

## **Models and theories to support health promotion programmes for overweight and obese adults: A scoping review**

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### **ABSTRACT**

**Introduction:** The increasing prevalence of overweight and obesity has been alarming. One approach to address this issue is to implement health promotion programmes. Despite the many health promotion and health intervention programmes held, there is a lack of evidence showing the application of theories and models. This scoping review aimed to explore existing literature and synthesise findings based on models and theories used to support health promotion programmes for overweight and obese adults. **Methods:** This review was guided by the Arksey and O'Malley framework. Online databases, such as Ovid, PubMed, Scopus, and Web of Science, were used to search for relevant articles using suitable keywords, from January 2015 until December 2021. Articles were written in English and Malay, and the study subjects were adults aged 18-59 years old. Two reviewers independently screened the articles, and the extracted information were tabulated after analysis. **Results:** A total of 13 different theories and models were found in the 27 articles selected. Many studies reported using the Transtheoretical Model, Social Cognitive Theory, and Health Belief Model in health promotion programmes for overweight and obese adults. Most constructs and components focused on changing health-related behaviours starting with the individual, such as self-efficacy and readiness to change. Majority of the articles showed an improvement in health-related behaviours and had great potential for future studies. **Conclusion:** When conducting health promotion programmes for overweight and obese adults, researchers should consider models and theories with constructs and components to ensure consistent improvement and potentially significant impacts on health-related outcomes.

**Keywords:** adult, health promotion, model, obesity, theory

### **INTRODUCTION**

Overweight and obesity are significant public health issues. The prevalence of

overweight and obesity has dramatically increased globally. In 2016, it was found that 39% of adults aged 18 years and

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above among the world's population were overweight, while 13% were obese (WHO, 2021). These are alarming figures because the risk of mortality due to overweight or obesity is higher than being underweight. Overweight and obesity are public health concerns because they increase the risk of chronic diseases such as high blood pressure (Aniza *et al.*, 2015), stress and depression (Rosengren *et al.*, 2015), anxiety (Abdollahi & Abu Talib, 2015), diabetes, cancer, and cardiovascular diseases (Moghaddam, Woodward & Huxley, 2007). Indirectly, obesity-related treatment costs have risen (Atella *et al.*, 2015; Correia & Laviano, 2018; Marcellusi *et al.*, 2016), as has the investment in intervention programmes at the individual, environment, and policy levels (Flegal *et al.*, 2010). Nevertheless, this epidemic can still be prevented (De Lorenzo *et al.*, 2020).

One of the strategies to address overweight and obesity issues is through health promotion programmes. The World Health Organization (WHO) defines health promotion as a process of enabling people to control and improve their health. Programmes, such as obesity interventions, are also part of health promotion programmes that include various social and environmental interventions to improve weight management and quality of life, and mainly to prevent diseases. Hence, implementing health promotion programmes is one of the approaches that is scientifically proven to improve health among individuals and communities (Khodaveisi *et al.*, 2017). Past studies have shown that theories and models have a beneficial positive impact on health promotion programmes for overweight and obese adults (Martin *et al.*, 2015; Martinez *et al.*, 2017), whereby they can further assist in reducing morbidity and mortality by changing the behaviours of the population (Crosby &

Noar, 2010). Therefore, a programme based on theories such as health promotion or behaviour modification will be more efficient and effective (Fertman & Allensworth, 2016; Sanaeinasab *et al.*, 2020).

However, there is a limited body of literature that collects information about models and theories, as well as their components or constructs, which have been used in health promotion programmes for overweight and obese adults. For this reason, this scoping review was conducted to systematically map the existing literature on models and theories that have been used in health promotion programmes for overweight and obese adults. It is also an effort to map out the constructs and components, which gives insight into the importance of using theories and models in health promotion programmes.

## **MATERIALS AND METHODS**

### **Study design**

A scoping review was conducted to map the available literature and key concepts informing the models and theories used to support health promotion programmes for overweight and obese adults. The method was based on the Arksey & O'Malley (2005) framework for scoping review. The approach to searching, screening, and reporting was modified and utilised as suggested by Levac, Colquhoun & O'Brien (2010) and the Joanna Briggs Institute (Peters *et al.*, 2020). The PRISMA Extension for Scoping Reviews (PRISMA-ScR) was used to inform this review.

### **Identifying the research questions**

Factors or descriptive characteristics that were relevant to the topic and how the research was conducted were suggested to be included while developing the research questions (Peters *et al.*, 2020; Munn *et al.*, 2018). Therefore,

research questions were identified based on descriptive characteristics relevant to the topic. In the meantime, a preliminary review was conducted to understand the importance and significant impact of using theories and models in health promotion programmes. Thus, research questions were generated as follows:

- i) What are the characteristics and health measurements of a study involving theories and models in a health promotion programme for overweight and obese adults?
- ii) What are the theories and models, as well as the constructs or components found in the studies included?
- iii) What is known from the literature about theories and models used in health promotion programmes for overweight and obese adults that resulted in improved and potentially significant health-related outcomes?

### Identification of studies

Articles published from January 2015 until December 2021 that were written in English or Malay and described the theories and models used in health promotion programmes for overweight and obese adults aged 18-59 years old were selected. Meanwhile, articles involving children, adolescents, elderly, pregnant and menopausal women, patients using medicine, supplement, or herbal treatments, as well as studies with any specific chronic and non-communicable diseases, such as heart attack, diabetes, cancer, mental illness, mental disability and many more, were excluded. Review articles, protocol articles, qualitative and pilot studies were also excluded in this review.

To identify relevant documents, the following bibliographic databases were searched – Ovid, PubMed, Scopus, and Web of Science (WOS) – by utilising the keywords outlined in Table 1. Reference lists of retrieved articles

were also checked to identify additional articles of interest. The key terms in the search strategy were theor\*, model\*, obes\*, overweight, body mass index, fat\*, adult\*, health program\*, health campaign\*, health education\*, health intervention\*, wellness program\*, and adult\*. Results were sorted using the Mendeley software, and duplicates were omitted.

**Table 1.** List of keywords and synonyms generated as search terms

<i>Theory</i>	<i>Obesity</i>	<i>Health promotion</i>	<i>Adult</i>
Model	Overweight	Health programme	
	Obese	Health campaign	
	Body mass index	Health education	
	Fat	Health intervention	
		Wellness programme	

### Study selection

Two steps of screening were completed to select the related articles, and the Mendeley software was used to assist in this process. In the first step, two reviewers named TS and RAT independently screened all the retrieved articles. The articles' titles, abstracts, and keywords were sorted if they met the inclusion and exclusion criteria. Selected articles that both reviewers agreed on proceeded to the second step. Upon any disagreement, the article was decided in the second step on whether to be included or omitted from this study. Articles were excluded if both reviewers agreed that they did not meet any of the study's criteria. The same process was repeated in the second step, but the whole article was screened and reviewed this time. Further discussion was held until both reviewers reached a consensus on

whether to include or exclude the article. For any inconsistency in deciding the article selection, a third reviewer helped to make the final decision. The PRISMA 2020 flow diagram (Page *et al.*, 2021) in Figure 1 was used to illustrate the study selection.

### Charting the data

A standardised data-charting form to extract information from the articles that corresponded with the research questions was developed and tested by a reviewer. The form was refined and improved by other reviewers. Then, the form was finalised to ensure all the categories were appropriate and consistent throughout this process. The following variables were included such as article characteristics (authors, year of publication, continent), study characteristics (study design, study duration, and health measurement), theory and model along with the construct or component, and outcome or impact of the studies. Two reviewers independently charted the data, and the form was updated from time to time while discussing the results. Any discrepancy in extracted data was discussed further by the reviewers' team until an agreement was reached.

### Collating, summarising, and reporting results

The collated data were analysed using descriptive analysis and tabulated into several forms, such as frequency and percentage. The descriptive analysis helped to identify the frequency of theories and models that have been used in health promotion programmes. In addition, study characteristics like location, study design, and setting were also presented in the results. The constructs or components of theories and models were tabulated using thematic analysis, while the outcomes or impacts were summarised in a table.

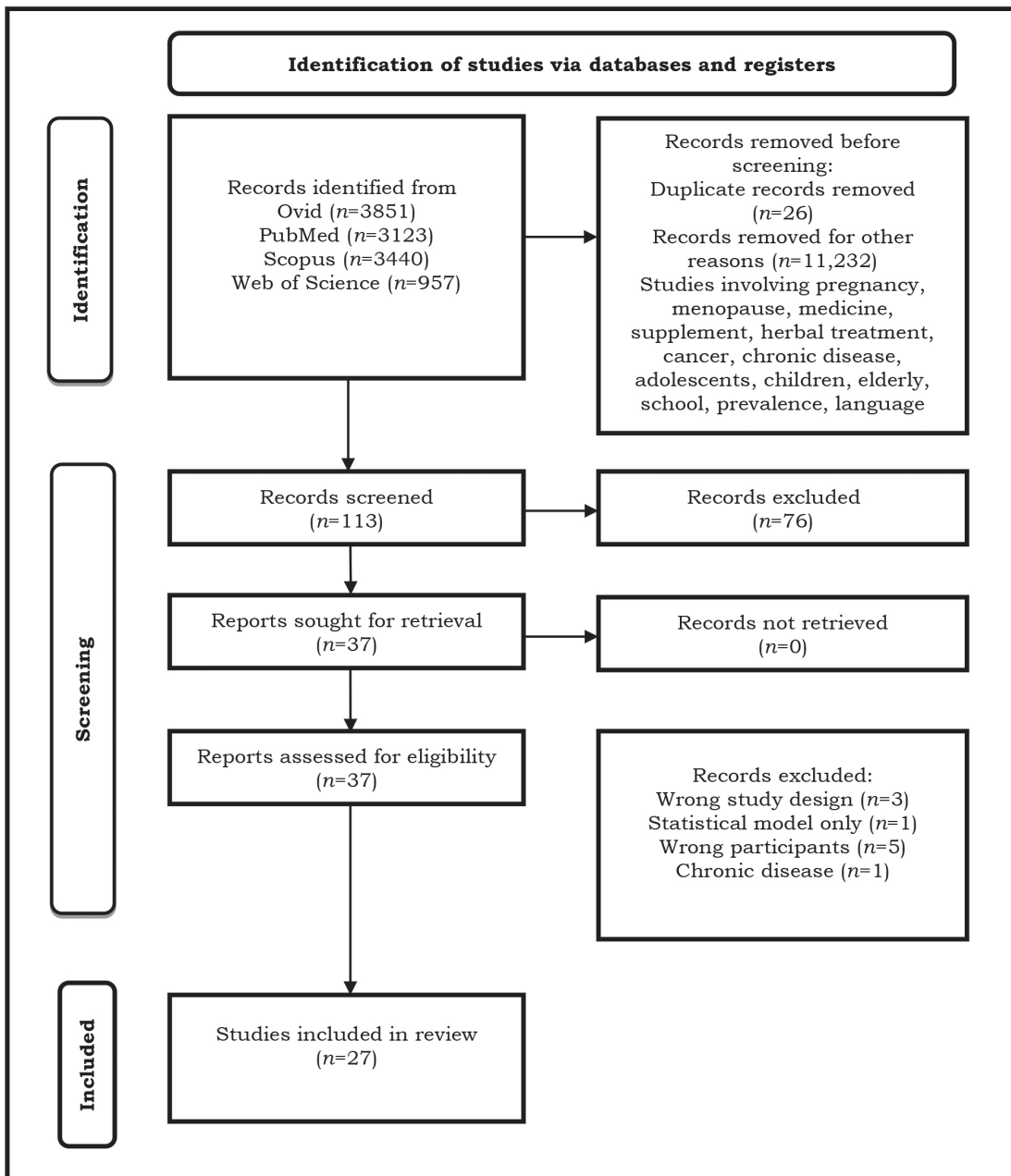
## RESULTS

A total of 11,371 articles were identified from four different databases. From this sum, 26 articles were excluded due to duplication, while another 11,232 articles were removed based on the inclusion and exclusion criteria. The titles, abstracts, and keywords from 113 articles were screened, and 76 articles were discarded. After retrieving 37 articles to be screened entirely, 10 articles were excluded for several reasons, as shown in Figure 1. Therefore, a total of 27 articles were included in this scoping review.

### Study findings

#### *Characteristics and health measurements of the included studies*

All 27 articles included in this study reported evidence of a health promotion programme for overweight and obese adults. A greater proportion of the studies were from North America (55.6%) and Asia (29.6%). Two studies were conducted in Australia, and one was conducted in Europe and South America. Most of the studies (44.4%) were conducted in the community setting (Arevalo & Brown, 2019; Armitage, Alganem & Norman, 2017; Tucker *et al.*, 2019; Choo & Kang, 2015; Ekundayò *et al.*, 2020; Griffin *et al.*, 2018; Hales *et al.*, 2016; Kite *et al.*, 2018; Powers *et al.*, 2019; Schifferdecker *et al.*, 2016; Spurrier *et al.*, 2018; Vandelanotte *et al.*, 2018). In comparison, five (18.5%) were conducted in the workplace (Abdi *et al.*, 2015a; Abdi *et al.*, 2015b; Ott *et al.*, 2015; Sanaeinasab *et al.*, 2020; Silberman *et al.*, 2020) and institutional settings, respectively (Dong & Branscum, 2019; Johnson & Annesi, 2017; Romain, Horwath & Bernard, 2018; Saghafi-Asl, Aliasgharzadeh & Asghari-Jafarabadi, 2020; Wright *et al.*, 2020); three (11.1%) in a health care setting (de Menezes *et al.*, 2015; Nazari *et al.*, 2019; Winik & Bonham, 2018); and one each in a



**Figure 1:** PRISMA 2020 flow diagram for study selection

church (Lin *et al.*, 2015) and a sports centre (Cingil & Göger, 2020).

Table 2 presents the characteristics of the included studies and health assessments reported. The included studies employed different study

designs, including 17 (63.0%) experimental studies such as pre- and post-intervention (Arevalo & Brown, 2019; Tucker *et al.*, 2019; Spurrier *et al.*, 2018; Wright *et al.*, 2020); pre-test and post-test (Griffin *et al.*, 2018;

**Table 2:** Characteristics and health measurements of the studies

No	Authors & publication year	Country/continent	Setting	Study design	Study duration	Health measurement(s)
1	Abdi <i>et al.</i> (2015b)	Western Iran/Asia	Workplace	Randomised controlled trial	12 months	BMI, weight, waist circumference, and blood pressure.
2	Abdi <i>et al.</i> (2015a)	West of Iran/Asia	Workplace	Cross-sectional	Data were collected in 2014	BMI. FANTASTIC lifestyle questionnaire.
3	Arevalo & Brown (2019)	Texas, USA/ North America	Community	Pre-post intervention	12 months	BMI and blood pressure.
4	Armitage <i>et al.</i> (2017)	Kuwait/Asia	Community	Randomised controlled trial	6 months	Weight and height. Volitional help sheet.
5	Tucker <i>et al.</i> (2019)	Florida, USA/ North America	Community	Pre-post test	3 months	Weight, height, clinical assessment such as diastolic and systolic blood pressure, and Newest Vital Sign.
6	Choo & Kang, (2015)	Korea/Asia	Community	Longitudinal correlational	12 months	Health behaviour and lifestyle were assessed using Health Information Questionnaire, Health-Promoting Lifestyle Profile-II, and Health-Smart Behaviour Frequency Scale. Weight, height, and BMI. Physical activity and lifestyle were measured by The Weight Efficacy Lifestyle (WEL) questionnaire, The Exercise Self-Efficacy (Exercise SE) Scale, and The Health-Promoting Lifestyle Profile-II (HPLP-II).
7	Cingil & Göger (2020)	Turkey/Asia	Sport centre	Quasi experimental	6 months	Height, weight, waist circumference, hip circumference, and BMI. Lifestyle was measured using Healthy Lifestyle Behaviours Scales II (HLBS II).

No	Authors & publication year	Country/continent	Setting	Study design	Study duration	Health measurement(s)
8	de Menezes <i>et al.</i> (2015)	Brazil/South America	Primary care	Randomised controlled trial	6 months	BMI and waist circumference.
9	Dong & Branscum (2019)	Texas, USA/North America	Institutional	Cross-sectional	Mention	Questionnaire related with health behaviour.
10	Ekundayò <i>et al.</i> (2020)	North Omaha Nebraska, USA/North America	Community	Cross-sectional	Did not mention	Physical activity level was assessed using REACH Health Activity Assessment Questionnaire.
11	Griffin <i>et al.</i> (2018)	Alabama, USA/North America	Community	Pre-test and post-test	12 weeks	Weight, height, and dietary intake.
12	Hales <i>et al.</i> (2016)	South Carolina, USA/North America	Community	Randomised clinical trial	3 months	Physical activity level using Physical Activity Readiness Questionnaire (PAR-Q). BMI, physical activity, and dietary intake.
13	Johnson & Annesi (2017)	South-eastern, USA/North America	Institutional	Biweekly treatment	24 months	Physical activity level using Physical Activity Readiness Questionnaire (PAR-Q). Weight, BMI, waist circumference, and dietary intake.
14	Kite <i>et al.</i> (2018)	New South Wales/Australia	Community	Cohort	12 months	Physical activity using Godin-Shepherd Leisure-Time Physical Activity, set of questionnaires measuring self-regulation for exercise (SR-exercise), self-regulation for controlled eating (SR-eating), Exercise Self-Efficacy Scale, and Weight Efficacy Lifestyle Scale. Fast-food intake. Physical activity level and online survey.

No	Authors & publication year	Country/ continent	Setting	Study design	Study duration	Health measurement(s)
15	Lin <i>et al.</i> (2015)	Baltimore, USA/North America	Church	2-arm randomised controlled trial	6 months	Weight, body composition, blood pressure, and waist circumference.
16	Nazari <i>et al.</i> (2019)	Iran/Asia	Health service centre	Cross-sectional	Data were collected from November 2017–January 2018	BMI. Physical activity level and exercise.
17	Ott <i>et al.</i> (2015)	Utah, USA/ North America	Workplace	Cross-sectional	Data were collected in Spring 2012	BMI, total cholesterol, fruit, and vegetable intake. Physical activity.
18	Powers <i>et al.</i> (2019)	Alabama, USA/ North America	Community	Pre-test and post-test	9 weeks in 2017	Healthy dietary intake. Assessment on behaviour and practice in physical activity.
19	Romain <i>et al.</i> (2018)	France/Europe	Institutional	Cross-sectional	Mention	BMI. Physical activity behaviour and scale was measured using the International Physical Activity Questionnaire (IPAQ). Tobacco intake was categorised under lifestyle.
20	Saghafi-Asl <i>et al.</i> (2020)	Iran/Asia	Institutional	Cross-sectional	Data were collected from June–September 2018	BMI.



No	Authors & publication year	Country/continent	Setting	Study design	Study duration	Health measurement(s)
21	Sanaeinasab <i>et al.</i> (2020)	Iran / Asia	Workplace	Randomised controlled trial	3 months	BMI, fasting blood sugar, cholesterol, triglyceride, high density lipoprotein (HDL), low density lipoprotein (LDL), and lipid levels. Physical activity level by International Physical Activity Questionnaire (IPAQ) and Theory of Planned Behaviour (TPB).
22	Schifferdecker <i>et al.</i> (2016)	New Hampshire & Vermont, USA/ North America	Community	Quasi-experimental	10 months	BMI. A 6-minute walk test to measure physical activity or exercise.
23	Silberman <i>et al.</i> (2020)	California, USA/North America	Workplace	Retrospective, observational design	12 months	BMI.
24	Spurrer <i>et al.</i> (2018)	West Virginia, USA / North America	Community	Pre-post intervention	12 weeks	BMI and nutrition intake. Physical activity was assessed by the Godin Leisure-Time Exercise Questionnaire and the Patient-Centered Assessment and Counselling for Exercise (PACE).
25	Vandelanotte <i>et al.</i> (2018)	Australia	Community	Randomised controlled trial	3 months	BMI. Measuring physical activity changes using Active Australia Survey, Godin Shephard Leisure-Time Exercise Questionnaire for non-Fitbit group and Workforce Sitting Questionnaire.
26	Winik & Bonham (2018)	Midwest, USA/ North America	Ambulatory care	Pre-test and post-test	6 months	BMI. Fitness assessment.
27	Wright <i>et al.</i> (2020)	USA/North America	University / Institutional	Pre-post design	6 weeks	BMI, waist circumference, body composition, blood pressure, dietary intake, fruit, and vegetable consumption. Exercise and sleep quality and quantity.

Powers *et al.*, 2019; Winik & Bonham, 2018); randomised controlled trials (Abdi *et al.*, 2015b; Armitage *et al.*, 2017; de Menezes *et al.*, 2015; Hales *et al.*, 2016; Lin *et al.*, 2015; Sanaeinasab *et al.*, 2020; Vandelanotte *et al.*, 2018); quasi-experimental (Cingil & Göger, 2020; Schifferdecker *et al.*, 2016); and treatment (Johnson & Annesi, 2017). The remaining 10 (37%) were observational studies, for example, cross-sectional (Abdi *et al.*, 2015a; Dong & Branscum, 2019; Ekundayò *et al.*, 2020; Nazari *et al.*, 2019; Ott *et al.*, 2015; Romain *et al.*, 2018; Saghafi-Asl *et al.*, 2020), cohort (Kite *et al.*, 2018), longitudinal (Choo & Kang, 2015), and retrospective (Silberman *et al.*, 2020). Meanwhile, the minimum duration of the included studies was less than three months (Tucker *et al.*, 2019; Griffin *et al.*, 2018; Hales *et al.*, 2016; Powers *et al.*, 2019; Sanaeinasab *et al.*, 2020; Spurrier *et al.*, 2018; Vandelanotte *et al.*, 2018; Wright *et al.*, 2020) and the maximum was 24 months (Johnson & Annesi, 2017).

The majority of the included studies, 23 out of 27, reported anthropometric measurements [weight, height, body mass index (BMI), body fat percentage, waist circumference, hip circumference, and waist-to-hip ratio] as their outcome measurements. Meanwhile, 15 of the 27 studies used physical activity to assess the results. Several studies reported on dietary intake (29.6%), such as healthy eating, fast food intake, fruits and vegetables consumption (Griffin *et al.*, 2018; Hales *et al.*, 2016; Kite *et al.*, 2018; Ott *et al.*, 2015; Powers *et al.*, 2019; Spurrier *et al.*, 2018; Wright *et al.*, 2020), lifestyle (smoking, drinking, sleeping, health behaviour) (25.9%) (Abdi *et al.*, 2015a; Tucker *et al.*, 2019; Choo & Kang, 2015; Cingil & Göger, 2020; Dong & Branscum, 2019; Romain *et al.*, 2018; Wright *et al.*, 2020), clinical measurements (18.5%) (diastolic and systolic blood pressure) (Abdi *et al.*,

2015b; Arevalo & Brown, 2019; Tucker *et al.*, 2019; Lin *et al.*, 2015; Wright *et al.*, 2020), and biochemical (7.4%), such as blood sugar level and blood cholesterol level (Ott *et al.*, 2015; Sanaeinasab *et al.*, 2020).

#### *Theories and models with constructs or components of health promotion programmes*

Table 3 enlists the principles of the theories and models, along with the outcomes and impacts of the studies. Of the 27 included studies, the majority (25.9%) applied the Social Cognitive Theory (SCT) (Abdi *et al.*, 2015b; Choo & Kang, 2015; Griffin *et al.*, 2018; Hales *et al.*, 2016; Johnson & Annesi, 2017; Nazari *et al.*, 2019; Vandelanotte *et al.*, 2018) and The Transtheoretical Model (TTM) (Abdi *et al.*, 2015a; Armitage *et al.*, 2017; de Menezes *et al.*, 2015; Lin *et al.*, 2015; Ott *et al.*, 2015; Romain *et al.*, 2018; Silberman *et al.*, 2020) while conducting health promotion programmes for overweight and obese adults. The constructs or components found in SCT were self-efficacy, social support from family and friends, self-regulation, reinforcement, outcome expectations, outcome expectancies, and behavioural capability. Most studies used one or more TTM stages, such as pre-contemplation, contemplation, preparation, action and maintenance; only one study incorporated all four TTM pillars (de Menezes *et al.*, 2015).

Four studies (14.8%) used the Health Belief Model (HBM) (Ekundayò *et al.*, 2020; Lin *et al.*, 2015; Saghafi-Asl *et al.*, 2020; Spurrier *et al.*, 2018), which employed constructs such as perceived susceptibility, perceived severity, perceived threat, perceived barrier, perceived benefit, cues to action, and self-efficacy. Three studies (11.1%) each applied the Health Promotion Model (HPM) (Choo & Kang, 2015; Cingil & Göger, 2020; Winik & Bonham, 2018)

**Table 3:** Principles of theories and models with the health-related outcomes or impacts

No.	Authors & year	Theory / model	Principle	Health-related outcomes / impacts
Improvement in health behaviours or health outcomes (n=15)				
1	Armitage <i>et al.</i> (2017)	TTM	A volitional help sheet was built based on TTM processes of change.	Using a volitional help sheet had a significant impact on weight loss among overweight and obese participants in a weight loss programme in Kuwait.
2	de Menezes <i>et al.</i> (2015)	TTM	Using four pillars of TTM, such as stage of change, decisional balance, self-efficacy, and processes of change.	Intervention using TTM led to a reduction in high calorie and fat food intake. Weight and body perception among participants improved significantly.
3	Abdi <i>et al.</i> (2015b)	SCT	Self-efficacy, intention, situational social support, behavioural strategy, outcome expectations, and outcome expectancies.	The study found intervention effectiveness using SCT and new communication technologies, such as improvement in weight loss.
4	Griffin <i>et al.</i> (2018)	SCT	Self-regulation or goal setting, self-efficacy, behavioural and environmental factors.	Text messaging based on SCT showed improvement in dietary and physical activity behaviour and environment, positive dietary and physical activity goal setting, and reduced body weight among participants.
5	Hales <i>et al.</i> (2016)	SCT	Self-efficacy, reinforcement, outcome expectation, self-regulation, social support, and behavioural capability.	Using the Social POD mobile app significantly reduced body weight compared to a commercial tracking app.
6	Spurrer <i>et al.</i> (2018)	HBM	Individual perceptions, modifying factors, and likelihood of action were derived from perceived susceptibility, perceived severity, perceived threat, perceived barrier, perceived benefit, and cues to action.	Significant changes in nutritional intake, physical activity, and improvement in BMI.
7	Sanaeinasab <i>et al.</i> (2020)	TPB	Attitude, subjective norms, perceived behavioural control, and intention.	Using the TPB component in the education programme significantly improved self-reported physical activity and decreased participants' BMI.

No.	Authors & year	Theory / model	Principle	Health-related outcomes / impacts
8	Wright et al. (2020)	TPB	Attitude, subjective social norms, and perceived behavioural control.	The efficacy helped to improve health behaviour and outcomes related to reducing and preventing obesity among the college population.
9	Cingil & Gröger (2020)	HPM	Components in health promotion behaviour such as spiritual development, interpersonal relations, nutrition, physical activity, health responsibility, and stress management are derived from the Health-Promoting Lifestyle Profile II questionnaire.	Effective to develop healthy lifestyle behaviours when using training and counselling based on the Health Promotion Model.
10	Tucker et al. (2019)	HSET	Health motivation, health knowledge, and health responsibility, health self-efficacy, active coping styles or strategies, health self-praise.	Physical activity was increased in the pre- and post-intervention. Engagement in health-smart behaviour and health disparity populations can reduce obesity and its related diseases.
11	Powers et al. (2019)	SEM	Institutional, interpersonal, and individual levels.	The study found positive improvement in behavioural changes such as healthy eating motivation, vegetable intake, and shopping practices.
12	Schifferdecker et al. (2016)	ALCM	Goal setting, planning steps, data monitoring, and social support	Using components in the model showed improvement in weight loss and positive changes in physical activity level.
13	Choo & Kang (2015)	SCT & HPM	Self-efficacy and health-promoting behaviour.	By using a path model, the study found increasing diet and exercise self-efficacy that had an impact on increasing health-promoting behaviours. Indirectly, health-promoting behaviours affected initial weight loss.
14	Johnson & Annesi (2017)	SCT & SET	Self-regulatory skills, self-efficacy, and self-regulation.	The treatment showed significant results for weight loss and weight loss maintenance among middle-aged women. Hence, the treatment may also be effective among young adult women.
15	Vandelanotte et al. (2018)	TPB, SDT, SCT	Intrinsic motivation, self-efficacy, intention, self-regulatory strategy through goal setting, action planning, social support, overcoming barriers, problem solving, decision making, relapse prevention, and self-monitoring.	The effectiveness of the intervention was significantly increased when incorporating web-based computer tailored intervention with physical activity trackers.

No.	Authors & year	Theory / model	Principle	Health-related outcomes / impacts
Potential impact for future study ( <i>n</i> =11)				
16	Abdi <i>et al.</i> (2015a)	TTM	Stages in TTM: -Pre-contemplation -Preparation -Action -Maintenance	Significant in predicting obesity with age and work experience. The study also found a significant association between obesity and work experience, marital status, number of children, and gender. More than half of the Participants were in the preparation stage. It is recommended to use behaviour change theories like TTM as the basis for health education in the future.
17	Ott <i>et al.</i> (2015)	TTM	Stages of behaviour change in TTM: -Pre-contemplation -Contemplation Processes of change.	Overweight and obese workers were found in the pre-contemplation or contemplation stages to change their dietary behaviour and lose weight. The study found that behavioural processes are the key point to predict physical activity behaviour. Therefore, processes of change can be useful to increase the level of physical activity.
18	Romain <i>et al.</i> (2018)	TTM		Based on the difference in predictive constructs of physical activity, the results showed potential to be used in intervention to increase physical activity and health status through an active lifestyle among overweight and obese women.
19	Nazari <i>et al.</i> (2019)	SCT	Self-efficacy, self-regulation, outcome expectation, and social support from family and friends.	Compared with other races, African Americans were more likely to engage in Mild-to-Moderate Physical Activity (MMPA-150). Therefore, it is suggested to use different resources in access or availability for future programmes, especially living styles in different communities.
20	Ekundayo <i>et al.</i> (2020)	HBM	Perceived susceptibility, perceived benefit of taking action, self-efficacy, and cues to action.	

No.	Authors & year	Theory / model	Principle	Health-related outcomes / impacts
21	Saghafi-Asl et al. (2020)	HBM	Behavioural intention, perceived threat, perceived benefits, perceived barriers, and cues to action, self-efficacy.	Perceived threat, perceived benefits, self-efficacy in dieting and exercise, and cues to action in exercise were found as variables that predicted behavioural intention of weight management. Future studies in health education programmes, preventive health programmes, and health intervention are recommended to integrate with HBM.
22	Arevalo & Brown (2019)	RAA	Attitudes, subjective norms, perceived behavioural control, and self-efficacy.	The RAA framework was significant in determining the intention and attendance of organised exercise among Hispanics. It is also suitable for comprehending culturally-related behaviours.
23	Dong & Branscum (2019)	RAA	Attitudes, perceived norm, perceived behavioural control, and intentions.	The RAA framework is a significant model to understand behavioural intention to use Obesity-Related Direct-to-Consumer Genetic Test (ODTCGT), attitude, perceived norms, and perceived behavioural control.
24	Kite et al. (2018)	HOEM	Understanding, knowledge, attitude, social norms, self-efficacy, and intentions.	This study showed that HOEM has the potential to be used as a conceptual model in social marketing campaigns such as planning and evaluation.
25	Silberman et al. (2020)	SDT & TTM	Intrinsic motivation and maintenance stage.	Results showed possible improvement in weight loss by using digital health interventions with one-to-one coaching. Although a small number of participants had successfully reduced their weight, the mean weight loss exceeded the 5.0% benchmark.
26	Lin et al. (2015)	HBM, TTM, SRT	Behavioural modification strategies such as cognitive and behavioural emotion-focused content.	Tailored text message intervention showed the potential to help obese African American adults lose weight.
Decreasing in health behaviour or health outcome (n=1)				
27	Winik & Bonham (2018)	HPM	Self-initiated reconfiguration.	The main objective of reducing overweight and obesity was not achieved; instead, the rate was increased.

and the Theory of Planned Behaviour (TPB) (Sanaeinasab *et al.*, 2020; Vandelanotte *et al.*, 2018; Wright *et al.*, 2020). Constructs found in HPM were health-promoting behaviour, self-initiated reconfiguration, and mostly derived from the Health-Promoting Lifestyle Profile-II questionnaire. As for TPB, the constructs used were intention, attitude, subjective norms, and perceived behavioural control.

Two studies (7.4%) used the Self-Determinant Theory (SDT) (Silberman *et al.*, 2020; Vandelanotte *et al.*, 2018) and Reasoned Action Approach (RAA) (Arevalo & Brown, 2019; Dong & Branscum, 2019), respectively. Both studies that used SDT only employed intrinsic motivation, while studies using RAA employed attitude, subjective norms, perceived behavioural control, perceived norms, intention, and incorporated components like self-efficacy.

Meanwhile, the rest of the theories and models were each applied in one study, such as Health Self-Empowerment Theory (HSET) (Tucker *et al.*, 2019), Social Ecological Model (SEM) (Powers *et al.*, 2019), Action Learning Collaborative Model (ALCM) (Schifferdecker *et al.*, 2016), Self-Efficacy Theory (SET) (Johnson & Annesi, 2017), Hierarchy of Effect Model (HOEM) (Kite *et al.*, 2018), and Self-Regulation Theory (SRT) (Lin *et al.*, 2015). Each had different constructs, which are listed in Table 3.

#### *Health-related outcomes and potential impacts*

Participants in 15 out of the 27 included studies showed significant improvement in BMI, healthy eating, and physical activity. Meanwhile, another 11 studies showed potential to be useful for future studies, like understanding the variables and stages of changes that can predict participants' weight management (Abdi *et al.*, 2015a; Arevalo & Brown, 2019; Dong & Branscum, 2019; Ekundayo *et*

*al.*, 2020; Kite *et al.*, 2018; Lin *et al.*, 2015; Nazari *et al.*, 2019; Ott *et al.*, 2015; Romain *et al.*, 2018; Saghafi-Asl *et al.*, 2020; Silberman *et al.*, 2020). Only one study reported decreasing health behaviours due to an increase in weight instead (Winik & Bonham, 2018).

All three studies that used TPB reported to have a positive outcome (Sanaeinasab *et al.*, 2020; Vandelanotte *et al.*, 2018; Wright *et al.*, 2020). Six of the seven studies that applied SCT found that the health outcomes of the participants improved (Abdi *et al.*, 2015b; Choo & Kang, 2015; Griffin *et al.*, 2018; Hales *et al.*, 2016; Johnson & Annesi, 2017; Vandelanotte *et al.*, 2018). Studies from each theory like ALCM (Schifferdecker *et al.*, 2016), HSET (Tucker *et al.*, 2019), SEM (Powers *et al.*, 2019), and SET (Johnson & Annesi, 2017) also reported to have improved health outcomes.

The use of TTM showed more potential for use in future research (Abdi *et al.*, 2015a; Lin *et al.*, 2015; Ott *et al.*, 2015; Romain *et al.*, 2018; Silberman *et al.*, 2020), while the rest resulted in increased health outcomes (Armitage *et al.*, 2017; de Menezes *et al.*, 2015). Similarities in results were also found in studies using HBM (Ekundayo *et al.*, 2020; Lin *et al.*, 2015; Saghafi-Asl *et al.*, 2020), RAA (Arevalo & Brown, 2019; Dong & Branscum, 2019), SRT (Lin *et al.*, 2015), and HOEM (Kite *et al.*, 2018), which were shown to be more likely to be beneficial for future research.

## **DISCUSSION**

This scoping review extracted and explored 27 articles on health promotion programmes that were based on theories and models. The first research question was to describe the characteristics and health measurements of the studies found. Majority of the studies were from North America, were conducted in

community settings, used experimental studies, were less than three months in duration, and reported health measurements using anthropometry. Based on the results, all studies from North America were located in the United States of America. The alarming prevalence of overweight and obese individuals might cause an increased number of health promotion programmes to intervene in this situation. Aside from community settings, various study settings were discovered, including workplaces, institutions, health care facilities, churches, and sport centres. Choosing a controllable setting may increase the chances of a programme's success since practitioners can design suitable health promotion programmes by understanding the components that relate to the targeted participants, such as socio-economy, culture, environment, and many more (Poland, Krupa & McCall, 2009).

The majority of studies found used anthropometric measurements to assess participants' body composition, such as BMI, waist circumference, waist-to-height ratio, waist-to-hip ratio, and body fat percentage. Anthropometry is widely used to assess adult's nutritional status, particularly in large populations (Gómez-Campos *et al.*, 2021), making it suitable for detecting obesity (Low *et al.*, 2020; Motamed *et al.*, 2017). It is a simple yet reliable measurement for predicting cardiovascular disease risk factors (Liu *et al.*, 2019; Zeng *et al.*, 2014), cardiometabolic diseases, and hypertension (Zhang *et al.*, 2013).

The study duration identified was between less than 3 months and up to 24 months, depending on the objectives. However, since cross-sectional research design is limited to one-time data collection, so although it can investigate cause-and-effect relationships between independent and dependent variables (Rogers & Revesz, 2019), it is unable

to demonstrate further explanation for temporal relationships and causality in the long run (Zeng *et al.*, 2014). On the other hand, using experimental design gives researchers an advantage in testing variables between control and experimental groups (Rogers & Revesz, 2019), despite the fact that it takes longer time for data collection. Therefore, by mapping the characteristics and health measurements, we hope to assist researchers in choosing suitable variables for future health promotion programmes.

Theory plays a vital role in understanding the complexities of humans. As a consequence, a variety of theories and models are established, targeting different components in health promotion programmes (Raingruber, 2017). It is crucial to look into a broader perspective that influences human health, like psychology, culture, organisation, community, politics, and policy (Raingruber, 2017). However, one theory or model cannot possibly cover every perspective in health promotion.

Only HBM, HPM, and HSET were initially considered for health-related behaviours from the 13 theories and models listed. In comparison, the rest were adapted accordingly to fit the health-related context. Several theories can be categorised into behavioural change theories such as SCT, TPB, SDT, TTM, HBM, and TRA (Noar & Mehrotra, 2011; Raingruber, 2017). Despite criticism for excluding socio-cultural factors, the economy, policy, and the environment (Raingruber, 2017), these theories and models are still widely used in health behavioural research.

Some studies were focused on changing the behaviour of the participants, such as intention (TPB, RAA, and HOEM), self-reflection and self-organisation (SCT), intrinsic motivation (SDT), self-regulating behaviours, and self-initiated reconfiguration (HPM).



Meanwhile, similar constructs like self-efficacy can be found in SCT, TTM, HBM, SET, HSET, and HOEM. Self-efficacy is a person's belief that he/she can change his/her behaviour. Thus, it is crucial to initiate any behavioural changes in order to successfully create a positive outcome (Ajzen, 1985; Bandura, 1999; Prochaska & Velicer, 1997). The positive outcomes from the extracted articles were proven, like improvement in health behaviours or having great potential for future studies.

Some theories, such as TTM, have been useful in determining a person's readiness to change his/her health behaviour by stages or phases. For example, a study by Ott *et al.* (2015) and Abdi *et al.* (2015a) showed a positive change among participants in the pre-contemplation, contemplation, and preparation stages. A study by Romain *et al.* (2018) indicated that interaction between stages could predict physical activity levels among participants. Meanwhile, some studies showed an improvement in weight reduction (Armitage *et al.*, 2017; de Menezes *et al.*, 2015) and had great potential to help overweight or obese adults lose weight by using digital health interventions (Silberman *et al.*, 2020) or text message intervention (Lin *et al.*, 2015). Hence, TTM is useful to predict or deliver a positive outcome in a health promotion programme.

Limited studies took into consideration social or community influences, yet they gave significant outcomes. For example, previous studies guided by SCT found that social influence from family and friends improved physical performance activity and led to weight reduction (Abdi *et al.*, 2015b; Griffin *et al.*, 2018; Hales *et al.*, 2016). A similar result was found in Schifferdecker *et al.* (2016), which showed that encouragement and social support from family and neighbours resulted in increased physical activity

and exercise. Meanwhile, a study by Powers *et al.* (2019) indicated a supportive community was able to bring positive changes in participants' healthy choices and eating behaviours.

This scoping review comes with some strengths and limitations. Past research showed the significance of using theories or models in public health interventions like health promotion programmes. Hence, this article's intent was to gather information that will help researchers and practitioners choose a suitable theory or model to be implemented in their future research. Although using theories or models is a familiar practice in health promotion programmes, there are limited review papers that gather these two variables. While scoping reviews are not mainly used to appraise the quality of the extracted studies, we hope this article might provide a head start to researchers who want to further examine the quality of using theories and models in health promotion programmes.

Apart from not accessing the quality of gathered articles, this scoping review was only limited to four databases from the years 2015 until 2021 with specific inclusion and exclusion criteria. Hence, we advise future researchers to do more comprehensive searching by increasing the number of databases and years of study. In addition, conducting scoping reviews requires more reviewers in order to accelerate the process. Nevertheless, a minimal number of reviewers is able to minimise discrepancies in data selection and charting.

## CONCLUSION

This review provided an insight that applying theories and models can contribute to the effectiveness of health promotion programmes, particularly for the prevention of overweight and obesity. In addition, future health promotion

programmes need to understand the characteristics of the participants in order to incorporate suitable constructs and components into the programme. With these considerations, it will increase the chances of a successful programme in combating the prevalence of overweight and obesity among adults.

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#### Authors' contributions

TS, designed the study, screening, analysed, and prepared the manuscript; SWSSTW, structured, edited and reviewed the manuscript; HFMR, structured, edited and reviewed the manuscript; RAT, assisted in screening, methodology, structured, edited, and reviewed the manuscript.

#### Conflict of interest

The authors declare that there is no conflict of interest.

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