APPLICATION OF HEALTH BELIEF MODEL: PERCEPTION AND KNOWLEDGE OF BODY WEIGHT MANAGEMENT AND THE EFFECTIVENESS OF EDUCATIONAL INTERVENTION ON WEIGHT CONTROL INTENTION AMONG MALAYSIANS

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2024

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by

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Thesis submitted in fulfilment of the requirements
for the degree of
Master of Science

January 2024

ACKNOWLEDGEMENT

First and foremost, I would like to express my sincere gratitude and appreciation to my supervisors, Dr. Ong Siew Chin and Dr. Ooi Guat See for their invaluable guidance, constructive suggestions, and constant support throughout the study. It was a great privilege to work and study under their guidance and I am extremely grateful for their advice and assistance. I would also like to thank the experts who were involved in the validation of the Health Belief Model Questionnaire (HBMQ). My sincere appreciation also goes to the undergraduate research team for their collaborative effort during data collection. I would like to express my profound gratitude to my family for providing me with unfailing support and continuous encouragement throughout the study. Lastly, praises and thanks to God Almighty for His blessings and for giving me the strength to undertake the study and complete it successfully.

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LIST OF SYMBOLS

p	Significance level in statistical analysis
1-β	Statistical power level
n	Number of respondents

LIST OF ABBREVIATIONS

HBM	Health Belief Model
HBMQ	Health Belied Model Questionnaire
WHO	World Health Organization
BMI	Body Mass Index
USM	Universiti Sains Malaysia
IG	Intervention group
CG	Control group
CVI	Content validity index value
I-CVI	Item-level content validity index
S-CVI	Scale-level content validity index
FVI	Face validity index
I-FVI	Item-level face validity index
S-FVI	Scale-level face validity index
ICC	Intra-class correlation coefficient
EFA	Exploratory factor analysis
PAF	Principal axis factoring
KMO	Kaiser-Meyer-Olkin

LIST OF APPENDICES

APLIKASI MODEL KEPERCAYAAN KESIHATAN: PERSEPSI DAN PENGETAHUAN MENGENAI PENGURUSAN BERAT BADAN DAN KEBERKESANAN INTERVENSI PENDIDIKAN TERHADAP NIAT MENGAWAL BERAT DI KALANGAN RAKYAT MALAYSIA

ABSTRAK

Obesiti dan berat badan berlebihan telah menjadi masalah kesihatan utama sejak 50 tahun yang lalu, meningkatkan risiko penyakit, menjejaskan kualiti hidup dan meningkatkan beban kewangan di seluruh dunia. Kajian ini bertujuan untuk menyelidiki persepsi dan pengetahuan mengenai pengurusan berat badan dan menyiasat niat mengawal berat badan daripada intervensi pendidikan dalam talian menggunakan Model Kepercayaan Kesihatan (HBM). Kajian kuasi eksperimen yang terdiri daripada kajian keratan rentas dan intervensi digunakan dengan penugasan peserta kepada kumpulan intervensi (IG) yang menerima intervensi pendidikan manakala, peserta dalam kumpulan kawalan (CG) tidak menerima sebarang intervensi pendidikan. Keberkesanan intervensi pendidikan terhadap berat badan berlebihan dan obesiti dinilai berdasarkan perbandingan antara IG dan CG. Kumpulan yang berlebihan berat badan dan obes menunjukkan penilaian yang rendah untuk persepsi kerentanan yang dirasakan (3.49±0.81 dan 3.51±0.90), halangan yang dirasakan (3.19±0.85 dan 3.12±0.94) dan manfaat yang dirasakan (4.05 ± 0.69 dan 4.13 ± 0.78) daripada kumpulan berat normal (3.55±0.86, 3.24±0.83 dan 4.19±0.69). Skor persepsi keberkesanan diri dalam diet, persepsi keberkesanan diri dalam senaman, dan niat tingkah laku dalam kumpulan intervensi menunjukkan perbezaan yang signifik selepas intervensi. Responden berubah tingkah laku apabila mereka mempunyai pemahaman yang lebih baik tentang risiko berat badan berlebihan dan obes.

APPLICATION OF HEALTH BELIEF MODEL: PERCEPTION AND KNOWLEDGE OF BODY WEIGHT MANAGEMENT AND THE EFFECTIVENESS OF EDUCATIONAL INTERVENTION ON WEIGHT CONTROL INTENTION AMONG MALAYSIANS

ABSTRACT

Obesity and overweight have become major health concerns over the past 50 years, increasing the risk of illness, affecting the quality of life and raising financial burdens worldwide. This study aims to investigate the perception and knowledge of body weight management and to explore the weight control intention by an online educational intervention using the Health Belief Model (HBM). A quasi-experimental study consisting of cross-sectional and interventional study was employed with assignment of participants to the intervention group (IG) receiving educational intervention whereas, participants in the control group (CG) did not receive any educational intervention. The effectiveness of the educational intervention on overweight and obesity were evaluated by comparison between IG and CG. The overweight and obese groups showed the lower ratings for perceived susceptibility (3.49±0.81 and 3.51±0.90, respectively), perceived barriers (3.19±0.85 and 3.12±0.94, respectively) and perceived benefits (4.05±0.69 and 4.13±0.78, respectively) compared to normal-weight groups (3.55±0.86, 3.24±0.83 and 4.19±0.69). The scores of perceived self- efficacy in dieting, perceived self-efficacy in exercise, and behavioural intervention in intervention group showed a significant increase after the intervention. The respondents deliberate on behavioural changes when they have a better understanding of the risks of being overweight and obese.

CHAPTER 1

INTRODUCTION

1.1 Prevalence of overweight and obesity

Overweight and obesity are defined as abnormal or excessive fat accumulation that may cause a risk to health [1]. It is a rising public health concern that have become global epidemics [2]. They contribute to chronic health issues and their increasing prevalence has been a significant public health concern worldwide. In 2019, the World Health Organization (WHO) reported that Malaysia exhibits the highest rates of obesity and overweight among Asian countries, with approximately 64% of males and 65% of females in the population falling into these categories [3].

This concerning trend has led to a significant rise in diabetes prevalence among adults aged 18 and above, escalating from 11.6% to 17.5% over a span of 9 years, spanning from 2006 to 2015 [3]. The Ministry of Health, Malaysia, stated that Malaysia has the highest statistics of obesity prevalence in South-East Asia [4]. A comprehensive national survey conducted in 2019 demonstrated a noticeable increase in obesity rates. The prevalence of obesity escalated from 15.1% in 2011 to 17.7% in 2015 and further increased to 19.9% in 2019 [5, 6]. The prominent cause of rapid increase in obesity rates in Malaysia is multifaceted and associated to factors such as lifestyle changes, dietary patterns, and sedentary behaviors [6].

In the past, overweight and obesity were thought to primarily affect high-income countries, however they are now occurring in developing countries [1]. The prevalence of obesity increased rapidly between 2010 and 2016, predominantly in lower-middle- and low-income countries in Asia-Pacific. This increase was

pronounced among children and adolescents by 61% (from 2.7% to 4.4%) and by 28% among adults (from 6.8% to 8.7%) [7].

Overweight and obesity are deliberated as a significant risk factor for numerous diseases including diabetes mellitus, hypertension, hypercholesterolemia, cardiovascular diseases, respiratory diseases, musculoskeletal diseases, cancer as well as increased mortality [8, 9]. Recently, obesity has been associated with increased rate of hospitalizations, the need for assisted ventilations and mortality among people with coronavirus disease 2019 (Covid-19) [10]. A crucial driver of increasing overweight and obesity is the evolutions in social, economic and dietary practices with reduced physical activity due to urbanization resulted an impact to the health of the population [14].

1.2 Body Mass Index (BMI), knowledge and perception

Overweight and obesity, as defined by WHO, are those with a Body Mass Index (BMI) exceeding or equal to 25 kg/m^2 and 30 $kg/m^{2,}$ respectively. The BMI is commonly used to measure and classify overweight and obesity. It measures an individual's weight in relation to height, which is defined as the body weight in kilograms divided by the square of height in meters (kg/m^2).

Overweight, obesity and severe obesity are defined as BMIs greater than 25, 30 and 40 respectively [11]. Previous studies have also reported other indices such as waist-to-height ratio, waist circumference and the body adiposity index which are considered to be more sensitive to determine the association between different degrees of overweight and their impact on health [12, 13].

Table 1.1 Body Mass Index Classification

Classification	**BMI (kg/m^2)**
Underweight	<18.5
Normal weight	18.5 - 24.9
Overweight	25.0 - 29.9
Obese	>30

Body weight gain is multifactorial for each individual, resulting from genetic, psychological, metabolic, behavioral, environmental, cultural and socio-economic influences [11, 14]. In a study conducted in Kuantan, Pahang, Malaysia, it was found that females (77.7%) have higher mean scores for weight management knowledge than males (42.3%) [15]. A study conducted between overweight and normal-weight Malaysian female adolescents reported more overweight subjects (64%) than normal-weight subjects (52%) had a low level of weight management knowledge [16].

Body weight perception is defined as the personal evaluation of one's body weight regardless of their actual BMI rate [17]. Individuals who perceive being overweight are more likely to engage in weight reduction activities, whereas individuals who do not perceive themselves as overweight are less likely to engage in such activities. Several studies reported that body weight perception is associated with numerous demographical factors, including age, gender, family, ethnicity, peers and media [17].

1.3 Demographical factors

Demographic factors such as age, gender, geographic area, education level and marital status may be associated with BMI. There are prominent differences in the physical activities and eating habits between men and women. Physical activity

involvement levels in females are often lower than in males [18]. In addition, females are more likely to practice a healthy eating habits compared to males [19].

Adults with a high level of education are associated with a lower risk of overweight and obesity. This is because they are well-informed and aware of appropriate weight management behaviour [20]. Besides, highly educated people are more likely to be employed and get highly paid which allow them to be able to afford to organic and healthy foods which are known to be expensive than fast food [20].

Several studies conducted to evaluate the demographic factors associated with BMI among adults have reported that males have higher BMI than females [21-24]. A cross-sectional study conducted among Iranian Postgraduate Students at Universiti Putra Malaysia revealed a significant association between BMI and gender, physical activity involvement, body fat, dietary intake, waist and hip circumference, and waist-to-hip ratio [25].

The findings reported a significant relationship between gender and body weight status, whereby the prevalence of overweight and obesity in male respondents (35.0% and 4.0%, respectively) was higher compared to female respondents (14.5% and 3.6%, respectively).

In addition, the findings of a previous study revealed that age group ($p<0.001$), educational level ($p<0.001$), and marital status ($p<0.001$) are factors that influence BMI among adults. The average BMI appeared to increase with age and decrease with higher educational levels. The BMI found to be lower in single respondents compared to married respondents [26].

This is consistent with the findings of another study which showed a linear positive association between older age groups and increasing BMI [24]. Besides, a significant relationship was found between BMI and educational levels, whereby increased education level significantly decreased the BMI of respondents. This indirectly implied that the higher levels of education has influenced healthy eating habits and physical activities [26].

1.4 Health Belief Model (HBM)

In order to evaluate weight management across different populations in Malaysia, it is imperative to have a reliable and valid survey instrument. There are several tools used to assess beliefs and perceptions in weight management among Malaysian population which include the Health Belief Model (HBM), Theory of Planned Behavior (TPB) Questionnaire, Social Cognitive Theory (SCT) and Stages of Change Questionnaire [27-29].

The HBM has been widely used and recognized for its effectiveness in understanding and predicting health-related behaviors. It is a health-specific social cognition model that predicts the reasons for change or maintain specific behaviour and addresses the impacts of beliefs on health [30, 31]. This model also guides the development of weight management interventions to promote weight loss [31]. The HBM incorporates crucial elements like perceived susceptibility, severity, benefits, barriers, cues to action and self-efficacy, all of which play significant roles in shaping decisions regarding health behaviors [30].

1.5 Problem statement

Obesity and overweight have become major health concerns over the past 50 years, increasing the risk of illness, affecting the quality of life and raising financial burdens worldwide [14]. The National Health and Morbidity Survey (NHMS) identified an increasing trend of overweight and obesity prevalence among Malaysian adults aged 18 years and older [2]. The current prevalence of obesity among Malaysian adults was 19.7% as reported by NHMS 2019 [32].

It is deliberated as a multifactorial disease that is correlated to various comorbidities such as diabetes mellitus, hypertension, cardiovascular disease, stroke, sleep apnea, osteoarthritis and certain types of cancer [32]. The International Agency for Research on Cancer (IARC) has reported several cancers associated with obesity such as increased risk of breast cancer in postmenopausal women who are obese, colorectal cancer in obese people and endometrial cancer in obese women [33].

The common causes of overweight and obesity are physical inactivity and over-eating. Besides, it could be contributed by a carbohydrate rich diet, certain medications (e.g., antidepressants, anticonvulsants, etc.), and psychological factors such as excessive eating in response to emotions [34]. The symptoms of overweight and obesity for adults include fat accumulation mainly around the waist, back pain, sleeping difficulties, shortness of breath and snoring [35]. These symptoms may affect an individual's ability to perform a simple physical task and negatively impact their daily life.

Moreover, overweight and obesity may contribute to physiological and psychological consequences such as low self-esteem, depression, anxiety and eating disorders such as bulimia and anorexia [36]. A study conducted to evaluate the

prevalence of obesity among Malaysian adults reported that the risk of obesity is more prevalent among females, middle aged adults (30 to 39 years old), married and respondents having only high school education. The study also revealed that quality of life and stressful events were the significant predictor of BMI among females whereas perceived stress, suicidal ideation and quality of life significantly contributed to obesity in males [37].

Therefore, it is utmost important to adopt a proper body weight management. This may include eating a well-balanced diet, exercising regularly, staying hydrated and appropriate stress management. These behaviours will aid in getting enough sleep, improving mood and enhancing social life. The findings of this study will serve as a reference for future studies involving the general population in Malaysia. The outcome of this study will be helpful in developing a more focused interventions for weight management.

1.6 Study rationale

The literature review showed a gap in the use of HBMQ for weight management behaviour in the Malay language, which most of its citizens use as the national language. In addition, there is a lack of studies conducted on the HBM constructs in Malaysia to study the weight control intention among Malaysians. To develop efficient weight management intervention, it is important to deliberate on the significant predictors of behavioural change and weight control intention. This study also urges the need to have individual involvement in health-related behaviours.

1.7 Objectives

This study aims to investigate the perception and knowledge of body weight management and to explore the weight control intention from an online educational intervention using the Health Belief Model (HBM) theoretical framework.

i. To perform translation and cross-cultural adaptation of the HBMQ into Malay language and to validate the questionnaire.

ii. To evaluate the body weight management perception concerning body image, lifestyle, and obstacles via HBM Questionnaire (Perceived Severity, Perceived Susceptibility and Perceived Barriers)

iii. To study the knowledge on body weight management by healthy eating and physical activity habits through HBM Questionnaire (Perceived Benefit)

iv. To explore the effectiveness of educational intervention on weight control intention associated with the reasons for action, dietary practices and physical activity via pre-post HBM Questionnaire (cue to action, perceived self-efficacy in dieting, perceived self-efficacy in exercise and behavioral intention of weight management).

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A thorough literature review was performed based on the conceptual framework of this study shown in Figure 2.1. The conceptual framework is divided into two sections. The first section describes the perception (body image, lifestyle, and obstacles) and knowledge (healthy eating and physical activity) that may influence the body weight management. Meanwhile the second section explicates the significant predictors of weight control intention among Malaysians.

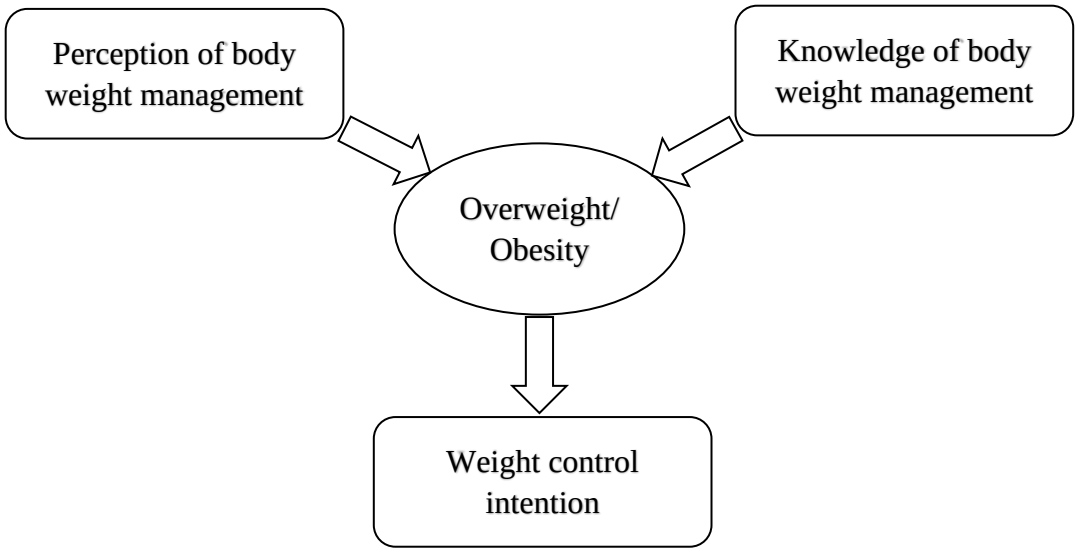

Figure 2.1 Conceptual Framework

2.2 Perception of Body Weight Management

Body weight perception is significantly associated with factors such as gender, socio-economic status, cultural and familial [38-40]. Previous studies have reported that females are more likely to overperceive their body weight compared to males while males tend to underperceive their body weight than females [41-43]. A study conducted in Southern California among adolescents discovered a significant relationship between

gender and body weight perception where 39.3% of females and 26.0% of male respondents perceived themselves as overweight. As for weight control interventions, 50.4% of females tried to lose weight compared to male respondents [41]. This aligns with the influence of societal and cultural factors on weight management behaviors. Historically, females have been subjected to greater societal pressure regarding body image and weight, potentially leading to more females perceiving themselves as overweight and attempting weight loss.

According to a study on relationships between body weight perception and weight management among adolescents in Nepal reported that 61.5% respondents perceived their body weight accurately, whereas 21.5% respondents underperceived and 16.5% respondents overperceived their body weight [44]. The study revealed that the weight control behaviours is highly influenced by the body weight perception of the individual [44]. Adults who perceived themselves as overweight involved in weight control activities than those who underperceived their body weight [45, 46]. A previous study to evaluate the relationship between young adults' body weight perception and physical activities concluded that young adults who perceived themselves as slightly overweight and very overweight are more likely engage in physical activities [45].

In contrary, a study conducted to determine the association of body weight perception between diet and physical activity, whereby adolescents who underperceived their body weight were more prone to avoid healthy dietary behaviors and physical activity [43]. Similarly, a study conducted among late adolescents in Kuantan, Malaysia stated that approximately 33% of the respondents perceived their body weight imprecisely which directly results in the lack of interest for intervention [38]. According to an online survey conducted among adults with obesity and health care professionals

in 11 countries, patients with minimal desire or motivation to address their weight management may hinder conversations related to weight management [47].

2.3 Knowledge of Body Weight Management

A study evaluating the knowledge, behaviours and attitudes of physical activity on obesity among university employees concluded that BMI is highly influenced by knowledge, behaviors and attitudes. The knowledge levels among lecturers are better compared to the administration employees which implies that the lecturer have better understanding on the consequences of obesity [48]. Similarly, another study conducted among university students reported that the knowledge of respondents concerning obesity is substantially higher in students majoring in medicine compared to the other students [49].

According to a study that assessed the determinants of overweight and obesity, the respondents' knowledge of BMI was insufficient, whereby only 50.2% and 28.1% able to predict their BMI for normal and obese weight, respectively. The majority of respondents (80.7%) showed a good level of knowledge regarding the relationship between diet and diseases. Conversely, the understanding was considerably lower (37.1%) for the specific recommendation emphasizing the reduction of red meat consumption to mitigate the risk of cancer. As for diet and weight, about 57.5% responded correctly to the item about eating a high-protein diet for healthy weight. For weight management topic, only 23.5% responded correctly for the item about taking nutritional supplements [50].

Previous studies on surveys for other lifestyle diseases revealed that there is a gap in the knowledge, attitude and practices of the individuals [51, 52]. Both studies have underlined the need for patient educational intervention which will facilitate

individuals to transform the knowledge into practice. Knowledge of body weight management may act as a trigger for behavioural change and weight control intention. It was deliberated that the sufficient knowledge of body weight management, change in behaviour and change in body weight perception is crucial for effective interventions [53].

2.4 Weight Control Intention

There are many factors that may influence the weight control intention of overweight and obese individuals. A survey conducted among primary care patients stated that the perception of body weight as a health risk was associated with being in advanced stages to reduce weight, improve eating habits, and increase physical activity. Similarly, a previous study reported 23% of respondents with hypertension, and 28% of respondents with both hypertension and diabetes were adopting a low fat or calorie diet to reduce weight.

The study revealed that the weight control behaviour among respondents with disease (hypertension and/or diabetes) was higher compared to 19% of respondents with neither disease [54]. A previous study revealed that most obese individuals showed their willingness to lose excess body weight to prevent them from developing health problem or diseases. This study stated that obese males and females who are diagnosed with non-communicable diseases expressed strong determination in losing weight [55].

Other factors that influence the behavioural change for weight management include BMI, knowledge, self-reported health and advice from healthcare professional that their weight was a health risk [47]. A study conducted among Korean adolescents reported that the prevalence rate of weight control behaviour was significantly higher in females compared to males [56]. First-line intervention such as multi-component

weight management programs, diet, exercise and counselling may lead to significant change in weight control intention and weight loss [57].

In addition, weight control behaviour is highly influenced by body size dissatisfaction. The body size satisfaction among women is interrelated with age, educational level, marital status and multiparity [58]. A study on body size satisfaction reported about 60.5% of respondents had weight control intention and 92.15% of them had atleast one healthy dieting behavior [58].

Parents and peers play an important role in influencing body weight reduction strategies. A previous study reported that perceptions by parents on their child's weight have been associated with the child's body dissatisfaction. The findings of this study implied that parents serve as role models for their children in motivating weight loss behaviours [59].

The misperception of body weight was correlated to weight control behaviors [43, 44, 60]. This is in line with a study on the overestimation of body weight among female university students, whereby the respondents who overperceived their body weight had significant obesity stress weight control intentions and checked body weight more often and had dieting experiences [61]. The study concluded that over-erception of body weight overestimation is associated with weight control behaviors, risky lifestyles and mental illness, therefore interventions should also underline the impact of body weight over perception.

2.5 Health Belief Model (HBM)

There are several tools used to evaluate weight management, aside from the Health Belief Model which include the Theory of Planned Behavior (TPB)

questionnaire, the Social Cognitive Theory (SCT) survey and the Stages of Change questionnaire based on the Transtheoretical Model (TTM). The TPB questionnaire evaluates attitudes, subjective norms and perceived behavioral control, providing insights into individuals' intentions regarding weight management behaviors [27]. The SCT survey explores observational learning, self-regulation and self-efficacy, offering a comprehensive understanding of influences on healthy behavior, whereas the Stages of Change questionnaire categorizes individuals into stages reflecting their readiness to change weight management behaviors [28, 29].

The various behaviour models have their strengths and areas of applicability based on the context and behavior being studied. However, the HBM is often considered effective due to its comprehensiveness and wide application across various health domains. One of the strengths of the Health Belief Model is its simplicity and ease of use. It provides a straightforward framework to understand how individuals perceive a health threat (e.g. obesity) and the corresponding behavioral response (e.g. engaging in weight management strategies). The HBM integrates essential components such as perceived susceptibility, severity, benefits, barriers, cues to action and self-efficacy. All these HBM subscales come into place affecting their belief to trigger a behavioural change.

When people considered themselves susceptible to developing a health problem (perceived susceptibility), believed that it would bring serious health complications (perceived severity), believed that changing health behaviour would bring potential positive aspects in reducing the severity of the condition (perceived benefits), believed that the benefits overweigh the obstacles of adopting a health-related behaviour (perceived barriers) and believed that they are able to perform a new health-related

bahviour (perceived self-efficacy), then they are most likely to involve in a course of actions to reduce the health risks (cue to action) [62].

A study evaluating the weight loss behaviour among female school students by utilizing HBM constructs reported that the overweight students had strongest intention to reduce weight. The study also revealed perceived severity, cues to action and perceived self-efficacy were the significant predictors of behavioural intention for weight reduction [63]. Perceived severity, perceived susceptibility, cue to action, perceived barriers and perceived benefits were reported as the significant predictors of BMI in a previous study conducted to evaluate the predictive power of the HBM among college students [64].

The perceived barrier for weight loss was classified into six barriers, namely situational barrier, stress and depression barrier, social pressure, adverse effect of weight loss diet, food craving and the cost of the diet. Among the six barriers, the situational barrier is the most common barrier for adopting a healthy diet. Practising a healthy diet is often interrupted when an individual joins a celebration or party. In addition, perceived barriers for physical activity are categorised into two barriers, namely external and internal barriers. The study reported that lack of time and lack of interests or motivation are the common barriers [65].

A previous study showed that one of the noteworthy variables in predicting behavioural intention is perceived benefits. The perceived benefits HBM subscale can be classified into three groups which are emotional health, physical health and social health. The emotional health group had the higher ratings compared to others. It is accepted by the individual that there are positive outcomes of adopting a healthy diet

and lifestyle. This will reduce their emotional burden, make them feel energetic and comfortable around others [66].

Several experimental studies were conducted to evaluate the effectiveness of educational intervention developed based on HBM constructs. A previous study evaluating the effects of educational intervention based on HBM on improving dietary habits revealed that higher mean scores were obtained in the intervention group and almost all variables had significant differences between the control and intervention groups [67].The mean scores of obesity-related behaviour reported a significant difference between control and intervention groups immediately after the intervention, implied that educational intervention based on HBM able to improve obesity-related behaviours [68].

The findings of a previous study suggested that the modified HBM-based intervention was effective as a significant change in health knowledge and health behaviour was observed among students in intervention group [69]. According to an experimental study among female students, a significant difference was observed in the mean scores and BMI scores in the intervention group compared to control group. The findings denoted that the nutrional education based on HBM was effective in improving the BMI of the overweight female students [70].

2.6 Body Weight Management among Malaysians

Body weight perception is highly associated with weight control behaviour among adolescents [71]. The findings of the study stated that almost half of the respondents had misperceived their body weight and majority of them overperceived their body weight.

There was an association between correct body weight perception and weight control behaviour, whereby the respondents who perceived their body weight accurately were less likely to participate in weight control practices. The most common weight reduction method was food intake restriction (42.4%) followed by physical exercise (25.3%) and a small number involved in unhealthy weight loss practices such as extreme calorie restriction, detox cleanses, diet pills and laxative abuse [71]. These unhealthy practices may results in nutritional deficiencies, gastrointestional issues and heart problems [72-75].

The findings of a cross sectional study conducted by the Institute for Public Health, Malaysia showed about 13.8% of respondents underperceived, 35.0% overperceived and 51.2% accurately perceived their body weight [76]. The study reported that significant number of female respondents with normal weight overperceived themselves as overweight. Contradictorily, significant number of male respondents with overweight underperceived themselves as underweight. The study underlined that there is a need to have better understanding on weight control behaviour among adolescents [76].

A previous study conducted on female adolescents in Perak state stated that more respondents with normal weight misperceived their body weight than the overweight respondents [16]. The knowledge level on weight management was lower in overweight respondents (64%) compared to normal weight respondents (52%).

Besides, a study among adolescents in Kuantan, Pahang found that the involvement in physical activity was significantly higher in male (35.0%) respondents than female respondents (17.3%). In contrary, about 77.7% of female respondents had higher score for knowledge level on weight management than male respondents

(42.3%). The results of the study showed that the eating behaviour was significantly influenced by the knowledge level of body weight management and body image misperception [15].

A previous study demonstrated the efficacy of lifestyle education utilizing the HBM to enhance behaviors related to obesity. The average scores of obesity-related behavior exhibited notable differences between the experimental and control groups immediately after the intervention and also remained significant two months post-intervention [68].

Another previous study assessing the impacts of an educational program using the HBM, indicated that the experimental group exhibited a significant outcomes of HBM constructs. This difference was remained significant at both the 3-month and 6-month marks post-intervention. The results underscored the effectiveness of education based on HBM in enhancing behaviors related to obesity [77].

The previous studies underlined the need for educational intervention programs to prevent overweight and obesity problems among Malaysians. Therefore, in this context, the findings of the present study will help in developing health education programs based on the HBM and integrate in preventive health programs or interventions strategies to ensure well-being of the people.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The study protocol (USM/JEPeM/20090504) was reviewed and approved by The Human Research Ethics Committee of Universiti Sains Malaysia (JEPeM-USM) (Appendix A).

The study comprised two components.

i. A cross-sectional study for the translation, cross-cultural adaptation and validation of the Health Belief Model Questionnaire (HBMQ)
ii. A quasi-experimental study (Part 1 – cross-sectional study and Part 2 – interventional study) to evaluate the perception and knowledge associated with Body Mass Index (BMI) and the effectiveness of an educational intervention on weight control intention

3.1.1 General Data Collection Method

The study was conducted by distributing the self-administered HBMQ link, developed with an online survey platform, Google Forms. The HBMQ Google Form link was created and promoted on social media platforms, e.g., email, WhatsApp, Facebook and Instagram, to reach out to the public in Malaysia.

The first page of the Google Form consisted of the background information of the study and the consent form. The participants could agree or decline their participation in the study before the survey. The participants who provided their consent to participate were directed to section one of the survey, while those who declined to participate were directed to a page thanking them and exit directly from the survey.

The responses collected on the questionnaire remained confidential and anonymous. Responses collected in Google Forms were stored in a password-protected electronic format. Information and data obtained from this research were aggregated and summarized. Data derived from the study will be kept for at least 5 years after the completion of the study.

3.2 A cross-sectional study for the translation, cross-cultural adaptation and validation of the HBMQ

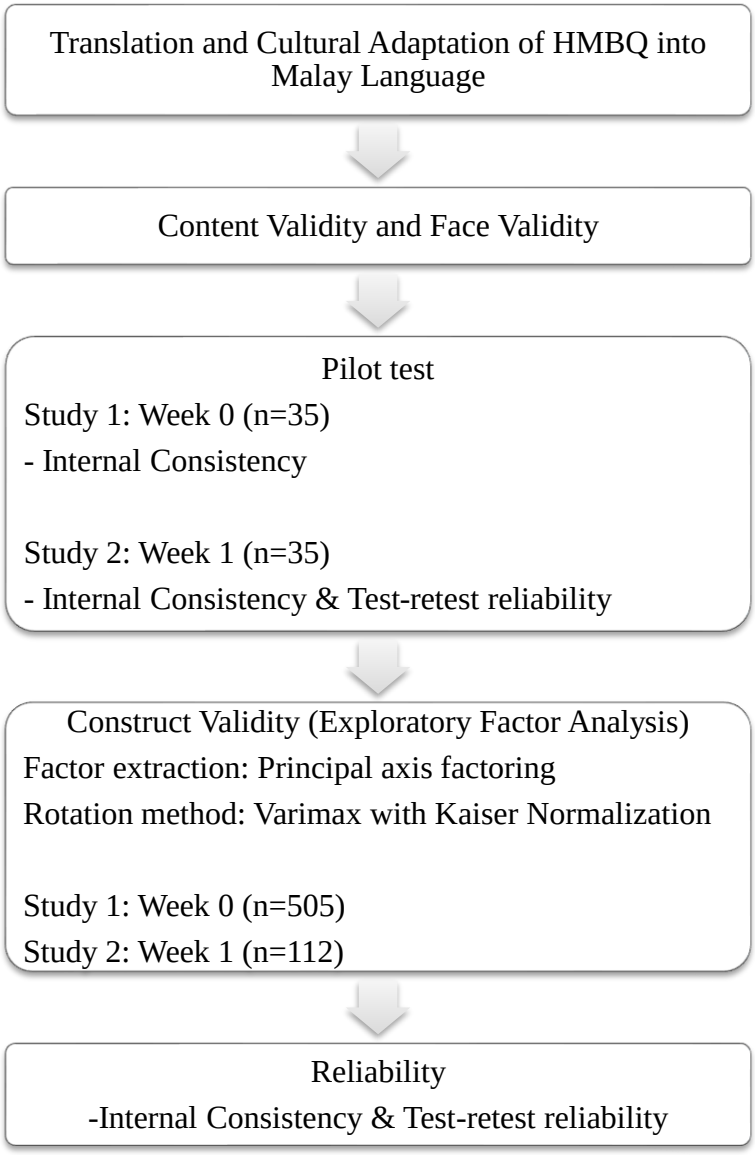

Figure 3.1 Different Stages of Developing Malay version HBM

3.2.1 Translation and Cultural Adaptation of the HBMQ

The HBMQ is based primarily on the instrument used in a previous study by Saghafi-Asl et al [66]. The questionnaire items were derived from a similar instrument utilized in previous studies by Park and McArthur et al [63, 78]. The format of the HBMQ includes rating all statements using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The HBMQ was adapted and translated into Malay language based on published international guidelines (Appendix B) [79, 80]. This was conducted by the opportunistic sample of bilingual experts aged 18 years and older (pharmacist academicians, practicing hospital and community pharmacists) via Google Meet. The translation and cultural adaptation process consist of steps including preparation, forward translation, reconciliation, back translation, back translation review and finalization.

Table 3.1 The translation and cultural adaptation of HBMQ

Steps	**Critical Component**	**Procedure**
Preparation	Obtain permission	Obtained permission from instrument developer to use and adapt HBMQ
Forward Translation	Translation of the original language of the HBMQ into another language.	Two independent forward translations of HBMQ from English to Malay language by two bilingual experts (pharmacist academicians).
Reconciliation	Resolve discrepancies between the independent forward translations and reconciliation into one	Compared the two forward translations and reconciled them via discussion with six practicing hospital and community pharmacists.
Back translation	Back translation of the reconciled translation into the original language to ensure same meaning is derived.	Carried out back translation from Malay into English language by two additional bilingual experts (pharmacists).
Back translation review	Review of the back translations against the original to ensure conceptual equivalence	Reviewed the back translation against the original version, identified discrepancies between the original version and reconciled translation. Revised the reconciled translation to resolve the discrepancies.
Finalization	Resolve discrepancies and make amendments	The translation was finalized.

3.2.2 Translational Validity: Content Validity and Face Validity

The Malay version HBMQ was validated for its face and content validity by a panel of 10 experts who are Malaysian adults aged 18 years and above from both genders, are able to read and understand Malay or English and agree to participate in the validation. The expert panel comprised two pharmacist academicians, four practicing hospital pharmacists, two community pharmacists, a nutritionist and a physician. The inclusion of the expert panel was determined by the convenience sampling technique, facilitating accessibility and participation in the study. The role of expert panel in weight management includes The experts reviewed the relevance and content equivalence of each questionnaire item through a four-point Likert-scale response whereby, 1 (not relevant), 2 (somewhat relevant), 3 (quite relevant), 4 (highly relevant) in HBMQ Google Form.

The experts were asked to provide their evaluations through suggestions and comments for the refinement of the instrument. For face validity, the clarity of translation, appropriateness of grammar, format (font size and space) and comprehension of the questionnaire items have been evaluated with categorical option of “Yes” and “No” [81] (Appendix C). This denotes that the favorable items are adequately relevant and clear whereas the unfavorable items are ambiguous and unclear.

3.2.3 Pilot Test: Internal Consistency and Test-retest reliability

The pilot test was conducted with an opportunistic sample of 35 Malaysian students from Universiti Sains Malaysia (USM), aged 18 years and above from both genders, are able to read and understand Malay or English and agree to participate in the pilot test. While university students may not perfectly represent the entire general public, including them in the pilot test allows for an initial assessment of the research

instruments and procedures. It provides a convenient and accessible starting point to identify any potential issues before expanding the study to a more diverse population, ensuring the study's feasibility and enhancing its applicability to a broader audience. The students were approached via Microsoft Teams and their response were collected by distributing the self-administered HBMQ Google Form link. The data was analysed using Cronbach's Alpha to ascertain its format, length, clarity, reliability and ease of comprehension for data collection. Participants rated the 89-item questionnaire and a second evaluation was conducted after a week with the same 35 participants to assess the test-retest reliability of the HBMQ. The purpose of conducting a test-retest reliability is to evaluate whether the HBMQ used to collect data yields consistent responses from participants when administered at two different points in time.

3.2.4 Construct Validity: Exploratory Factor Analysis (EFA)

A cross-sectional study was carried out among the general public all over the 13 states in Malaysia in May 2021. A convenience sampling technique was used to recruit the respondents by distributing the self-administered HBMQ Google Form link. This cross-sectional study included Malaysian adults aged 18 years and above from both genders, with BMI of 25 kg/m^2 and greater or who have the intention to reduce body weight, are able to read and understand Malay or English and agree to participate in the survey.

People who are aged below 18 years, with a BMI lesser than 25 kg/m^2 or do not have any intention to reduce body weight, are unable to read and understand Malay or English or those with medical conditions attributable to weight gain or from any vulnerable groups (i.e., whoever considered particularly susceptible to coercion or undue influence in a research setting which includes persons who may be incapable of