

**THE EFFECTIVENESS OF THE TRIM AND
FIT PROGRAM IN BODYWEIGHT
MANAGEMENT AMONG HEALTHCARE
PROVIDERS IN TERENGGANU**

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FIT PROGRAM IN BODYWEIGHT
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PROVIDERS IN TERENGGANU**

by

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LIST OF SYMBOLS

$<$	Less than
$>$	More than
\leq	Less than or equal to
\geq	More than or equal to
$=$	Equal
\times	Times
α	Alpha
β	Beta
$\%$	Percentage
$\&$	And

LIST OF ABBREVIATIONS

AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
CRCT	Cluster randomised controlled trial.
HCP	Healthcare provider
KG	Kilograms
KOSPEN WOW	“Komuniti Sihat, Perkasa Negara” Wellness of Workers
MOH	Ministry of Health
NCD	Non-communicable disease
NHMS	National Health Morbidity Survey
OR	Odds Ratio
RCT	Randomise controlled trial
SD	Standard Deviation
WHO	World Health Organisation

**KEBERKESANAN PROGRAM TRIM AND FIT DALAM
PENGURUSAN BERAT BADAN DAN FAKTOR-FAKTOR YANG
BERKAITAN DI DALAM KALANGAN PENYEDIA PENJAGAAN
KESIHATAN DI TERENGGANU**

ABSTRAK

Obesiti dalam kalangan petugas penjagaan kesihatan (HCP) merupakan satu isu penting yang mempengaruhi kesejahteraan mereka dan kualiti penjagaan pesakit. Kajian ini bertujuan untuk menilai persepsi imej tubuh, keberkesanan Program Trim and Fit, dan faktor-faktor yang berkaitan dengan penurunan berat badan yang berjaya di kalangan HCP yang mengalami masalah berat badan berlebihan dan obesiti di Terengganu. Kajian ini bermula dengan kajian keratan rentas yang menilai skor persepsi imej tubuh dan faktor-faktor yang mempengaruhinya di kalangan HCP yang mengalami masalah berat badan berlebihan dan obesiti. Ini diikuti dengan ujian terkawal rawak berkumpulan untuk menilai keberkesanan Program Trim and Fit ke atas berat badan, peratusan lemak badan, dan lingkar pinggang, serta satu kajian kohort untuk menentukan faktor-faktor yang berkaitan dengan kejayaan penurunan berat badan. Kajian ini bermula pada Januari hingga Oktober 2023, melibatkan 201 HCP dengan BMI $\geq 25\text{kg/m}^2$. Pemilihan peserta dilakukan melalui pemilihan rawak berperingkat, dengan 100 dalam kumpulan intervensi dan 101 dalam kumpulan kawalan. Kumpulan intervensi menjalani Program Trim and Fit selama enam bulan yang menekankan pengubahsuaian pemakanan, aktiviti fizikal, penglibatan rekreasi, dan motivasi. Kumpulan kawalan menerima lembaran pendidikan tentang tekanan di tempat kerja. Analisis statistik melibatkan regresi linear berganda, ANCOVA

berulang-kali, dan regresi logistik berganda ($p < 0.05$). Purata skor persepsi imej tubuh (SD) bagi perasaan negatif, daya tarikan, kesedaran fungsi fizikal, dan ketidakpuasan tinggi adalah masing-masing 27.2 (7.78), 18.5 (5.19), 15.7 (3.47), dan 8.6 (3.82). Umur dan waktu kerja meningkatkan dengan kepuasan imej tubuh, manakala BMI yang lebih tinggi mengurangkan kepuasan imej. Jururawat melaporkan ketidakpuasan tinggi terhadap ketinggian. Pendapatan yang lebih tinggi berkorelasi dengan penilaian diri yang lebih baik dalam penampilan, kesihatan, dan kecergasan, manakala pendidikan yang lebih tinggi berkorelasi dengan skor yang lebih rendah. Perkahwinan mempengaruhi keyakinan diri dalam kemenarikan, kesihatan, dan kecergasan tetapi meningkatkan kepuasan ketinggian. Program Trim and Fit secara signifikan meningkatkan berat badan, peratusan lemak badan, dan lingkar pinggang. Faktor-faktor yang berkaitan dengan penurunan berat badan yang berjaya termasuk pendapatan, kehadiran program keseluruhan, dan kerapian perekodan pengambilan kalori. Persepsi imej tubuh diramalkan oleh ciri-ciri sosiodemografi dan pekerjaan, tetapi ia tidak memberi sumbangan yang signifikan kepada kejayaan penurunan berat badan. Kesimpulannya, persepsi imej badan dalam kalangan HCP di Terengganu menunjukkan kepentingan intervensi yang disesuaikan bagi meningkatkan persepsi diri mereka. Walaupun program Trim and Fit telah terbukti berjaya dalam meningkatkan hasil kesihatan utama, komitmen dengan program ini, terutamanya melalui kehadiran dan pengawasan kalori, adalah penting untuk keberkesanannya. Sehubungan itu, sumber boleh digunakan ke arah keutamaan yang lain, oleh kerana program sedia ada berkesan mencapai objektifnya.

**THE EFFECTIVENESS OF THE TRIM AND FIT PROGRAM IN
BODYWEIGHT MANAGEMENT AND ITS ASSOCIATED FACTORS
AMONG HEALTHCARE PROVIDERS IN TERENGGANU**

ABSTRACT

Obesity among healthcare providers (HCPs) is a significant concern, impacting both their well-being and patient care quality. This study aims to assess body image perception, the effectiveness of the Trim and Fit Program, and factors associated with successful weight reduction among overweight and obese HCPs in Terengganu. This study started with a cross-sectional study that evaluates body image perception scores and predictors among overweight and obese HCPs. This was followed by a cluster randomized controlled trial to assess the effectiveness of the Trim and Fit Program's impact on weight, body fat percentage, and waist circumference and a cohort study to determine the factors associated with successful weight reduction. The study spanned January to October 2023, involving 201 HCPs with BMI ≥ 25 kg/m². Participants were selected using a multistage random sampling, with 100 in the intervention group and 101 in the control group. The intervention group underwent a six-month Trim and Fit Program emphasizing nutritional modifications, physical activities, recreational engagement, and motivation. The control group received educational booklets on workplace stress. Data was analysed using multiple linear regression, repeated-measures ANCOVA, and multiple logistic regression ($p < 0.05$). The mean (SD) scores of body image perception for negative affect, attractiveness, physical functional awareness, and height dissatisfaction are 27.2 (7.78), 18.5 (5.19), 15.7 (3.47), and 8.6 (3.82), respectively. Age and working hours increase with body

image satisfaction, while higher BMI decreases with satisfaction. Nursing professionals report increased height dissatisfaction. Higher incomes correlate with better self-evaluation in looks, health, and fitness, while increased education correlates with lower scores. Marriage impacts self-esteem in attractiveness, health, and fitness but increases height satisfaction. The Trim and Fit Program significantly improves body weight, body fat percentage, and waist circumference. Factors associated with successful weight reduction include income, total program attendance, and frequency of calorie intake recording. Body image perception is predicted by sociodemographic and occupational characteristics, but it doesn't significantly contribute to weight reduction success. In conclusion, the body image perception among HCPs in Terengganu highlights the significance of tailored interventions to enhance their self-perception. While the Trim and Fit program has proven successful in improving key health outcomes, the high engagement with the program, particularly through attendance and calorie tracking, is essential for its effectiveness. As a result, resources can now be redirected towards other priorities, recognizing that the program's existing structure effectively achieves its objectives.

CHAPTER 1

INTRODUCTION

1.1 Background

1.1.1 Burden of Obesity in Malaysia

As reported by the World Health Organisation (WHO), worldwide obesity rates increased from 4.0% to 18.0% between 1975 and 2016, resulting in approximately 2 billion overweight adults, 650 million of whom were obese. Furthermore, 39.0% of adults worldwide were overweight, with a nearly equal distribution between men (39.0%) and women (40.0%). Obesity affects approximately 13.0% of the global adult population, with 11.0% being males and 15.0% being females (WHO, 2021). Obesity and overweight are becoming increasingly common in low and middle-income countries. This trend is concerning as it is expected that the prevalence of non-communicable diseases (NCDs) related to obesity will double in the next four decades (Rtveladze *et al.*, 2014). According to a recent World Obesity Federation forecast, approximately one billion people worldwide are expected to be obese by 2030. One in every five women and one in every seven males are affected (Lobstein *et al.*, 2022).

The data on obesity trends in South and Southern Asia between 2010 and 2014 reveals a significant increase. During this period, obesity rates rose by 24.0% in Singapore, 27.0% in Malaysia, and 38.0% in Vietnam (Canetti *et al.*, 2013). Furthermore, there is a concerning prediction that the prevalence of obesity in this region is set to double from 2010 to 2030 (Lobstein *et al.*, 2022).

In Malaysia, there was a significant and escalating burden of NCDs, which accounted for approximately 73.8% of deaths and 73.6% of disability-adjusted life years lost in 2019 (IHME, 2021). The National Health Morbidity Survey in 2019:Volume II found that about 50.1% of the Malaysian adult population was overweight or obese, with 30.4% overweight and 19.7% obese (Institute for Public Health), 2020). It was reported that a total of 52.6% of them were found to be abdominal obese. Compared to NHMS 2011 Volume II and NHMS 2015 Volume II, the trend of overweight, obesity and abdominal obesity continues to climb (29.4%, 15.1%, and 46.6% in NHMS 2011. Volume II) and (30.0%, 17.7%, and 48.6% in NHMS 2015 Volume II (Institute for Public Health, 2015)

1.1.2 Obesity and Body Image Perception

There were many studies relating to obesity and body image perception. Body image refers to an individual's perceptions, thoughts, and emotions around their physical appearance, including how they see and evaluate their body (Grogan, 2021). Body image includes a variety of aspects, including positive and negative attributes, as well as perceptual, attitudinal, and behavioural elements (Cash, 2012; Joo *et al.*, 2018). A person may have a negative or positive body image (Andharia, 2023). The relationship between body image perception and obesity is interconnected and influenced by various factors. Obesity frequently leads to negative body image perceptions due to social standards and stigmas related to excessive weight (Jones *et al.*, 2020). The affective aspect of body image encompasses how a person responds emotionally to their body, including feelings of contentment, discontentment, or shame. Meanwhile, the behavioural aspect involves the actions taken in response to

one's perception and emotions regarding one's body, such as grooming, engaging in diets, or exercising (Andharia, 2023).

Negative affect is a spectrum of negative emotions, including anxiety, sadness, fear, and anger, influenced by self-perception, especially in relation to one's body (Stringer, 2013). Body satisfaction is significantly influenced by an individual's self-perception of health, fitness, and physical appearance, with more favourable self-perceptions promoting overall well-being and fitness. On the other hand, negative self-perceptions often result from body dissatisfaction (Joo *et al.*, 2018).

Greater awareness of one's body and needs contribute to maintaining good physical functionality and a positive body image. When individuals are attuned to their body's signals and requirements, they are more likely to participate in healthy behaviours, such as consistent physical activity and a well-balanced diet. This enhances physical well-being and fosters a positive body image as individuals appreciate their body's capabilities and take better care of it (Alleva and Tylka, 2021). Essentially, higher awareness acts as a bridge connecting physical functionality and body image.

Body dissatisfaction includes height dissatisfaction as a component. When someone is dissatisfied with their height, it contributes to their overall dissatisfaction with their body. Height constitutes a fundamental component of an individual's body image, and negative emotions about height can impact a person's general perception and assessment of their physique (Batterham *et al.*, 2016). Thus, body dissatisfaction is a subset of height dissatisfaction, establishing an interrelation between the two.

1.1.3 Consequences of Body Dissatisfaction

Body dissatisfaction and obesity often have a bidirectional relationship. Dissatisfied individuals may engage in unhealthy eating habits and sedentary behaviours, leading to weight gain and obesity. Body dissatisfaction has significant physical and psychological effects on individuals, increasing the risk of mental health conditions like depression, anxiety, and reduced self-esteem while also being associated with lower self-esteem and a distorted body image (Paxton *et al.*, 2006; van den Berg *et al.*, 2010). Depending on coping mechanisms, body dissatisfaction can lead to physical health issues like obesity or undernutrition, posing potential long-term risks while simultaneously diminishing quality of life, impairing concentration, and hampering productivity. It is consistently associated with unhealthy weight control behaviours like extreme dieting and excessive exercise and serves as a predictor of eating disorders, low self-esteem, depression, and obesity (Grabe *et al.*, 2008; Johnson and Wardle, 2005).

Obese people may experience increased body dissatisfaction as a result of physical appearance alterations. According to studies, overweight or obese people frequently suffer weight bias, which contributes to poor mental health, decreased body satisfaction, poorer self-esteem, and difficulties in both work and social functioning (Friedman *et al.*, 2002; Mento *et al.*, 2021)

1.1.4 The Necessity of an Obesity Intervention Program

The projection that one billion people worldwide are expected to be obese by 2030, coupled with the specific data indicating a high prevalence of overweight and obesity in Malaysia and a rising trend, underscores the pressing necessity for intervention programs focused on weight reduction (Health, 2020; Lobstein *et al.*, 2022). These alarming data highlight the urgent need for effective and accessible

interventions to control the escalating obesity rates, particularly in regions like Malaysia, where NCDs are already a significant burden. A tailored weight reduction program is essential to address the unique challenges and health risks the Malaysian population faces; this leads to improved health outcomes and reduces the burden on healthcare systems. The above statements emphasize how body dissatisfaction, obesity, and body image perception are interconnected, influencing people's eating habits and physical activity, which can lead to physical and psychological effects. It highlights the importance of a weight loss program that not only concentrates on physical components but also tackles the emotional and psychological causes linked to body dissatisfaction in order to obtain more efficient and comprehensive results in encouraging better weight control.

To effectively tackle obesity, intervention programs should target the core causes, such as diet, physical activity, access to healthy food options, and social support. These programs should also overcome barriers to lifestyle changes across personal, socioeconomic, and environmental factors. Additionally, engaging diverse stakeholders at all levels is critical for success (Chan and Woo, 2010). Sacks *et al.* (2009) have proposed a comprehensive framework for the development and effective implementation of public health strategies to prevent obesity. This framework outlines three crucial components that should be addressed: Firstly, it emphasises the importance of targeting environmental factors, specifically those related to food, physical activity, and broader socioeconomic conditions. By addressing these environmental determinants, policymakers can create a supportive context for obesity prevention. Secondly, the framework underscores the need to directly influence behaviour. This involves efforts aimed at improving individuals' eating habits and physical activity behaviours. These behavioural changes are central to reducing

obesity rates. Lastly, the framework advocates for the support of health services and clinical interventions. By integrating healthcare systems into obesity prevention efforts, individuals can receive the necessary support and guidance to manage and mitigate obesity-related risks effectively (Chan and Woo, 2010)

1.2 Problem Statement

Healthcare providers (HCPs) in Asian regions have high rates of obesity, which is a public health concern. This is because HCPs play a role in promoting healthy lifestyles and preventing obesity, so their own obesity rates are significant (Jonsdottir *et al.*, 2011). Obesity has negative health consequences for HCPs, including increased risk of death, and also affects their job performance and productivity. Employers of HCPs face challenges due to obesity, such as increased costs and negative public perception (Barber *et al.*, 2015).

The MOH Malaysia has initiated an excellent initiative to cope with NCD diseases, especially obesity, among HCPs by developing and improving the Trim and Fit Weight Management Program. However, evidence of the Trim and Fit Weight Management Program's effectiveness is still limited. The limited assessment of outcomes associated with the TRIM and FIT module, along with the scarcity of studies investigating the effectiveness of weight reduction programs specifically in the context of Malaysia, emphasizes the importance of this study. This study plays a fundamental role by collecting data and conducting assessments, empowering program managers to make evidence-based decisions for program modifications rooted in empirical findings. Identifying barriers to success enables proactive measures, including providing support or adjusting program components, to effectively overcome obstacles and ensure the long-term benefits of the program.

1.3 Rationale

The study investigates the level of body image satisfaction among overweight and obese HCPs and its influence on their adherence to the weight reduction program. Body image perception plays a crucial role in the success of weight reduction interventions. When individuals have a negative body image perception, they may be less motivated to engage in and adhere to weight management programs, resulting in reduced compliance with dietary and exercise recommendations, ultimately affecting the intervention's effectiveness. The data from these findings are utilised to determine the factors associated with the success of interventional activities in weight reduction.

Identifying predictors of body image perception among HCPs within healthcare settings helps uncover potential barriers to their active participation and success in weight reduction programs. By recognising and addressing these barriers in the program's design, we can enhance outcomes and provide better support to HCPs in managing their health and well-being. While numerous weight reduction programs have been introduced worldwide, many were not aligned with the local social culture, posing sustainability challenges. Therefore, implementing the Trim and Fit Weight Management Program in Malaysia, tailored to our social context, is necessary.

Evaluating the program's effectiveness is vital in ensuring its long-term success. By assessing outcomes such as changes in body weight, body fat percentage, and relevant health indicators, we can determine whether the intervention is achieving its intended goals.

Understanding the factors contributing to the success of a weight reduction program among HCPs is essential for tailoring interventions, efficiently allocating resources, crafting effective messaging, improving engagement and retention, and ensuring long-term success. This knowledge allows public health strategies to be more

targeted and impactful in promoting healthy weight management among this specific group.

1.4 Research Questions

1. What are the mean score and predictors of body image perception among overweight and obese HCPs in Terengganu?
2. Is the Trim and Fit Weight Management Program effective in weight management among overweight and obese HCPs in Terengganu?
3. What are the factors associated with the success in achieving targeted weight reduction among HCPs in Terengganu?

1.5 Objectives

1.5.1 General Objective

To study the mean score and predictors of body image perception, the effectiveness of the Trim and Fit weight management program and their associated factors among overweight and obese HCPs in Terengganu

1.5.2 Specific Objectives

1. To determine the mean score and predictors of body image perception among overweight and obese HCPs in Terengganu
2. To determine the mean changes in weight, body fat percentage, and waist circumference post-intervention among overweight and obese HCPs in Terengganu
3. To determine the factors associated with the success in achieving targeted weight reduction among the intervention group of the Trim and Fit Weight Management Program in Terengganu

1.6 Research Hypotheses

1. There are significant associations between socio-demographic and job characteristics and body image perception scores among HCPs in Terengganu.
2. There are significant differences in mean weight, body fat percentage, and waist circumference among HCPs in Terengganu after their participation in the Trim and Fit Weight Management Program.
3. There are significant associations between socio-demographic, work-characteristic, and participant-characteristic and the success in achieving targeted weight reduction among HCPs in Terengganu after their participation in the Trim and Fit Body Weight Management Program.

CHAPTER 2

LITERATURE REVIEW

This chapter provides a narrative review of existing research. This involves establishing connections between various topics, including obesity among healthcare providers, its consequences, factors influencing body image perception, workplace weight management programs, factors contributing to successful weight reduction, and the creation of a cohesive conceptual framework.

2.1 Obesity among Healthcare Providers

The National Health Morbidity Survey in 2019: Volume II found that the prevalence of disease and NCD factors among workers was high. Almost 34.0% of Malaysian adults are obese, and more than half (57.0%) of them are among the productivity age group adults (Institute for Public Health, 2020). Obesity among HCPs is a significant issue as it impacts the morbidity and mortality of HCPs. Studies across Malaysia in 2012, 2015, and 2021 showed that about 20.0% of HCPs were obese (Ehsan, 2012; Hazmi *et al.*, 2015; Kunyahamu *et al.*, 2021). Despite providing comprehensive care to patients, HCPs often struggle with neglecting their own health, resorting to unhealthy food choices, limited physical activity, and inadequate exercise (Nepper *et al.*, 2021). Obesity among healthcare workers can have several consequences, including health problems, psychological issues, impact on patient care and financial burden.

Obesity increases the risk of chronic conditions like diabetes, heart disease, and cancer (Fruh, 2017). Healthcare workers with obesity face these risks, affecting their health and job performance, leading to more absenteeism and presenteeism (Guo *et al.*, 2023). Obesity can result in physical health problems like joint pain, reduced

mobility, and lower energy levels. These issues can hinder healthcare workers from performing physically demanding tasks and providing effective patient care (Richard *et al.*, 2017). Additionally, obesity and related health issues can make it challenging to use appropriate equipment and meet job demands, leading to increased presenteeism and absenteeism (Barber *et al.*, 2015).

Obesity is often linked to an increased risk of depression and anxiety. Healthcare workers who are obese may experience psychological distress, which can negatively impact their mental health (Kivimäki *et al.*, 2006). Obesity can lead to reduced self-esteem and self-confidence (van den Berg *et al.*, 2010). Healthcare workers may struggle with body image issues and experience social stigma, which can affect their self-perception and interactions with colleagues and patients (Friedman *et al.*, 2002; Mento *et al.*, 2021).

Overweight and obese healthcare workers may encounter challenges when counselling patients, especially those facing weight-related issues (Younis *et al.*, 2023). This barrier could impact patient consultations despite healthcare professionals' specialised training. Ideally, HCPs should possess a deep understanding of their own health conditions and the impact of lifestyle changes on health (Zhao *et al.*, 2022). Additionally, they play a crucial role in promoting healthy lifestyle changes for disease prevention and serve as role models for the general population by leading healthy lifestyles (Younis *et al.*, 2023).

Obesity-related healthcare costs, including medical treatments and interventions, can place a financial burden on both healthcare workers and their employers. These costs may result from managing obesity-related health conditions. A systematic review by Andrea *et al.* (2017) highlights that obesity results in significant costs related to lost productivity among workers, mainly due to absenteeism

and presenteeism. These findings underscore the considerable short-term and long-term indirect expenses associated with overweight and obesity, particularly in the absence of effective intervention programs.

By enhancing HCP well-being, several strategies can be implemented, including increasing the availability of healthy food options, organising weight-loss challenges, and providing dedicated spaces and equipment for exercise and physical activities (Rusali, 2018). The workplace is the most appropriate place for health promotion and intervention among HCPs because most of them spend their time there, and it can be the ideal setting to promote obesity intervention (Wilson *et al.*, 1996). HCPs play a vital role in promoting healthy lifestyles, especially among communities and patients (Jonsdottir *et al.*, 2011). Therefore, it's really important to develop a program that inspires HCPs to personally support and embrace a healthy lifestyle. Previous research indicates that workplace wellness programs for weight reduction can enhance employee health, lower absenteeism and healthcare costs, and increase workers' quality of life (Baicker *et al.*, 2010; Chapman, 2005; Michaud *et al.*, 2016; Pelletier, 2011). As worker quality of life and absenteeism have been linked to obese employees, these changes may influence their productivity at work (Rusali, 2018). Workplace health promotion and intervention programs have the potential to increase physical activity, develop healthy dietary habits, and control a healthy weight (Schröer *et al.*, 2014). Workplace health promotion also benefits employees and employers, with organisations benefiting from reduced productivity costs (Martin *et al.*, 2019).

2.2 Factors Associated with Body Image Perception

The study of predictors influencing body image perception can serve as a valuable means to facilitate improvements and interventions for overweight and obese HCPs in Malaysia. The factors can be divided into sociodemographic factors,

behavioural factors, family and relationship factors, environmental factors, and cultural and societal factors. Studies on the HCP population are still scarce. Most of the available studies discussed its associated factors among adolescent and general adult populations.

2.2.1 Sociodemographic Factors

The study conducted by Šivert and Sinanović (2008) involving 215 women aged between 17 and 60 indicated that younger women exhibited notably higher levels of body dissatisfaction compared to their counterparts. However, a recent study by Silva *et al.* (2011) presents a contradictory result, whereby body dissatisfaction among the obese population was higher among older women. Meanwhile, a study on the general population in Brazil showed that as men age, there is a higher likelihood of experiencing mild to moderate dissatisfaction related to thinness, not due to obesity. Among men, the older age group constituted a protective factor for dissatisfaction (de Menezes *et al.*, 2014). Another study by Grilo *et al.* (1994) found that individuals who had obesity in their youth are more likely to experience body dissatisfaction in adulthood. The study focused on the age at which obesity began and its connection to body dissatisfaction, aligning with a recent study by Wardle *et al.* (2002), which also suggests that early obesity can increase body dissatisfaction.

Several studies have examined gender differences in body image perceptions, revealing that women tend to experience higher levels of dissatisfaction and have a greater awareness of their body's functioning. Pop *et al.* (2021) conducted a qualitative study among freshman medical university students, showing that women scored higher on scales measuring private body consciousness and public body consciousness. This suggests that individuals with a heightened awareness of their body's functioning also tend to pay significant attention to both their internal physical sensations and external

appearances. In Malaysia, a study focused on body shape perceptions and attitudes among adolescents, revealing that females exhibited significantly higher levels of body dissatisfaction compared to males. This indicates a preference for a slimmer body shape among Malaysian females (Khor *et al.*, 2009). Furthermore, Fallon *et al.* (2014) conducted research which found that women had a greater prevalence of negative feelings about their bodies, encompassing both overall body dissatisfaction and specific concerns related to physical functions and aspects.

In a study conducted by Pimenta (2019), it was observed that 70.0% of the participants expressed dissatisfaction due to excess weight, indicating a higher BMI compared to those who were dissatisfied due to thinness. Meanwhile, studies conducted among Chinese adolescents and medical students in Oman, which included participants with diverse body weights, consistently demonstrated that individuals with a higher BMI were more likely to experience elevated levels of body dissatisfaction (Chen and Jackson, 2009; Divecha *et al.*, 2022).

Rosenqvist *et al.* (2023) and Albuquerque *et al.* (2021), generally align in highlighting the role of education in body image dissatisfaction, found that there are some differences in the specific results for men and women. Rosenqvist *et al.* (2023) found that men with lower educational attainment tend to have a less positive body image throughout their lives, indicating a consistent trend of dissatisfaction among less educated men. On the other hand, among women, increasing levels of body dissatisfaction were observed as they aged, especially among those with lower levels of education. This suggests that education may play a role in the trajectory of body dissatisfaction in women. Albuquerque *et al.* (2021) complement these findings by indicating that individuals, both men and women, with lower levels of education are more likely to experience moderate to severe body dissatisfaction related to excess

weight. This aligns with the idea that education influences how people perceive their bodies, particularly when it comes to weight-related dissatisfaction. In a separate study conducted by Austin *et al.* (2009), the focus was on parental education, revealing that girls with parents of lower educational attainment and those residing in rural areas were more likely to experience lower levels of body satisfaction.

In a cross-sectional study conducted among a cohort of women recruited from socially vulnerable areas in the city of Porto Alegre, Brazil, Kops *et al.* (2019) identified a significant association between higher income and increased levels of body dissatisfaction. This finding was consistent with research conducted by Silva *et al.* (2014) in Brazil, which also observed a higher prevalence of dissatisfaction with perceived excess weight among individuals with higher incomes. Furthermore, similar trends have been identified in developed countries. Nikniaz *et al.* (2016) reported that women of high socio-economic status in these countries are also more likely to experience body image dissatisfaction.

2.2.2 Lifestyle and Behavioural Factors

A systematic review by Gualdi-Russo *et al.* (2022) demonstrated that involvement in physical activity could be effective in protecting individuals from concerns related to body image perception and enhancing overall body satisfaction. This is supported by Hao *et al.* (2023) and Daniels and Van Niekerk (2011), who reported that exercise and physical activity had been identified as significant predictors of body image perception (Hao *et al.*, 2023).

Korn *et al.* (2013) findings indicate that engaging in physical exercise has a more significant impact on fostering positive body image and overall health perceptions compared to maintaining a healthy diet. This suggests that students who participate in physical activity tend to perceive their bodies and self-image more

positively than those who focus solely on maintaining a healthy diet. In essence, among these students, physical activity plays a more prominent role in shaping a positive self-image than dietary choices.

The study revealed that an individual's perception of their weight status significantly influenced their weight management behaviours. Those who viewed themselves as overweight were more inclined to engage in spontaneous weight management activities, such as dieting and exercising, indicating that self-perception serves as a motivator for weight control efforts. Moreover, individuals who experienced misperception and dissatisfaction with their body weight tended to make unhealthy lifestyle choices. They were more prone to engage in unhealthy behaviours and faced challenges in adopting healthier habits. Additionally, those with body image disturbances had a higher likelihood of underreporting their calorie intake, which could complicate dietary assessments. This underscores the interplay between self-perception, body image, and lifestyle choices in the context of weight management (Bouzas *et al.*, 2019).

2.2.3 Occupational Factors

Leite *et al.* (2019) investigated the association between shift work and sleep duration with body image dissatisfaction among working women in Brazil. The findings revealed that 42.4% of shift-working women experienced body image dissatisfaction, with 93.0% of them expressing a desire for a smaller body size. Both shift work and sleep duration were independently associated with body image dissatisfaction, indicating that these factors influenced how women perceived their bodies. Additionally, women who experienced sleep deprivation, defined as those sleeping less than 7 hours per day while working night shifts, were more likely to experience body image dissatisfaction.

A study among athletes found that those who experience burnout are more likely to feel dissatisfied with their body image (Baella-Vigil *et al.*, 2020). Additionally, for people who work long hours, especially over 40 hours a week or more than 60 hours a week, their risk of burnout increases (Hu *et al.*, 2016). This shows that there is a connection between excessive work hours and burnout, and both burnout and body image dissatisfaction can affect athletes' well-being.

2.2.4 Family and Peer Support Factors

Multiple studies have noted that unmarried women tend to report higher levels of body satisfaction than their counterparts. This difference in body satisfaction may be influenced by the opinions and perspectives of close relatives, including spouses (Garousi *et al.*, 2017; Naeimi *et al.*, 2016). The latest study by Albuquerque *et al.* (2021) in Brazil found that married women have 50.0% higher odds of body image dissatisfaction due to feeling overweight. This finding aligns with a 2011 health survey conducted by Silva *et al.* (2011) in Florianopolis, Brazil, which also found an association between marital status and body image dissatisfaction due to excess weight. However, studies by Tom *et al.* (2005) and Friedman *et al.* (2002) present contradictory findings. Tom *et al.* (2005) emphasised that body image dissatisfaction is less significant in married couples compared to single individuals. In contrast, Friedman *et al.* (2002) found that marital status was not associated with body dissatisfaction.

Additionally, some research has examined the impact of parents, especially mothers, on the body satisfaction of teenage girls. However, in the Iranian study, even those who have acknowledged the family stress associated with their body changes did not directly address the role of parents in this context.

A systematic review by Tort-Nasarre *et al.* (2021) reveals that eight studies have examined how peers influence adolescents' ideal body image and the emotional impact it has on them. Adolescents often express feelings of pressure to be accepted, fears of rejection, exclusion, and judgment, as well as a sense of being constantly observed, compared, or criticised for their physical appearance. The issue of body weight remains a persistent concern among peers, often leading to teasing, jokes, and exclusion. Consequently, participants commonly experience emotions related to acceptance, fear of rejection, and criticism regarding their appearance.

2.2.5 Environmental Factors

A systematic review by Tort-Nasarre *et al.* (2021) showed a relationship between mass media and adolescents' satisfaction or dissatisfaction with body image. Individuals were influenced by celebrity images, while others copied celebrities' fashion to feel comfortable. Some teens feel frustrated by the commercial use of body image, while others find it uncomfortable. Selfies are crucial for body image comfort and self-esteem. Another study among the general population also found that frequent comparisons on social media, particularly among teenagers and young adults, can lead to body dissatisfaction and a desire for thinness (Jiotsa *et al.*, 2021).

2.2.6 Cultural and Societal Factors

The expectations of society regarding human appearance are widely disseminated, particularly in developed countries with extensive media. These messages reinforce ideas about attractiveness and link concepts of femininity and masculinity to specific physical attributes. Western culture often emphasises beauty and thinness for girls and boys while promoting tall, handsome, lean, and muscular bodies for boys and men. These messages shape individuals' attitudes about their bodies and reactions to appearance-related events (Cash, 2012).

2.3 Workplace Weight Management Program

2.3.1 Workplace Weight Management Programs Worldwide

In the United States, the most recent workplace weight management program, known as the Better Living Program, was developed in 2018. This program was created by the Program Director, who worked with the Methodist Health System as the director of a new weight loss program for employees. It featured weekly group meetings that covered topics such as nutrition, physical activity, cognitive and behavioural changes, mental health, and sleep quality. Participants also had 16 individual weekly appointments with weight-loss experts to monitor their progress, establish behavioural goals, and address challenges.

The primary goal of the program was to help participants achieve a weight loss of 5.0% to 7.0% of their baseline weight. To foster engagement and motivation, social media, including platforms like Facebook, was employed to disseminate healthy recipes, nutritional and exercise tips, and motivational content. Additionally, follow-up efforts included regular phone calls, outreach to participants who missed meetings, and access to recorded meetings on Facebook. Employees were actively encouraged to take part in follow-up sessions, including monthly group meetings and quarterly weigh-ins, with the aim of maintaining weight loss or preventing weight regain. A quasi-experimental study was conducted to evaluate the program's effectiveness, revealing improvements in weight (5.6% weight loss), BMI, lifestyle behaviours, sleep quality, and reduced depression symptoms following the intervention (Nepper *et al.*, 2021).

In the United Kingdom, the Platform for Health and Wellbeing is a collaborative network comprising private, public, and voluntary sector organisations

with a shared focus on improving health and addressing obesity in the region. Member organisations are dedicated to taking proactive steps to enhance the well-being of employees, individuals, and communities within the United Kingdom. One prominent member of this network is Slimming World (SW), which stands as the largest commercial weight management organisation in the United Kingdom. SW has a well-established history of partnering with the United Kingdom's National Health Service (NHS) to implement referral programs, a collaboration that dates back to 2000. SW's weight management program is a comprehensive behaviour change support program that aligns with the UK's National Institute of Health and Clinical Excellence criteria for weight management services. This program includes an eating plan based on energy density and satiety, complemented by group-based support to facilitate behaviour change in diet and activity. It empowers participants to make lifestyle changes necessary for weight reduction, preventing weight gain, and ensuring long-term weight maintenance. The program utilises a facilitator-led peer group support structure, enabling participants to share experiences and ideas, thus supporting them in adopting healthier lifestyle changes related to food and physical activity to promote weight loss, support employees in achieving weight loss, and improve psycho-social health outcomes. A quasi-experimental study was conducted in 2014 to assess the feasibility and benefits of providing the SW weight management program in the workplace. The data from the study supported the use of a 12-week SW weight management program as a credible option for employers who wanted to support employees in achieving weight loss and improving psycho-social health outcomes (Barber *et al.*, 2015).

2.3.2 Trim and Fit Weight Management Program

In Malaysia, “Komuniti Sihat, Perkasa Negara” Wellness of Workers (KOSPEN WOW) program was launched in 2016 in alignment with the National Strategic Plan for Non-Communicable Diseases (2016-2025) with the goal of reducing the burden of non-communicable diseases among Malaysians. This program encompasses employees from both the public and private sectors. In 2020, a total of 193 new agencies joined the KOSPEN WOW program. Of these, 163 (84.5%) were public sector agencies, while 30 (15.5%) were from the private sector. The program aims to build healthy and productive employees with a conducive working environment that fosters a healthy work culture. The program comprises eight components, which include Health Screening, Healthy Eating, No Smoking, Active Lifestyle, Weight Management, Healthy Mental Health, Healthy Workplace, Alcohol Prevention, and Harm Reduction. The Ministry of Health (MOH) introduced the weight management program, known as the Trim and Fit Weight Management Program, as one of the components of the KOSPEN WOW initiative in 2016.

The Trim and Fit Weight Management Program provides weight reduction interventions in individual and group sessions, including a program of increased physical activity, encouraging a healthy diet, and a behavioural strategy to facilitate adherence to the diet and physical activity. The Trim and Fit Weight Management Program was developed based on literature reviews and content expert inputs, and the modules were prepared by the MOH. The Trim and Fit secretariat in each district approaches the HCPs in each district to join the Trim and Fit program each year. Participation in the program was voluntary. Currently, the program evaluation is based on the percentage of participants who achieved the target of 5 to 10 per cent weight loss within six months.

2.3.3 Effectiveness of Intervention Program in Malaysia

A recent study by Leow *et al.* (2022) adopted a pre-post interventional design to assess the effectiveness of a weight loss program. The study population was comprised of overweight or obese HCPs in a health clinic setting. The primary focus of the study was to evaluate the Fit and Trimmed Staff program, a program developed by the research team.

This program encompassed a combination of weekly group health education sessions held over three months, complemented by monthly individual dietary counselling sessions spanning six months. To evaluate the impact of the program, the researchers compared pre- and post-intervention measurements of body weight, BMI, body fat percentage, visceral fat, and percentage of skeletal muscle using the Wilcoxon signed-rank test. The findings showed that there were no significant changes in the median values of weight, BMI, body fat percentage, visceral fat, and muscle percentage post-intervention. These findings lead to the conclusion that the program may be insufficient, possibly due to its exclusive reliance on health discussions and nutritional advice.

Hussain *et al.* (2018) conducted a study employing a single-arm experimental design, focusing on obese HCPs within a hospital setting. This investigation implemented a comprehensive intervention strategy, encompassing elements such as nutritional guidance, promotion of a healthy lifestyle, motivational workshops, supervised exercise training, and one-on-one dietary counselling. Additionally, participants were equipped with logbooks to monitor their progress throughout the three-month intervention period. The impact of the program was assessed using paired *t*-tests, which identified differences between baseline and post-intervention measurements. The results demonstrated a significant reduction in all four

targeted parameters following the program. Specifically, post-intervention outcomes revealed a reduction in body weight by 4.57 kilograms (equivalent to 5.4%), a waist circumference reduction of 2.65 centimetres (6.8%), and a decrease in body fat percentage by 4.5% (9.2%). These collective findings provide substantial support for the effectiveness of the three-month weight-reduction program conducted within a public tertiary care centre in Malaysia.

Rusali *et al.* (2018) conducted a study on weight loss programs for overweight and obese office employees in the Klang Valley. Participants were divided into face-to-face, online, and control groups. They utilised a program called "Slim and Shape", consisting of sixteen two-hour sessions over four months, covering topics like healthy eating and exercise. Dietitians and health professionals led the sessions. The program combined diet, exercise, and motivation. After four months, the face-to-face group exhibited the most significant weight reduction (-5.80 kg) compared to the online (-1.12 kg) and control groups (-1.82 kg). The face-to-face group also showed notable improvements in waist circumference. It was concluded that the face-to-face weight management program was the most effective in improving various health indicators among overweight and obese employees.

In a study conducted by Rusali *et al.* (2016), the effectiveness of a structured weight management program in a workplace, specifically targeting overweight and obese employees in the petroleum industry, was examined. The intervention group received a carefully planned three-month program, including monthly group sessions on healthy eating and exercise, interactive activities, a single group exercise session, and encouragement for self-exercise. Statistical tests ANOVA and ANCOVA were used to assess the program's impact by comparing baseline and three-month results while considering factors like age, income, knowledge, attitudes, practice levels, and

selected biochemical parameters. Significant findings emerged, indicating a group effect impact on waist circumference in men. In the intervention group, men achieved a 3.4% reduction in their waist circumference (-3.7 cm), whereas women in the control group experienced a 0.7% decrease in their waist circumference (-0.8 cm). The researchers concluded that the structured weight management program effectively improved waist circumference in men.

2.3.3(a) The Effectiveness of Intervention Program Outcomes

Cruz *et al.* (2011) stated that it is very plausible that individuals who start an exercise program or restrict their caloric intake would receive an inaccurate estimation of change in their body composition when using body weight alone. The study revealed that relying solely on weight changes underestimates improvements in body composition for overweight and obese individuals. A surprising 73.0% of participants who experienced no weight reduction still showed positive changes in body fat (Cruz *et al.*, 2011). Body fat percentage and waist circumference are more reliable indicators of adverse health risk compared to body weight or BMI, as they reflect unhealthy fat distribution around the abdomen or abdominal obesity (Arif *et al.*, 2022; Ross *et al.*, 2020).

2.4 Factors Associated with the Success in Achieving Targeted Weight Reduction

A systematic review was conducted by discussing various aspects of adherence in studies related to weight management programs. The factors that were considered include sociodemographic factors (such as age, gender, employment, income, and education), psychosocial factors (including self-confidence, body image perception, depression, motivation, and stress), behavioural factors (such as eating habits, dietary adherence, physical activity, attendance, self-monitoring, and previous