion, weight management is a complex issue which derives its motivations from behavioral, psychological and physiologic origins. Current data regarding the perceptions of youth about body size are needed prior to developing any type of intervention. Without knowledge of the reasons that are motivating the youth to make behavior changes, it is not possible to effectively intervene and expect positive results. It is important to understand the youth and parental knowledge, attitudes and beliefs about body size as well as their current behaviors regarding body size.

As a starting point to begin to change body weight it is essential to completely understand the problem and the challenges and barriers that face the behavior change implementation. There are theories of behavior change that apply well to this problem that can be utilized to develop the materials to utilize in the intervention specific to the needs of the population. As well there are health education planning approaches that can be utilized to structure and plan the intervention process to target the population and the specific needs and challenges.

COMPLEXITY OF WEIGHT MANAGEMENT

Understanding weight management of youth is a

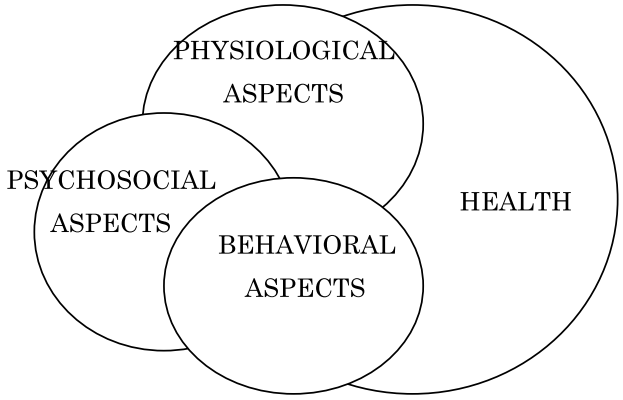

Figure 1. Model of Relationship of Aspects of Nutrition-Related Behaviors and Health

complex topic. As shown in Figure 1 nutrition related behaviors and health are interrelated. The model shows the complex interaction between the behavioral, psychological and physiological aspects of behavior that result in the health of an individual (Day, RS).

Each aspect in this model has some overlap on the other, yet remains partially separate. Thus, change in one aspect may result in change in another, all of which may affect health. This model can be applied to the problem of weight management. The knowledge, attitudes and beliefs of a person have impact on weight management both consciously and subconsciously. The physiological aspects of weight management may be from genetic factors. Some youth may have a genetic profile that will increase their probability of overweight. Studies of weight management among youth should include an assessment of the body size of the parents so that this factor can be included in analyses.

The behaviorally driven factors related to body weight may be from choosing low food intake to avoid gaining weight or eating higher caloric foods because of peer pressure which result in weight gain. Studies can investigate the types of foods that are considered acceptable or 'trendy' among youth. As well, it would be helpful to measure how traditional a Japanese diet the youth are consuming versus a more westernized diet. Teenage youth may also adopt special diets to attempt to loose weight and an assessment of these practices would be important.

Other behaviors related to weight management may include increases in physical activity to burn more calories to reduce body weight to offset food intake. An assessment of exercise habits of the youth would be helpful to determine if this is a factor among youth who have very low BMI. Trends in the US indicate that youth are increasingly more sedentary with many hours spent watching television. Recent data from the Continuing Survey of Food Intakes of Individuals1994-96 (3) reported that 22% of both male and female high school children are watching television and/or playing video games 5 or more hours a day. Adding to the problem in the US is the fact that low levels of physical education are required now in public schools, with a decreasing frequency as the youth age. Among high school youth 25% of girls and 12% of boys report exercising only 0-3 times a month and 62% of boys and 36% of girls report exercising 5-7 times a week. It would be important to measure the amount of physical activity that Japanese youth are engaged in at school in physical education and in leisure time activities.

One of the most difficult aspects of weight management is the psychological factors that motivate behavior to either gain or lose weight. These factors include the perceptions of the individual about body size driven from the knowledge, beliefs and attitudes of the individual, family, and society within which the person lives. Females may have a perception that they are more beautiful if they are thin, or that males are more attracted to very slim females than normal weight females. Females may want to be accepted and desired by males and if the female does not have immediate attention her self esteem may be lowered and thus she may try harder to loose weight to be more attractive to gain the attention of a male. This perception may be motivated from societal images from the media, the culture, peers or family. The same problem can manifest for males with their desire to be accepted and desired by females motivating them to alter their body size.

The psychological aspects of weight management are very complex. Body weight problems are also related to the family and the environment in which the youth is being educated and socialized. One of the greatest risk factors for weight problems among children is the parents. Parents may have high standards of appearance or behavior for youth to achieve which can cause stress. Stressed youth may develop a low self-esteem, which is a common problem among people with weight management issues. Youth with low self esteem may aspire to look like someone who they idolize or think is successful in an attempt to feel better about themselves when they are confronted with challenges or failures. If the image of the person they idolize has a different body size they may strive to become like the idol.

Because childhood weight is a good predictor of adult weight it is important that youth be taught appropriate body size and be encouraged and supported to maintain their weight within acceptable ranges. The relationship between childhood nutrition and nutritional status is strongly tied to parental nutrition and nutritional

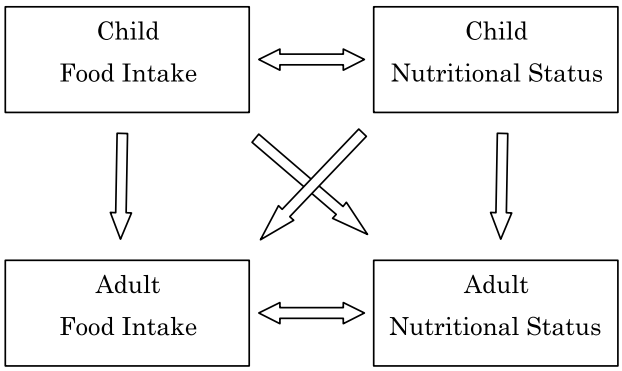

Figure 2. Relationship of Child and Adult Food Intake and Nutritional Status

status as shown in Figure 2 (Day, RS).

THEORETICAL APPROACH-STAGE OF CHANGE OR TRANSTHEORETICAL MODEL OF BEHAVIOR CHANGE

Stage of Change to develop or the Transtheoretical Model of Behavior Change was developed by James Prochaska and Carlo DiClememte (4, 5) after listening to smokers discuss the different strategies used during the quitting process. The smokers revealed that behavior change is not a discreet event that can be labeled as a one-time occurrence. One of the central tenets of the stage model is to work with the naturally occurring patterns of change to facilitate progression and behavior change. From the initial studies of change in smoking behavior, the stage model rapidly expanded to include other health and mental health behaviors. These behaviors include alcohol and substance abuse, anxiety and panic disorders, delinquency, HIV/AIDS prevention, mammograms, cervical cancer screening, compliance with medication regimes, unplanned pregnancy, radon testing, sedentary lifestyles, sun exposure, physicians practicing preventive medicine, eating disorders, obesity, and specific dietary intake of foods (6-16).

The Transtheoretical Model has five distinct stages of behavior change : precontemplation, contemplation, preparation, action, maintenance. This model conceives behavioral change as a process which involves progression through the five stages Table 1.

Table 1. Transtheoretical Mode

Stage of Change
• Precontemplation
• Contemplation
• Preparration
• Action
• Maintenance

In the precontemplation stage, people have no intention to change a particular behavior within 6 months. People may be uninformed or informed about the risks or desirability of change associated with the behavior, or they may have tied to change their behavior in the past but were unsuccessful and hence became discouraged about their ability to change. People in this category avoid reading, talking, or thinking about the high risk behavior. This is a difficult place to begin an intervention and requires carefully thought and development to determine evaluation components that are measurable.

The contemplation stage is one in which people are planning to make the change usually defined within the next six months. They are aware of the pros and cons of changing their behavior. The balance between the pros and the cons of behavior change may keep people in contemplation stage for long periods of time because of ambivalence. People in this stage can be characterized with behavioral procrastination. Programs of intervention must address their stage carefully.

The preparation stage is one in which people intend to take action in the near future, usually measured as within 30 days. People in this stage have already taken significant steps toward actively altering their behavior within the last year. They have a plan of action in place and generally, as a group, they are ready for traditional action oriented health promotion programs.

The action stage is one in which people have changed their behavior, but the change has taken place for less than six months. They have made specific overt modifications and the behavior change is observable. People categorized in this stage must attain criteria that scientists and professionals agree will reduce risk of disease, hence not all behavior change will qualify for action stage.

The last or maintenance stage describes people who have made overt changes in behavior for more that 6 months and are working to prevent relapse. Temptation to relapse is decreased and people have increased confidence in their ability to continue the changes.

Much research has been conducted to validate and apply the stages of change to diet assessment and staging algorithms have been developed to use with self-administered surveys to accurately reflect intake. The stage of change model is multi-dimensional and each of the dimensions must be applied to capture the richness of the model. One of the strengths of the model is that it provides the theoretical template to accelerate the behavior change process. Interventions based on this model have been able to tailor change messages to the specific stage and it is the tailoring of the messages that accelerates the process. This discussion provides a brief overview which can be elaborated on from references of development of the theory.

INTERVENTION PLANNING-INTERVENTION MAPPING

Intervention Mapping is a technique for planning health promotion and education intervention activities that was developed by two health promotion behavior experts Drs. Kay Bartholomew and Guy Parcel (17).

Table 2. How Does and Idea Turn into an Intervention ?

Intervention Mapping (Bartholomew, KL, *et al* . 1995)
- Needs assessment & problem definition
- Objectives development
- Selection of theory based strategies & methods
- Design of program organization
- Development of adoption & implementation plan
- Development of evaluation plan

Table 3. Where to Start ?

- Identify the target population
- Decide where you want to enter the model. This depends on what the problem is that you desire to change (community, health, or behavior)
- Not matter where to start, as long as information is clearly defined for each step

Table 4. Needs Assessment

Quality of Life : What affects quality of life for these individuals ?
Possible Examples
- absenteeism, achievement, alienation, comfort, crime, discrimination, happiness, hostility, riots, self-esteem, unemployment, welfare, performance

Health : What affects health issues or problems for these individuals ?
Possible Examples
- Health Status Issues : disability, discomfort, fertility, fitness, disease, death, mental issues, obesity
- Dimensions of Health : duration of problem, functional ability, incidence, intensity, longevity, prevalence

Behavior : What behaviors are related to the health problem ?
- Risk Behavior
- Health promoting Behaviors

Environment : What factors have to be identified as the cause of the health problems or that are health promoting ?

Determinants : Why do people behave this way and what cause the behavior ?

	date collection methods
• Observed behavior	Focus groups
• Knowledge	Brainstorm sessions
• Attitude	Observations
• Role perceptions	Experties
• Social influence	
• Availability	Experts panels
• Accessibility	Surveys
• Skills	Scientific reports
• Social reinforcement	
• Rewards	
• Punishment	

The approach guides the process from start to finish with assessment of the problem through evaluation. It was developed to help organize a very difficult multi-faceted process into an organized process to assure ability to develop clear objectives to meet the needs of the problem and to provide measurable outcomes for evaluation assessment (Table 2). This approach would work well to guide the process to develop an intervention for weight management for Japanese youth. As noted earlier, it is critical to understand the determinates of weight changes among Japanese youth prior to beginning to develop an intervention. This process would guide the needs assessment and results to help frame development of an intervention utilizing the information from the needs assessment.

Table 3 shows where to start the process. The process begins with identification of the target population. Example information of target population, who is involved in, is shown in Table 3. The target population is Japanese youth, however there are subgroups within the youth that may have different motivations driving their weight changes. Thus, this definition would be important to assure that appropriate subgroups were identified and included in needs assessment to determine if different factors are motivating different segments of the Japanese youth to alter their body weight. If there are differences in the determinants of body weight among subgroups of Japanese youth, targeted interventions could be developed later to best affect change among those groups. Next it follows to decide the information that is driving the initiation of the research. This information will drive which point one enters the Mapping process model. It is important to decide whether it is the community, health or behavior that needs to be changed. It does not matter where the model is entered, because all of the information must be gathered at some point in time to begin. The decision to enter is based on the information that is avail-

able at the beginning. If other information is needed to complete the Mapping-then it must be gathered as part of the development process-this is usually referred to as the needs assessment stage of the Mapping process. To begin the study of youth body weight, the available data suggest that determination of the perceptions of appropriate weight or body size among the Japanese youth and parents is important to understand. Because Japanese people of all ages in the National Nutrition Survey indicated a desire to have a lower BMI, it seems important to begin by determining the Japanese perception of appropriate body size.

INTERVENTION PLANNING

Figure 3 shows the model to follow indicating the needs assessment stage at the top which begins identifying the population at risk, the environmental and behavioral causes and the key determinates of the health problem. The needs assessment stage may include focus groups, surveys, literature reviews, interviews, etc.-any steps necessary to determine data regarding the components needed to accurately understand the problem and develop an intervention that will address the real issues that are affecting body weight. The needs assessment could include a variety of methods to assess the determinants of the perception of body size from adults and youth. To work through each of the stages it would be helpful to have a knowledgeable expert in Intervention Mapping to guide a group of nutrition, behavior and community experts to work through each of the stages of the needs assessment planning to assure that surveys or focus groups capture as much of the needed information as possible. Examples of quality of life issues are shown in Figure 4. These will differ for each type of health issue and must be developed by researchers to the best of their ability from literature and knowledge of the Japanese population and culture. Development of the questions to include on the needs assessment would build from each small survey that was completed. As information is learned from surveys, then it is included in and used to guide the next assessment. Careful steps need to be taken to assure that each engagement with the target population builds on the previous knowledge.

INTERVENTION PLANNING-NEEDS ASSESSMENT PROCESS

Figure 4 shows an example of the needs assessment process using some examples of other types of health promotion interventions. This shows how the needs assessment process can be entered at any stage depending on the information that is available to the researcher. In the process, assessment is begun with quality of life. And another stage of the needs assess-

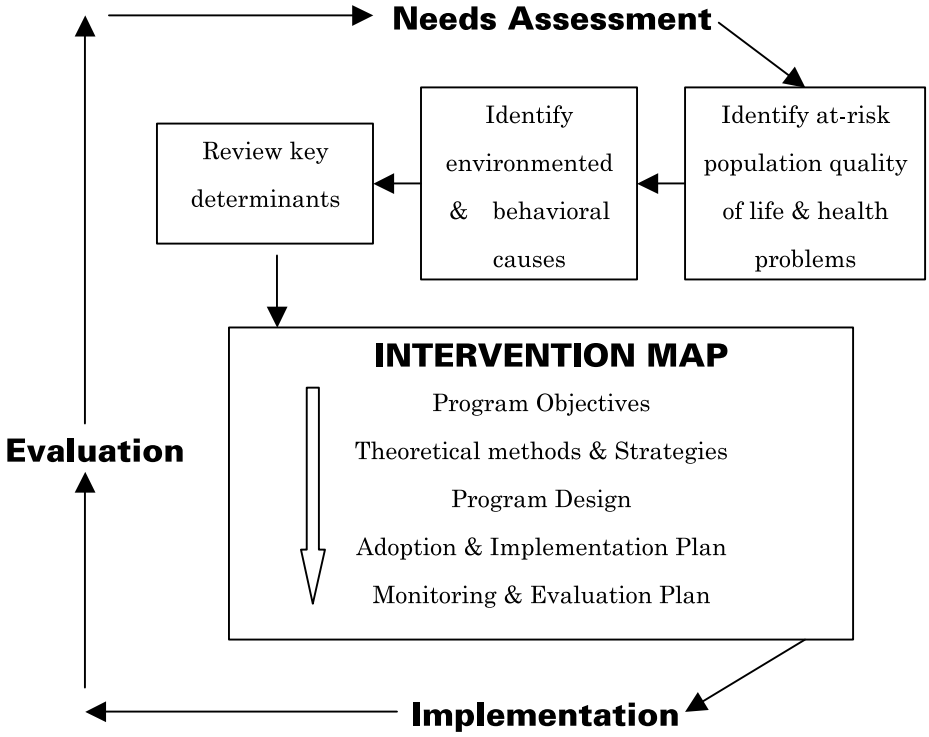

Figure 3. The model to follow indicating the needs assessment stage

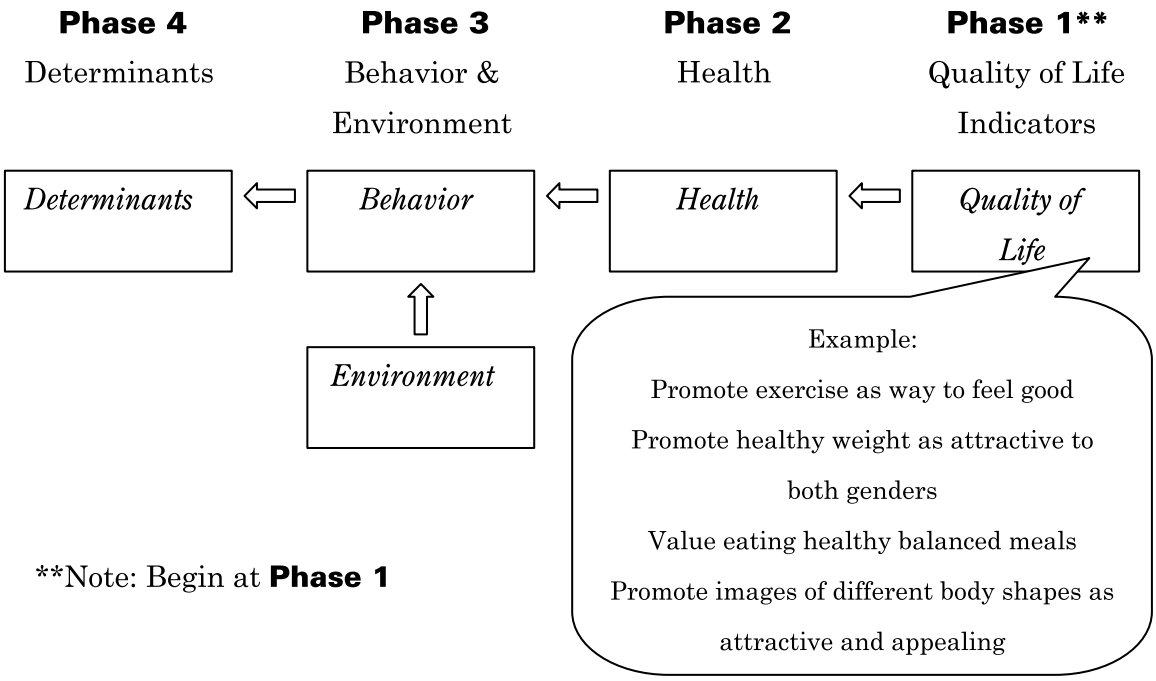

Figure 4. An example of the needs assessment process : Begin Assessment with Quality of Life

ment is gathering health information. If information on behavioral and environmental assessment is available, the needs assessment process can begin at this stage. The next part of the needs assessment is to assess the determinants of the behavior. This stage is difficult and again the assembled group of Japanese experts could benefit from guidance of an expert in intervention planning. Some of the things to consider in the discussion of determinates or motivations of a health problem. Table 4 shows examples and things to consider in each of four stages. As well the table shows some of the data collection methods that might be used to gather the information about the determinants of the problem.

INTERVENTION PLANNING-PERFORMANCE OBJECTIVES, STRATEGIES AND METHODS

Once each of the components of the needs assessment is completed the Intervention Mapping process continues to the stage of selection of the objectives of the intervention-all based on the data that has

Table 5. Performance Objectives

- These statements are the things to happen/change during the intervention
- What behaviors, health problems, or environmental factors needs to change ?
- What is the overall goal of the program ?
- After write down the things to change, create statements to achieve the goals

  Example

  Goal : To eat 3-4 servings/day of daily foods

  Objective : Select more calcium-rich foods during grocery shopping
- Develop as many performance objectives as possible because these guide the actions of the intervention

Table 6. Strategies and Methods

- Once performance objectives are developed decisions on how changes occur will flow
- Main intervention components

  Example-Increase walking

  Strategy : Form community level walking groups

  Methods : Use role models in the community to organize and encourage the residers to participate in walking groups.
- Use all avenues available in community for recruitment and participation to reach to appropriate population for the intervention
- Partner with community services in the area to coordinate ideas & topics so participants can be affected in all avenues of their life

been obtained. Table 5 indicates guiding principles in the development of the performance objectives for the intervention. These are the most important aspects of the planning process. These will drive development of all the materials and activities and will be the basis for determination of success or failure of the intervention program. Guidance from an experienced intervention planner is recommended.

After the performance objectives for the intervention are developed, the strategies and methods for implementation can be developed. Again an expert group of Japanese researchers and community experts will benefit this discussion. Table 6 shows some of the key aspects to consider in this discussion. The literature on successful and unsuccessful intervention programs greatly aids this stage of the planning process. It is useful to learn from others what has and has not worked effectively in the community. The needs assessment will have identified the barriers among the population to study-but other researchers can share what activities were good and which ones were not in their previous interventions.

This stage if the Intervention Mapping process planning will also include the adoption of a theory for the approach to development of the intervention activities and the strategies associated with that theory that will be put into place as part of the intervention program. As noted earlier the Transtheoretical Model-Stages of Change model could work well for the problem of underweight youth in Japan. Movement through the stages of change has been shown in several studies to be a good indicator of intervention effectiveness (12).

INTERVENTION PLANNING-MONITORING & EVALUATION

At the close of the Intervention Mapping process it is essential to plan the evaluation components that will accompany each stage of the intervention strategy. Typically the evaluation is multi-faceted with both primary and secondary outcomes, as well as process evaluations to determine compliance and dose of exposure to the different aspects of the program. Table 7 shows an example of some evaluation components for an intervention. Note that there are many levels of evaluation and several types of evaluation components.

Table 7. Monitoring & Evaluation

Development evaluation components at onset-Example :
• Primary & secondary outcomes
Process evaluation
• Individual nutrition education classes
Secondary outcomes
Process evaluation
• Behavior change on recommendations
Secondary outcomes
• Process evaluation for entire intervention

RECOMMENDATIONS

The issue of underweight and overweight among Japanese youth is a complex issue and needs to be addressed systematically. The overall objective would be to develop an intervention for Japanese youth on weight management which would address both ends of the distribution-those underweight and those overweight/obese. Since so little data exist on the determinants of weight among Japanese youth, it is imperative to do a needs assessment to understand the determinants of the problem. The needs assessment would provide data that would feed into the Intervention Mapping process which would help in planning the different components of the intervention. The needs assessment should provide data on the following : the health consequences that currently are, or may be in the future, resulting from the very low BMI of young females and males ; which youth are at risk-rural/urban areas, socioeconomic status, etc ; the youths' knowledge, attitudes and beliefs about body size ; the youth's barriers to change in body size ; the parental knowledge, attitudes and beliefs about body size ; the parental barriers to change in youth body size ; and the quality of life issues that are affected by this behavior. As well, the initial needs assessment could be used to determine the Stage of Change to weight management of youth which could be used as a baseline assessment in the evaluation of the intervention.

The Transtheoretical Model-Stages of Change theory is suggested to guide the development of the intervention and evaluation process. Data from the needs assessment and Intervention Mapping activity would guide the development of the intervention components to assure that they were appropriate for the needs and stage of readiness to change of the youth.

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