International Journal of Religion
2024
Volume: 5| Number 8 | pp. 484 – 493
ISSN: 2633-352X (Print) | ISSN: 2633-3538 (Online)
ijor.co.uk
DOI: https://doi.org/10.61707/1saxyb52

# Development of a Model for Modifying Eating Behaviour among Overweight Working People in Health Region Sixth Ministry of Public Health

Suttipong Thumtheang[1] and Kamonmarn Virutsetazin[2]

***Abstract***

*This research and development study aimed to develop and evaluate the effectiveness of a program designed to modify eating behaviors among overweight working individuals. Phase 1: A draft prototype was synthesized by applying the stages of change model and studying weight loss activities and eating behaviors among 65 overweight factory employees. Phase 2: The prototype was developed in 10 small groups, totaling 36 participants, resulting in three behavioral modification modules: 1. "Well Begun is Half Done" 2. "Win Small, Win Early, Win Often" and 3."I Can Do It". Phase 3: The effectiveness of the prototype was tested among experimental groups, with 39 participants per module, compared to control groups of equal size. Data were analyzed using t-tests. Research Results: 1) The stages of change in the experimental groups improved significantly. 2) The process of behavior change showed statistically significant improvement. 3) Perceptions of the pros of behavior change increased significantly, while perceptions of the cons decreased significantly. 4) Confidence levels increased significantly, while temptation levels decreased significantly. 5) Body mass index, waist circumference, and visceral fat measurements improved significantly.*

***Keywords:*** *The Process Behavior Change, Eating Behaviors, Overweight, Working People.*

## INTRODUCTION

Being overweight leads to obesity, which is considered a chronic disease characterized by excess body fat. While fat is essential as an important source of energy, obesity negatively impacts the quality of life for people in Thailand. Statistics indicate a high number of obesity-related deaths, especially among patients with complications such as heart disease, coronary artery disease, brain disease, high blood pressure, diabetes, high blood cholesterol, and cancer. Survey results show that the average body mass index (BMI) for the Thai population aged 15 years and older is 23.1 kg/m² for men and 24.4 kg/m² for women. The average BMI increases with age, peaking in the 45-59 age group, and then decreases after age 60, reaching its lowest point at age 80 and above. Regionally, Bangkok residents have the highest average BMI for both men and women, followed by those in the central region. The prevalence of obesity in the Thai population aged 15 and over is significant, with 28.3 percent of males and 40.7 percent of females classified as obese (BMI > 25 kg/m²), with the highest prevalence in the 45-59 age group (Pudjaiyo Nunticha, Pongwiritthon Kajornatthapol, Suthithananchai Siyaphat, 2024). The causes and risk factors of overweight and obesity primarily stem from individual behavioral factors, including poor eating habits such as consuming large amounts of food when not hungry and engaging in sedentary behavior, such as not exercising (Kalayanee Noin, 2017). Addressing these issues requires behavioral changes focused on consuming foods that promote weight loss and improve overall health. However, designing effective health behavior change activities based on behavioral science principles can be challenging. In addition to assessing risky behaviors, it is essential to evaluate an individual's readiness to change their behavior to tailor counseling and interventions accordingly. This approach, aligned with the Stage of Change model, can enhance the effectiveness of behavior change initiatives (Yuming Xu, Yijun Zeng, Phanniphong Kanakarn, 2024).

Evaluating readiness to change is particularly relevant for working-age individuals. By providing appropriate activities that match their readiness levels, it is possible to promote good health and prevent diseases associated with being overweight. The Transtheoretical Model (TTM), developed from the research of Prochaska and DiClemente, integrates various psychological theories to address the complexity of behavior. It involves assessing the stage of behavior and organizing health activities suitable for that stage. Previous research has

[1] Doctor of Philosophy of Public Health Program, Western University Thailand., E-mail: Suttipat@hotmail.com

[2] Assistant Professor Doctor of Public Health Program Western University Thailand, Email: kmm.swu@gmail.com

shown that the TTM concept effectively modifies behaviors such as stress management, medication adherence in chronic disease patients, eating habits, and exercise behavior (Joki A, Mäkelä J, Fogelholm M., 2017). Thus, the TTM framework is a promising approach for promoting healthy eating behaviors among overweight working-age individuals. Weight loss programs that promote healthy eating habits are varied, and no single method suits everyone. The weight loss guidelines used to develop the program include two main methods: 1. Intermittent Fasting (IF): This method involves specific eating and fasting periods without dictating the type of food consumed. The 16/8 method, where individuals eat for 8 hours and fast for 16 hours, is widely popular and sustainable. Studies show that IF can lead to a 3-8% reduction in body weight over 3-24 weeks. IF helps enhance fat burning by lowering insulin levels and increasing growth hormone levels during fasting periods, thereby boosting metabolism by 3.6-14% and reducing belly fat. IF is suitable for those seeking long-term weight loss, individuals at risk for type 2 diabetes, and those who do not prefer breakfast or have irregular waking hours. To optimize IF, consuming low-calorie foods and calorie-free beverages during fasting is recommended, such as black coffee, black tea, herbal tea, or matcha green tea powder. 2. Calorie Counting: This method involves monitoring calorie intake to prevent excess energy accumulation and fat formation. Normal individuals can consume 1800-2300 kilocalories daily, but those aiming to lose weight should reduce their intake below their Total Daily Energy Expenditure (TDEE) by 500 calories (TDEE - 500). Calculating the Basal Metabolic Rate (BMR) and TDEE helps determine the necessary calorie intake for weight loss. Ready-made tools can screen individuals with abnormal energy metabolism for accuracy in using this method. (Thomas DM, Martin CK, Redman LM, Heymsfield SB, Lettieri S, Levine JA, et al., 2014)

The researcher applied the TTM concept with behavior modification activities through various media to reach target groups and conducted follow-ups via Line official, a convenient communication channel for providing information and counseling on weight loss for overweight working-age individuals. Effective public relations and tailored programs are essential for creating suitable weight loss strategies for each individual in Health Zone 6 who seeks to lose weight. The weight loss program promotes healthy eating behavior through two main methods: Intermittent Fasting (IF) and calorie counting.

## Research Objectives

1. To study the weight loss needs and eating behaviors of working-age individuals in Health Zone 6, and to explore the process of changing eating behaviors using the stages of change model.

2. To develop a model for changing eating behaviors among overweight working-age individuals in Health Zone 6, Ministry of Public Health, including: Module 1: The process of changing behavior from the pre-contemplation stage to the contemplation stage. Module 2: The process of changing behavior from the contemplation stage to the action stage. Module 3: The process of changing behavior from the action stage to the maintenance stage.

3. To evaluate the effectiveness of the eating behavior change model among overweight working-age individuals in Health Zone 6, Ministry of Public Health. This includes assessing four main aspects: The process of changing eating behavior, The process of behavior change in each module, The balance of decision-making at each transformation stage, Self-efficacy in eating at each transformation stage, Measurements of BMI, waist circumference, and visceral fat.

## Research Hypothesis

The researcher has established the following research hypotheses for the third step of the study, which focuses on the effectiveness of the modules based on four main concepts:

1. The sample group will change their diet to promote weight loss more effectively after the experiment than before the experiment.

2. The sample group will exhibit changes in decision-making balance at each stage of the change process: 2.1 After the experiment, the experimental group will perceive the benefits of eating for weight loss more strongly than before the experiment. 2.2 After the experiment, the experimental group will perceive the drawbacks of eating for weight loss less strongly than before the experiment.

3. The experimental group will show changes in self-efficacy related to eating for weight loss at each stage of the change process: 3.1 After the experiment, the experimental group will have higher confidence in their ability to eat for weight loss than before the experiment. 3.2 After the experiment, the experimental group's perception of temptation will be lower than before the experiment.

4. The experimental group will demonstrate better adherence to the change process in Modules 1, 2, and 3 after participating in each module compared to before joining the module.

## Concepts Used in Research

The research framework is based on several health behavior change models and theories, primarily the Transtheoretical Model (TTM) developed by Asbjørnsen RA, Smedsrød ML, Nes LS, Wentzel J, Varsi C, Hjelmesæth J, et.al., (2021). The key components include:

1. Stages of Readiness to Change Behavior (Stages of Change): This model divides the readiness to change into five stages: 1.1 Precontemplation: Not considering change. 1.2Contemplation: Thinking about change. 1.3 Preparation: Getting ready to change. 1.4 Action: Actively making changes and 1.5 Maintenance: Sustaining the change.

2. Perception of Self-Efficacy: This refers to an individual's belief in their ability to succeed in specific situations or accomplish a task.

3. Decisional Balance: This involves weighing the pros and cons of changing behavior.

4. Processes of Change: Different behavior modification processes are used at each stage of readiness. There are 10 processes in total.

This research aims to develop a model for changing eating behaviors among overweight working-age individuals in Health Zone 6, Ministry of Public Health. The study focuses on modifying health behaviors, evaluating the behavior change process, assessing self-efficacy, and examining the balance in decision-making to promote weight loss. The weight loss program includes two methods: 4.1 Intermittent Fasting (IF): Eating according to a specific pattern and 4.2 Calorie Counting: Monitoring and controlling calorie intake.

These methods are integrated into the developed model to effectively promote healthy eating behaviors among overweight working-age individuals in Health Zone 6.

# RESEARCH METHODS

## Population and Sample

This research focuses on refining the methodology of conducting research, particularly within the context of overweight individuals in industrial settings. The target population consists of working-age individuals with overweight concerns within Health Zone 6, spanning eight provinces: Chonburi, Rayong, Chanthaburi, Trat, Samut Prakan, Chachoengsao, Prachinburi, and Sa Kaeo. This encompasses 69 districts, 529 sub-districts, and 4,500 villages, as per data from the Registration Administration Office, Department of Provincial Administration, Ministry of Interior as of December 31, 2021. (Institute of Medical Research and Technology Assessment, Ministry of Public Health, 2010). The research delves into the dynamics of industrial factories and their workforce, totaling 19,104 factories and 1,238,088 employees across 44 industrial estates, based on data from the Industrial Estate Authority of Thailand, Department of Industrial Works, also as of December 31, 2021. The research's key informants and sample groups are drawn from working-age individuals grappling with overweight issues within industrial settings in Health Zone 6. Specifically, this involves four provinces hosting industrial plants with employee counts ranging from 500 to 1,000, encompassing 23 locations and totaling 15,008 individuals, with information current as of October 12, 2022, sourced from the Department of Industrial Works. The selection of participants employs a multistage random sampling technique, involving simple random sampling from the six health zones, provinces, districts, sub-districts, and factories.

The key informants and samples are stratified into three distinct phases: Phase 1: Synthesis of Eating Patterns This phase involves crafting a blueprint for dietary intake among overweight working-age groups, employing a phased model of change (synthesis of a draft prototype). Initial investigations occur in Chachoengsao Province's Mueang District, particularly within the Khlong Nakhon Nueang Khet Subdistrict from Factory A. The preliminary analysis of dietary habits encompasses working-age individuals in Health Zone 6, particularly within Factory A, Khlong Nakhon Nueang Khet Subdistrict, Mueang District, Chachoengsao Province. Two groups of key informants, specializing in quantitative data analysis, comprise overweight individuals, totaling 65, selected via purposive sampling. Phase 2: Development of Dietary Patterns This stage focuses on refining dietary models using the prototype development phase, with a pilot group assembled from Factory B in Rayong Province's Mueang District's Huai Pong Subdistrict. This group is chosen via purposive sampling due to its compatibility with the sample group. A development team comprising three modules, each with five members, collaborates to evolve the prototype until a definitive dietary change process emerges. Phase 3: Testing Dietary Pattern Effectiveness Finally, the research assesses the efficacy of dietary interventions in Chonburi and Samut Prakan provinces. The weight loss programs, tested through a prototype model, are designed to evaluate their impact. The sample size, comprising 78 overweight individuals in industrial settings, is determined through statistical calculations, with the experimental and comparison groups each consisting of 39 participants. The experimental group, randomly allocated to Factory C in Samut Prakan Province's Mueang District's Bang Pu Mai Subdistrict, undergoes dietary interventions across three modules, totaling at least 117 individuals. Participants are selected based on specific inclusion criteria, ensuring their voluntary participation, absence of regular exercise habits, and no affiliation with eating-related organizations, among other factors. Exclusion criteria are also established to ensure the integrity of the study's outcomes.

The research process unfolds in three distinct phases: Phase 1: Synthesizing Draft Eating Patterns This initial phase involves synthesizing a preliminary eating pattern for overweight working-age groups through the application of a change process model (the synthesis phase of a draft prototype). The researcher initiates the selection process, identifying key informants from Factory A in Khlong Nakhon Nueang Khet Subdistrict, Mueang District, Chachoengsao Province. Collaboration with factory executives is sought on a voluntary basis to participate in the project. Phase 2: Developing Eating Patterns In the second phase, the focus shifts to developing eating patterns for overweight working-age groups, employing a change phase model (the prototype development phase). Experimental development of the draft eating pattern (derived from Phase 1) is conducted at Factory B in Huai Pong Subdistrict, Mueang District, Rayong Province, among overweight working-age groups (R2). This experimental development occurs in small groups across three modules, each tailored to reflect the characteristics of the behavior change process outlined in the change steps model. These modules are delineated as follows: Module 1: "Well Begun is Half Done", Module 2: "Win Small, Win Early, Win Often", Module 3: "I Can Do It," focusing on developing a prototype weight loss program titled "Health is Wealth in Program Line application in Program Line application" (D2). The development process continues until the characteristics of the behavior change process prototype are fully developed and presented. A secondary panel of three experts (the original team) assesses the prototype weight loss program's feasibility and appropriateness based on theoretical frameworks (Prototype). Phase 3: Testing Eating Pattern Effectiveness The final phase entails testing the effectiveness of the developed eating patterns among overweight working-age groups. Employing a prototype testing phase, this phase adopts a quasi-experimental research approach (R3: Quasi-experimental research). It compares two groups and measures experiment results before and after implementation using either the pretest posttest equivalent groups design or the randomized control-group pretest-posttest design. The assessment evaluates stages of change in eating behavior (stage of change) at each entry into the appropriate module. Additionally, it measures the balance of decision-making and self-efficacy in eating behavior before and after learning. Instruments utilized in experiments and data collection can be categorized as follows: Phase 1: Synthesizing the draft eating pattern among overweight working-age groups by applying the change process model (Phase of synthesizing a draft prototype). This phase involves employing the Eating Behavior Change Process Evaluation Form developed by Naruemon Chenglai (2021). Additionally, it incorporates in-depth interviews (Indepth Interview) with overweight working-age individuals regarding their eating habits. Furthermore, semi-structured interviews (Semi-structure Interview) are conducted with human resource officers of factories in the same area as the working-age population, focusing on guidelines for

organizing activities aimed at weight loss and promoting healthy eating habits. Phase 2: Developing eating patterns among overweight working-age groups by applying the change process model (phase of developing a prototype). This phase includes designing eating patterns tailored to overweight working-age individuals. The prototype, titled "Health is Wealth in Program Line application," comprises three modules (Module) and ten processes of behavior change (process of change). Feedback is gathered through a form during the development of the behavior change process across three modules by informants who have trialed each module with five participants at a time. Phase 3: Testing the effectiveness of eating patterns in overweight working-age groups. This phase utilizes a prototype model for testing, which involves: 1. Implementing a weight loss model using the Transtheoretical Model of Behavior Change for overweight or obese working-age individuals, incorporating insights gained from various activity formats studied. 2. Administering a general information questionnaire comprising socio-demographic data such as gender, age, race, religion, income, marital status, place of residence, educational level, and health information including BMI, presence of congenital diseases, BMR, waist circumference, and visceral fat. 3.Employing a 5-step behavior change process assessment form (Stages of Change). 4. Utilizing an eating behavior change process questionnaire adapted from Chaisri J, Klungtumneim K, Buajarean H. (2014). This questionnaire consists of 40 items, categorized into affective and behavioral processes, and employs a rating scale with five levels ranging from "never practiced" to "regular practice," with corresponding scoring criteria of 1–5. 5. Administering a decision balance questionnaire based on the Kanlayanee No-in (2017), which assesses the perceived benefits (Pros) and drawbacks (Cons) of behavior change. This questionnaire uses a five-level rating scale ranging from "uncertain" to "very much," with scoring criteria of 1–5. 6. Employing a questionnaire on self-efficacy in changing behavior using the Marcus and Forsyth scale from 2003, which assesses confidence and temptation across 18 items. This questionnaire utilizes a five-level rating scale ranging from "not confident" to "very confident," with corresponding scoring criteria of 1–5. Score interpretation ranges from 1.00 to 1.80 indicating the lowest level of proficiency, while scores from 4.21 to 5.00 denote a very high level of proficiency in the process of change, decision-making, and awareness of self-efficacy for change. To ensure the tools approved by the advisor met high standards, a panel of five experts evaluated their alignment with the theoretical framework. Content validity index (CVI) analysis gauged consensus, with questions scoring below 0.80 revised. Redundant queries were consolidated, and any missing topics addressed, followed by a reorganization of the questionnaire. The CVI summary yielded an impressive score of 0.94. For data gathering, a questionnaire focusing on changing eating behavior, emphasizing decision-making balance and self-efficacy perception, was piloted with 30 overweight working-age individuals at Factory B in Rayong Province. Reliability, assessed through Cronbach's alpha, produced strong values: 0.91 for both the change process and decision-making balance modules, and 0.95 for the perceived self-efficacy module. These robust reliability scores validate the tool's suitability for data collection. Data collection is divided into three phases: Phase 1: Synthesizing a draft prototype of eating patterns among overweight working-age groups by applying a change process model. Concept papers and change process formats, including 3 modules and 10 behavior change processes, were gathered from key informants. Quantitative data collection involved distributing questionnaires to 65 individuals with the assistance of the factory's personnel officer. Qualitative data were obtained through in-depth interviews and semi-structured interviews conducted by the researcher, including 10 individuals with weight balance, 10 overweight individuals, and 5 factory personnel. Phase 2: Development of eating patterns among overweight working-age individuals by applying a step model. The transformation phase involved experimental development of 3 modules with 5 individuals per session. The researcher collected qualitative data and recorded comments on module development, refining each module iteratively until achieving a prototype answer to eating patterns. Phase 3: Testing the effectiveness of eating patterns in overweight working-age groups. Using the change process format to assess readiness according to the change process questionnaire, samples were grouped into modules providing information on change processes, decision-making, and self-efficacy. This allowed for comparison with a control group before and after participating in the activity. Data analysis and statistical methods applied in Phase 1 aimed to synthesize the draft eating pattern among overweight working-age groups. Quantitative analysis focused on scrutinizing change steps and processes in eating behavior, utilizing descriptive statistics like frequency, percentage, mean, and standard deviation. Qualitative data from in-depth interviews were distilled to relevant issues concerning

eating patterns in this demographic, aligned with research objectives, and subjected to content analysis. In Phase 2, insights from 10 change processes guided the development of eating patterns, considering pivotal aspects for prototype activities. Pattern development outcomes were evaluated using the change process model, laying the groundwork for assessing effectiveness in Phase 3. Phase 3 gauged the efficacy of the eating pattern among overweight working-age individuals. Applying the change steps model, behavior change processes within the sample group were scrutinized, determining the percentage of change as per hypothesis number 1. Means before and after participating in activities within the sample group were juxtaposed using Dependent t-test, and between sample groups using independent t-test, maintaining a statistical significance level of 0.05. Data analysis and assumption testing were executed through computer-based programs.

## RESEARCH RESULTS

Phase 1: Synthesizing the Dietary Pattern Using the Transition Model for Working People, The study focuses on the weight loss needs and eating behaviors of overweight working individuals in Health Zone 6, Ministry of Public Health, and the process of changing eating behavior using a step-change model for working-age individuals in Health District 6. Key findings from the qualitative study of eating behaviors among two groups of 10 key informants each, selected from industrial plants, are as follows, Group 1: Overweight Individuals Without Weight Loss Eating Habits, The study identified several insights from in-depth interviews with overweight working-age individuals who do not engage in eating habits aimed at weight loss: 1. Reasons for Not Eating to Lose Weight, 1.1 Lack of understanding of the importance of weight loss. 1.2 Uncertainty about what foods to choose for weight loss. 1.3 Eating out of necessity due to work demands and fear of exhaustion. 1.4 Lack of knowledge about weight loss diets and perceived difficulty in finding appropriate foods. 2. Factors Influencing Food Intake, 2.1 Working individuals feel the need to eat regularly and lack time to prepare their own meals. 2.2 Belief that their health is still good and that their work environment does not support healthy eating. 3. Motivators for Weight Loss Eating Habits, 3.1 Social encouragement from friends. 3.2Availability of appropriate time and place for eating. 3.3 Desire to maintain health to avoid frequent illnesses and to be more active. 3.4 Motivation from children and social interactions that encourage eating for energy. 4. Impact of Eating on Health, 4.1 Improved health, stable weight, increased comfort, and better weight control. 4.2 Enhanced overall well-being and reduced health risks. Group 2: Overweight Individuals With Weight Loss Eating Habits, For individuals who already engage in weight loss eating habits, the study revealed the following, 1. Weight Loss Eating Activities, 1.1 Controlling food portions, particularly reducing dinner intake while consuming larger breakfasts. 1.2 Increasing protein and low-sugar fruits and vegetables, and avoiding high-sugar and high-fat foods and drinks. 1.3 Eating only until satisfied, avoiding overeating, and reducing consumption of fried foods, high-fat foods, and sweets. 2. Key Motivators for Regular Weight Loss Eating, 2.1 Fear of ridicule for being overweight. 2.2 Desire to change appearance, driven by personal inspiration and health concerns. 2.3 Fear of chronic diseases and the aspiration to resemble a favorite actor's physique. 3. Benefits of Weight Loss Eating, 3.1 Increased confidence in public appearances and improved personality and agility. 3.2Better overall health and fitness. 4. Convenience of Weight Loss Eating, 3.1 Ability to easily select and prepare appetizing foods that do not cause weight gain. 3.2 Availability of easily accessible, simple-to-prepare foods. 5. Support Factors for Weight Loss Eating, 5.1 Encouragement from self, family, and friends. 5.2 Combining diet control with regular exercise. 5.3 Maintaining a positive attitude, self-praise, and perseverance. 5.4 Setting clear goals for fat loss and body proportion improvement. 5.5 Visualizing a better life upon successful weight loss. These insights highlight the varied needs and behaviors of overweight working-age individuals and the factors that influence their eating habits, providing a foundation for developing effective dietary interventions. Group 2: Quantitative Study on Eating Habits, The quantitative study focused on the eating habits of 65 working-age individuals in industrial plants. The key findings are as follows, 1. Demographics, 1.1 The majority of the sample were female (53.85%). 1.2 The highest age range was between 25-34 years (60.00%), followed by 35-44 years (26.15%). 1.3 Most participants were widowed/divorced/separated (55.38%), followed by married (23.08%). 1.4 The highest educational qualification for most was less than a bachelor's degree (52.31%), followed by more than a bachelor's degree (29.23%). 1.5 Most participants had a monthly income of 15,001 - 25,000 baht (64.62%), followed by less than 15,000 baht (20.00%). 2. Health Examination Results, 2.1 The majority had a body mass index (BMI) indicating

overweight (≥ 23) (58.46%), followed by normal weight (18.5 – 22.9) (24.62%). 2.2 Most had a waist circumference higher than normal (64.62%) and elevated visceral fat (60.00%). 2.3 The majority had no underlying diseases (61.54%). 4. Diet Preferences for Weight Loss, 4.1 Most participants were interested in Intermittent Fasting (IF) that defines eating and fasting periods (36.92%), followed by calorie counting for weight loss (18.46%). 4.2 These results highlight the demographic characteristics, health status, and dietary preferences of the sample group, providing valuable insights for developing targeted interventions to promote healthy eating and weight loss.

The study of weight reduction eating behaviors among overweight working-age individuals revealed several stages of behavior change. These stages include the pre-contemplation to contemplation stage, the contemplation to action stage (33.84%), and the action to maintenance stage (32.31%). The sample group exhibited a low change process from the pre-contemplation to contemplation stage and a high change process from the action to maintenance stage. Regarding decision-making balance for changing eating habits to lose weight, overweight working-age individuals perceived the benefits of changing eating habits as follows, 1. From the pre-contemplation to contemplation stage, the perceived benefits were low (mean = 2.29±0.38). 2. From the contemplation to action stage, the perceived benefits increased significantly to a moderate level (mean = 3.27±0.66). 3. From the action to maintenance stage, the perceived benefits further increased to a high level (mean = 3.69±0.34). Regarding the perceived costs of changing eating habits to lose weight, 1. From the pre-contemplation to contemplation stage, the perceived costs were the lowest (mean = 1.77±2.59). 2. From the action to maintenance stage, the perceived costs remained low (mean = 1.92±0.19). 3. From the contemplation to action stage, the perceived costs increased to a moderate level (mean = 3.07±0.58). 4. Self-efficacy in changing eating behavior to lose weight among overweight working-age individuals was observed as follows, 1. Confidence in changing eating behavior from the pre-contemplation to contemplation stage was low (mean = 1.32±0.40). 2. Confidence significantly increased to a moderate level from the contemplation to action stage (mean = 2.99±0.59). 3. Confidence further increased to a high level from the action to maintenance stage (mean = 3.24±0.60). 4. Perceived temptation to revert to old eating habits was analyzed across stages, 4.1 During the action to maintenance stage, temptation was the lowest (mean = 1.74±0.61). 4.2 From the contemplation to action stage, temptation was low (mean = 1.81±0.55). 4.3 From the pre-contemplation to contemplation stage, temptation increased to a moderate level (mean = 3.12±0.56). Additionally, a group of five factory personnel participated in weight loss eating activities and supportive activities for overweight working individuals. Participation was voluntary, and activities were conducted in a conducive learning environment, promoting changes in eating habits to achieve appropriate weight loss. Participants reported increased awareness of the importance of eating to lose weight. Evaluations included pre-activity questionnaires and satisfaction surveys, indicating that the activities provided practical knowledge. Participants gained a better understanding of their health and the health of those around them, recognizing the advantages and disadvantages of different eating habits. Most importantly, they learned how to select appropriate weight loss foods suitable for their physical condition, resulting in stronger bodies and improved quality of life. Phase 2: Development of Eating Patterns Among Overweight Working-Age Groups Using the Change Process Model, The development of eating patterns among overweight working-age groups in Health Zone 6, based on the change process model, revealed several guidelines and expectations for effective intervention 1. Create Awareness: Emphasize the value and importance of eating to lose weight. Raising awareness is crucial for motivating individuals to adopt healthier eating habits. 2. Provide Correct Knowledge and Understanding: Educate individuals on the correct ways to promote health through diet. This includes, 2.1 Detailed guidelines for healthy eating. 2.2 Two effective eating patterns: structured eating patterns and Intermittent Fasting (IF) combined with calorie counting. 3. Establish Learning Platforms: Develop platforms for learning about health promotion and weight loss through diet. These platforms should facilitate, 3.1 Sharing results from health promotion activities. 3.2 Providing opportunities for participants to meet and exchange knowledge and experiences. 4. Promote Supportive Actions, 4.1 Encourage supportive actions by Implementing policies that facilitate healthy eating and weight loss efforts. 4.2 Creating an environment that supports and sustains healthy eating behaviors. By following these guidelines, the development of eating patterns for overweight working-age groups can be effectively tailored to meet their needs, promoting sustainable weight loss and overall health improvement. Phase 3,

Testing the Effectiveness of Dietary Patterns Among Overweight Working-Age Groups, Using the change process model, the effectiveness of dietary patterns among overweight working-age groups was assessed. The results are as follows, 1. Experimental Group, Module 1, 1. Confidence in Eating for Weight Loss: Significantly increased from 1.49±0.06 to 3.54±0.43 ($p < 0.05$). 2. Perceived Temptation in Eating to Lose Weight: Significantly decreased from 2.85±0.67 to 1.53±0.07 ($p < 0.05$). Module 2, 1. Confidence in Eating for Weight Loss: Significantly increased from 1.62±0.17 to 4.15±0.71 ($p < 0.05$). 1. Perceived Temptation in Eating to Lose Weight: Significantly decreased from 3.30±0.37 to 1.55±0.10 ($p < 0.05$). Module 3, 1. Confidence in Eating for Weight Loss: Significantly increased from 1.55±0.62 to 3.92±0.61 ($p < 0.05$). 2. Perceived Temptation in Eating to Lose Weight: Significantly decreased from 2.81±0.59 to 1.60±0.63 ($p < .05$). 3. Control Group, Module 1, 1. Confidence in Eating for Weight Loss: No significant difference after the activity (1.67±0.58) compared to before (1.49±0.56) ($p > 0.05$). 2. Perceived Temptation in Eating to Lose Weight: No significant difference after the activity (2.35±0.02) compared to before (3.03±0.56) ($p > 0.05$). Module 2, 1. Confidence in Eating for Weight Loss: No significant difference after the activity (1.46±0.63) compared to before (1.49±0.66) ($p > 0.05$). 2. Perceived Temptation in Eating to Lose Weight: No significant difference after the activity (2.17±0.45) compared to before (2.49±0.65) ($p > 0.05$). Module 3, 1. Confidence in Eating for Weight Loss: No significant difference after the activity (1.51±0.62) compared to before (1.57±0.71) ($p > 0.05$). 2. Perceived Temptation in Eating to Lose Weight: No significant difference after the activity (2.25±0.45) compared to before (2.59±0.55) ($p > 0.05$). These results indicate that the change process model effectively increased confidence and decreased temptation in eating for weight loss in the experimental group across all modules, while no significant changes were observed in the control group.

## DISCUSSION

The process of changing diet for weight loss among the experimental group participating in each module revealed several key findings. Module 1, A total of 39 participants (new cases) transitioned from the pre-weighing stage to the weighing stage. Module 2, 67 participants transitioned from the weighing stage to the action stage, including 54 new cases and 13 who had previously participated. Module 3, 44 participants transitioned from the practice stage to the behavior maintenance stage, with 39 new cases and 5 repeat participants. Overall, 44 participants in the experimental group engaged in more than one module, with 57 individuals transitioning stages, which represents 23.08% and 43.18% according to research hypothesis number 1. The effectiveness of each module can be attributed to the innovative use of a smartphone-based system via LINE Official, which facilitated the "Health is Wealth" weight loss program. This digital approach enabled participants to progress through the stages of readiness for behavior change, moving from pre-contemplation to higher levels of readiness (Thattika Chatchaiphan, Suwanna Junprasert, Somsamai Rattanagreethakul, 2016(.

The experimental group demonstrated superior behavior change processes following participation in Module 1, Module 2, and Module 3 compared to their pre-module engagement, surpassing the control group with statistical significance at the .05 level, in line with research hypothesis number 4. This underscores the efficacy of each module's implementation in orchestrating the change process by employing strategies and techniques that engage emotions or experiences (cognitive/experiential processes) and behavioral modification techniques, consistent with Prochaska's framework. These methodologies play a pivotal role in aiding individuals to sustain desired behaviors over time. Previously, weight loss activities and the promotion of healthier eating habits among overweight working-age individuals were voluntary and tailored to personal preferences. These activities were conducted in conducive learning environments, facilitating appropriate changes in eating behavior. The majority of participants acknowledged the importance of dietary modifications in attaining weight loss objectives. Engaging in structured activities enabled the practical application of knowledge, enabling participants to discern the advantages and disadvantages of consuming appropriate foods to enhance bodily strength and prevent obesity. Aligned with research findings, sustained engagement in weight loss programs yields enduring weight loss outcomes. Notably, 60 percent of participants achieved significant weight loss by the seventh year of program participation, underscoring the long-term effectiveness of continued involvement. This persistence in weight loss endeavors resonates with efficacy studies, including research on telephone and

email-based lifestyle counseling for long-term weight management among overweight employees. Such interventions have proven effective in reducing BMI and improving physical fitness, underscoring the pivotal role of proper diet and exercise in sustaining effective weight control and overall physical well-being (Kanter, R. M.,1997 and Gibson, C. H., (1995).

The experimental group perceived more benefits of dieting for weight loss after participating in Module 1, Module 2, and Module 3 than before engaging in the modules, with statistical significance at the 0.05 level. However, there was no discernible difference between the experimental group and the control group, indicating that the application of each module can indeed augment perceived benefits. Initially, the perceived benefits of changing eating habits to reduce weight were low from the pre-weighing to weighing stages, but increased notably from the weighing stage to the action stage at a moderate level, and further escalated from the action stage to the maintenance stage, reaching a high level. While previous studies on decision-making balance when altering eating habits for weight loss are lacking, a study by Chaisri J, Klungtumneim K, Buajarean H. (2014) explored the relationship between judgment balance and the process of changing exercise behavior among employees in the city of Jordan, Northern Iran. The study found that an increase in decision balance led to a 61 percent rise in the average score of perceived benefits (Prochaska, J. O., Velicer, W. F., DiClemente, C. C., & Fava, J., 1988(. Therefore, organizing activities should incorporate information to facilitate decisions based on the benefits derived from exercise. Moreover, the experimental group perceived fewer cons after participating in Module 2 and Module 3 than before the activity, with statistical significance at the 0.05 level, while there was no difference after participating in Module 1 compared to before the activity, and no distinction was observed between the experimental group and the control group. This suggests that the application of Module 2 and Module 3 induced a change in the perception of losses. The perceived loss of changing eating behavior to reduce weight was initially low from the practice stage to maintaining the practice stage but moderately increased from the weighing stage to the practice stage. In Module 1, the perceived cost of changing eating behavior to lose weight according to the pre-consideration to consensual stages of change was the lowest. While previous studies on decision-making balance when altering eating habits for weight loss are scarce, the study by Joki A, Mäkelä J, Fogelholm M. (2017) revealed that an increase in decision balance led to a 49 percent reduction in perceived obstacles, influencing the final decision (Asbjørnsen RA, Smedsrød ML, Nes LS, Wentzel J, Varsi C, Hjelmesæth J, et.al., 2021(.

Therefore, organizing activities must provide information to aid decision-making by emphasizing the benefits gained from exercise, particularly in Modules 2 and 3. Referring to the evaluation of decisional balance according to Janis and Mann's decision-making concept, individuals weighing the pros and cons of behavior change will progress to a higher stage of readiness when the perceived benefits outweigh the perceived costs. Module 1 should focus on elucidating the benefits gained from behavior change and the associated losses to encourage participation further.

## SUGGESTIONS FOR THIS RESEARCH

When implementing eating patterns among overweight working-age groups, which emphasize the process of changing eating behavior, allow the target group to voluntarily select their preferred process for altering eating habits. Participants should have the autonomy to choose activities that align with their preferences and select sample groups with similar daily routines. This approach facilitates convenience in practicing eating behaviors simultaneously within the group, thereby enhancing participation and success rates.

Leaders guiding the eating patterns of overweight working-age individuals, emphasizing the process of changing eating behavior, should familiarize themselves with techniques for organizing activities and understand the tools utilized on smartphone operating systems through LINE Official. Utilizing a weight loss program like Health is Wealth, which records and tracks behavior change results, is essential. This approach encourages participants to develop awareness and skills necessary for effectively modifying their eating habits. Moreover, employing tools such as Health is Wealth aids participants in evaluating progress, following up on results, and addressing challenges appropriately.

Before implementing eating patterns among overweight working-age individuals, which emphasize the process of changing eating behavior, it is crucial to study the characteristics of prospective participants. This understanding informs the format selection process, ensuring compatibility with individuals comfortable using smartphone operating systems via LINE Official. As Health is Wealth is designed for working individuals, adapting eating patterns for other demographic groups requires a thorough understanding of self-efficacy techniques, health management practices, and proficiency in utilizing the Health is Wealth weight loss program for recording and tracking individual behavioral changes. These measures contribute to the successful implementation of the Health is Wealth weight loss program.

## REFERENCES


Asbjørnsen RA, Smedsrød ML, Nes LS, Wentzel J, Varsi C, Hjelmesæth J, et.al. (2021). Persuasive System Design Principles and Behavior Change Techniques to Stimulate Motivation and Adherence in Electronic Health Interventions to Support Weight Loss Maintenance: Scoping Review. *J Med Internet Res*, 21(6), e14265. DOI:10.2196/preprints.14265.

Chaisri J, Klungtumneim K, Buajarean H. (2014). Clinical Nursing Practice Guideline for Management of Obesity in Children: the Synthesis of Thesis. *Journal of The Royal Thai Army Nurses*. 15(2), 360-367. https://he01.tci-thaijo.org/index.php/JRTAN/article/view/25303/21517.

Gibson, C. H. (1995). The process of empowerment in mothers of chronically ill children. *Journal of Advanced Nursing*, 21, 1201-1210. http://dx.doi.org/10.1046/j.1365-2648.1995.21061201.x.

Institute of Medical Research and Technology Assessment, Ministry of Public Health. (2010). *Clinical practice guildline of preventing and caring obesity*. Bangkok: The agricultural co-operative federal of Thai and Ltd.

Joki A, Mäkelä J, Fogelholm M. (2017). Permissive flexibility in successful lifelong weight management: a qualitative study among Finnish men and women. *Appetite*, 1(116):157–63. DOI:10.1016/j.eatbeh.2014.01.008.

Kanlayanee No-in. (2017). Overweight and Obesity among Thai School-aged Children and Adolescents. Journal of The Royal Thai Army Nurses, 18 (Supplement May - August 2017), 1-8. https://he01.tci-thaijo.org/index.php/JRTAN/article/view/101572/78692.

Kanter, R. M. (1997). *Rosabeth Moss Kanter on the frontiers of management*. Boston, Mass: Harvard Business School Press.

Naruemon Chenglai. (2021). Effect of Weight Loss Program in Thailand 4.0 Era on Body Weight of Overweight Teenage in Trang Province. Journal of Sakon Nakhon Hospita. 24(3), 23-33. https://thaidj.org/index.php/jsnh/article/view/11708.

Jam, F. A., Mehmood, S., & Ahmad, Z. (2013). Time series model to forecast area of mangoes from Pakistan: An application of univariate ARIMA model. Acad. Contemp. Res, 2, 10-15.

Prochaska, J. O., Velicer, W. F., DiClemente, C. C., & Fava, J. (1988). Measuring processes of change: Applications to the cessation of smoking. *Journal of Consulting and Clinical Psychology*, 56(4), 520-528. doi:10.1037/0022-006X.56.4.520.

Pudjaiyo Nunticha, Pongwiritthon Kajornatthapol, Suthithananchai Siyaphat. (2024). The Organizational Culture and Internal Control Efficiency Mirror the Operational Outcomes of Private Higher Education Institutions in Thailand. *International Journal of Religion*, 5(7), 885-895. https://doi.org/10.61707/3ny2b172.

Thattika Chatchaiphan, Suwanna Junprasert, Somsamai Rattanagreethakul. (2016). The *Journal of Faculty of Nursing Burapha University*, 24(3), 83-93. https://he02.tci-thaijo.org/index.php/Nubuu/article/view/74923/60437

Thomas DM, Martin CK, Redman LM, Heymsfield SB, Lettieri S, Levine JA, et al. (2014). Effect of dietary adherence on the body weight plateau: a mathematical model incorporating intermittent compliance with energy intake prescription. *Am J Clin Nutr*, 100(3), 87–95. DOI:10.3945/ajcn.113.079822.

Yuming Xu, Yijun Zeng, Phanniphong Kanakarn. (2024). Research on the Impact of Organization Commitment on Traditional Chinese Medicine University Teachers' Innovative Work Behaviour. International Journal of Religion, 5(5), 438-447. https://doi.org/10.61707/xtc40w11.