

APPLICATIONS OF HEALTH BEHAVIOR THEORIES IN DIETARY BEHAVIOR CHANGE INTERVENTIONS : A SCOPING REVIEW

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ABSTRAK

Perilaku makan merupakan salah satu faktor risiko penyakit kronis. Namun, banyak tantangan ditemukan dalam upaya mengubah perilaku makan masyarakat. Teori perilaku kesehatan menunjukkan faktor-faktor penentu perubahan perilaku pada level individu dan lingkungan sebagai panduan dalam merancang program intervensi. Studi intervensi telah menunjukkan efek positif dari intervensi berbasis teori dalam mengubah perilaku makan. Akan tetapi, penelitian yang mengukur perubahan konstruk teori terkait perilaku makan masih terbatas. *Scoping review* ini menelusuri dampak dari program intervensi berbasis teori pada perubahan konstruksi teori dan perilaku makan, sekaligus mendeskripsikan strategi intervensi yang digunakan. Pencarian artikel dilakukan melalui PubMed untuk *randomized controlled trials* (RCTs) yang dipublikasikan tahun 2014–2024, melibatkan orang dewasa (≥ 19 tahun), dan memberikan intervensi berbasis teori untuk mengubah perilaku makan. Empat belas studi dimasukkan dalam *scoping review* ini. *Theory of Planned Behavior* adalah yang paling sering digunakan ($n=7$). Durasi intervensi antara 2 minggu hingga 12 bulan (median 10 minggu). Strategi yang diterapkan meliputi rangkaian edukasi sesuai karakteristik target sasaran, pembelajaran praktik, serta pendampingan intensif. Intervensi seperti ini mampu meningkatkan konstruk teori seperti efikasi diri, niat, sikap, serta memperbaiki pola makan. Namun, belum ada studi yang secara langsung mengevaluasi hubungan antara peningkatan konstruk teori dengan perubahan perilaku makan. Selain itu, hanya sedikit studi yang mengevaluasi efek jangka panjang lebih dari enam bulan. Studi ini menyimpulkan bahwa intervensi berbasis teori dapat memperbaiki konstruk teori dan perilaku makan melalui rangkaian edukasi yang terstruktur dan pengalaman praktis. Penelitian selanjutnya sebaiknya mengevaluasi dampak jangka panjang dan analisis mediasi untuk memperjelas bagaimana perubahan pada konstruk teori memengaruhi perilaku makan.

Kata kunci : intervensi perilaku, perilaku makan, pola makan, teori perilaku kesehatan

ABSTRACT

Dietary behaviors significantly affect chronic disease risk, but challenges exist in modifying dietary behaviors. Health behavior theories offer frameworks to guide interventions by targeting individual and environmental determinants. This scoping review explores the impacts of theory-based intervention on theory constructs and dietary behaviors, while describing the strategies used. A PubMed search was conducted for randomized controlled and clinical trials published between 2014–2024, including adults (≥ 19 years) and interventions applying at least one health behavior theory. Fourteen studies were included in this study for meeting the inclusion criteria. The Theory of Planned Behavior was most frequently applied ($n=7$). Interventions ranged from 2 weeks to 12 months (median 10 weeks). Tailored, hands-on, or culturally adapted interventions with reinforcement strategies improved constructs such as self-efficacy, intention, and attitudes, along with positive dietary changes. While all studies measured changes in constructs and dietary behavior, none evaluated whether construct improvements mediated behavioral change. Moreover, there were few studies assessed long-term maintenance beyond six months. This review concludes that utilizing health behavior theory as the foundation of behavioral intervention improved the theory constructs and dietary behaviors through structured education series and practical experiences. Future research is encouraged to use long-term follow-up and mediation analyses to clarify how changes in theoretical constructs influence dietary behavior.

Keywords : behavioral intervention, dietary behavior, dietary pattern, health behavior theory

INTRODUCTION

Dietary behavior encompasses all activities related to food consumption, including food choices, eating processes, and nutritional intake (Stok et al., 2018). Studies have found that different dietary behaviors lead to varying health outcomes. Adequate intake of whole grains, fruits, legumes, nuts, fish, and dairy products is beneficial for health (Tapsell, 2017). Conversely, excessive consumption of refined grains, processed meats, high-sodium or high-sugar products is detrimental, leading to heart failure, coronary heart disease, chronic kidney disease, type 2 diabetes, and stroke (Mozaffarian, 2016; Tapsell, 2017). A meta-analysis showed a global shift in dietary pattern in nearly every country between 1990 and 2010 (Imamura et al., 2015). There has been an increased consumption of food products high in added sugar, processed meats, saturated fatty acids, cholesterol, and sodium (Imamura et al., 2015). This transition correlates with an increased global burden of chronic diseases, which contributed to 67% of death in 2010 and increased to 74% in 2019 (GBD 2019 Diseases and Injuries Collaborators, 2020). Globally, chronic diseases are estimated to cause a cumulative economic loss of \$17.3 trillion from 2011 to 2030 due to healthcare costs, diminished productivity, and lost capital (Bloom et al., 2012).

Dietary behavior is influenced by multiple factors, including accessibility to food, food beliefs and perceptions, social and cultural environments, social and material resources, physical health, and psychosocial factors (Osei-Kwasi et al., 2016). Accessibility to food includes availability of food in markets, physical access, and financial ability to purchase it (Osei-Kwasi et al., 2016). Food beliefs and perceptions cover beliefs towards specific foods, perceptions of healthy food, and food preferences (Osei-Kwasi et al., 2016). Social and cultural environments consist of social norms, gender, religious belief, traditional food identity, and social networks (Osei-Kwasi et al., 2016). Social and material resources include education, socioeconomic level, nutritional knowledge, and lifestyle (Osei-Kwasi et al., 2016). Physical health refers to health status, dieting, BMI, and body size preferences (Osei-Kwasi et al., 2016). Psychosocial factors include perceived behavioral control, perceived community norms, motivation, and past behaviors (Osei-Kwasi et al., 2016).

Ample evidence highlights the need to prioritize nutrition interventions, particularly changes in dietary behavior, to reduce cardiovascular disease, obesity, weight gain, and diabetes (Mozaffarian, 2016). Various evidence-based strategies to enhance dietary behaviors have been explored at multiple levels, including individual, health system, and population levels (Mozaffarian, 2016). An integrated approach combining policy initiatives, educational efforts, community and environmental interventions may be effective (Mozaffarian, 2016). Health behavior theory provides a framework to focus on behavioral changes, rather than changes in knowledge, by considering both individual and environmental components (Hoelscher et al., 2002). Theoretical frameworks provide information for designing appropriate intervention strategies (Hoelscher et al., 2002). Randomized controlled studies have shown that the utilization of health behavior change techniques improves effectiveness in dietary interventions (Rigby et al., 2020).

Incorporating the Cognitive Behavior Theory (CBT) into an intensive lifestyle intervention for 6-12 months have shown significant improvements in dietary pattern and physical activity leading to reduction in weight, fasting blood glucose, glycated hemoglobin, and blood lipid levels (HbA1C) (Kim et al., 2006; Look AHEAD Research Group, 2007; Sebregts et al., 2003; Volek et al., 2002). Longer intervention programs for 18 months grounded on CBT reported more sustained effects on improving dietary habits, weight, waist circumference, and blood lipid levels until 5 and 8 years after intervention (Howard et al., 2006; Kuller et al., 2001). The Transtheoretical Model also showed significant effect on reducing fat-derived energy intake while increasing intake of fruits and vegetables by helping participants to move to the action or

maintenance stage (Jones et al., 2003). Moreover, a study utilizing the Social Cognitive Theory achieved significant improvements in the adherence to DASH diet which led to lower systolic blood pressure (Lien et al., 2007). Another study implementing the same theory showed less clear effect on changing dietary behavior (Burke et al., 2005).

Therefore, this scoping review aims to describe the impacts of utilizing health behavior theories in changing theory constructs and dietary behaviors. Furthermore, this study also reviewed strategies employed in nutrition interventions grounded in these frameworks.

METODE

Literature for this scoping review was search through PubMed on September-December 2024. The search terms used in this study were “health behavior theory AND (diet OR nutrition)”. The literature search of this review was limited to: (1) literature published during 2014 - 2024, to ensure relevance to the dynamic changes in cultural and environmental determinants of dietary behaviors; (2) randomized controlled trials and clinical trials, to gain evidence of behavioral intervention impacts to dietary behavior changes; (3) studies on adults (age 19+), as this population has full autonomy in making dietary choices. Studies were included in abstract and full-text screening if the title contained the following terms: “diet”, “nutrition”, “eating” or any specific food intake or conditions closely related to nutrition (e.g., obesity, weight loss, diabetes, CVD, etc.).

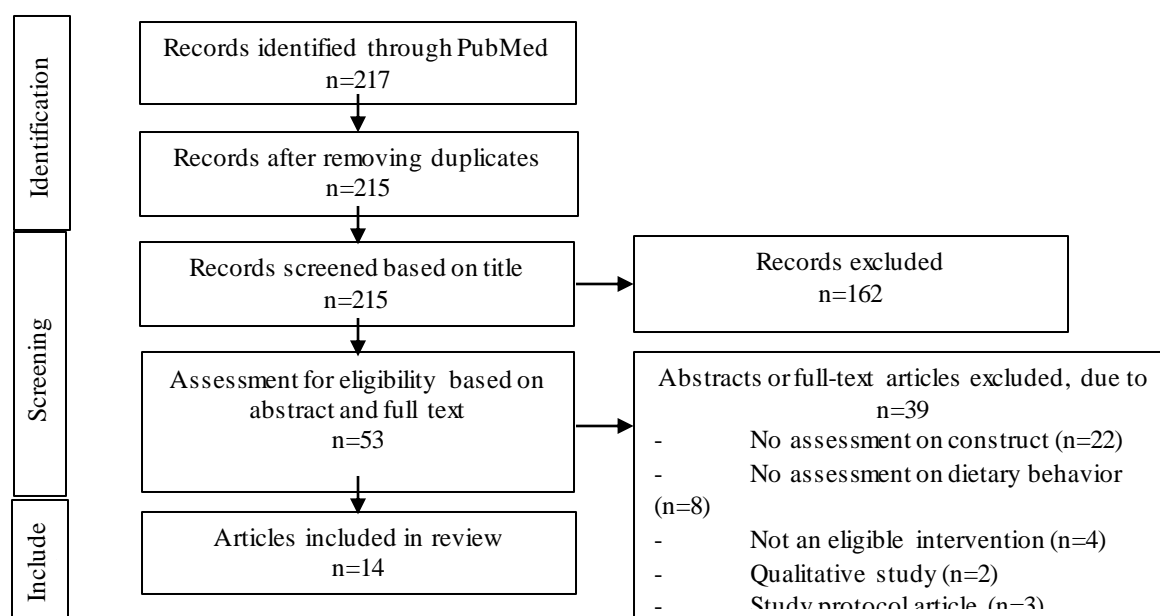


Figure 1. The Flow Diagram of Literature Search and Selection

Studies were included based on the following criteria: (1) applied at least one health behavior theory in the intervention; (2) measured changes in dietary behaviors; (3) measured changes in constructs of the theory applied; (4) incorporated interactive and progressive educational intervention; (5) reported quantitative data. Studies with no direct interaction between participants and educators in the intervention or those that implemented one-time interventions were excluded from this review. The literature search and screening process were presented on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis flow diagram (figure 1). Items extracted from each article included the authors, publication year, target population, behavior theory applied, intervention type and duration, dietary behavior measured, dietary behavior measurement, impact on constructs, and impact on dietary behavior.

RESULTS

After applying the inclusion and exclusion criteria, 14 articles qualified for inclusion in this review. Among the included studies, the most used theory is the Theory of Planned Behavior (TPB) (n=7), either in a single-theory or combined-theory approach (table 1). Other theories studied include the Social Cognitive Theory (SCT) (n=4), Health Belief Model (HBM) (n=2), Transtheoretical Model (TTM) (n=2), Process Model for Lifestyle Behavior Change (n=1, and Mindfulness theory (n=1) (Table 1). Nearly all included studies showed significant impacts of health behavior theory applications on dietary behavior (n=11, 92.86%) (table 2).

Table 1. Frequency of Health Behavior Theory Application in Dietary Behavior Change

Theory	Frequency (n)	As single theory (n)	Combined (n)	Notes
Theory of Planned Behavior (TPB)	7	5	2	Combined with HBM (n=1) or Self-Regulation (n=1)
Health Belief Model (HBM)	2	1	1	Combined with the TPB
Social Cognitive Theory (SCT)	4	2	2	Combined with the TTM (n=2)
Transtheoretical Model (TTM)	2	0	2	Combined with the SCT
Process Model for Lifestyle Behavior Change	1	1	0	
Mindfulness	1	1	0	

Table 2. Comparison of Intervention Effectiveness on Dietary Behavior Change Based on Duration

Intervention Groups	Significant impact	Non-significant impact	Total
10 weeks or less	5	2	7
More than 10 weeks	6	0	6
Total	11	2	13

Table 3. Summary of Finding from the Included Studies

Author (year)	Title	Target Population	Intervention Type/Duration	Impact on Behavior	Impact on Constructs
Githinji et al. (2022)	A Culturally Sensitive and Theory-Based Intervention on Prevention and Management of Diabetes: A Cluster Randomized Control Trial	Adults in peri-urban communities (n=226)	<ul style="list-style-type: none"> Intervention was based on the Health Belief Model. Daily education sessions for 5 day (3 hours/session) followed by 3 mobile-phone messages per week for 4 weeks to reinforce the materials. Educational messages were culturally tailored. 	Intervention group exhibited significant decrease in intakes of refined grains and oil, while intakes of starchy vegetables and fruits increased.	Significantly increased perceived benefits, perceived susceptibility, and self-efficacy in the intervention group than the control. Perceived barriers and perceived severity did not differ significantly the two groups
Gillison et al. (2015)	Processes of behavior change and weight loss in a theory-based weight loss intervention program: a test of the process model for lifestyle	People at risk of diabetes or heart disease (n=108)	<ul style="list-style-type: none"> Intervention was based on the Process Model for Lifestyle Behavior Change 9 group-based education sessions. Sessions held weekly (1st - 4th sessions), then fortnightly (5-6th 	Significantly increased fiber intake at 4 and 12 months, but could not significantly decrease fat intake.	Improvements in the understanding of the behavior change, self-efficacy, motivational and social support at 4 and 12 months.

	behavior change		sessions), and then with longer intervals (7 th , 8 th , 9 th sessions were run 4, 6 and 8 months after 1 st session). A handbook was provided for each participant.		
Khani et al. (2021)	The application of the theory of planned behavior to nutritional behaviors related to cardiovascular disease among the women	Women aged 20-50 years old (n=350)	<ul style="list-style-type: none"> Intervention was following the Theory of Planned Behavior 8 weekly educational sessions (@50-55 minutes) that included lecture, role play, group discussion, question and answer. Participants' family members were invited to the 5-6th sessions that addressed subjective norms and intention. A Whatsapp group was created for communication and delivery of motivational and educational messages every 5 days. 	Improved nutritional behaviors 3 months post-intervention	Improved attitude, subjective norms, perceived behavioral control, and intention 3 months post-intervention
Arefi et al. (2022)	The effect of educational intervention on nutritional behavior in pregnant women based on social cognitive theory	Pregnant women (n=300)	<ul style="list-style-type: none"> Intervention was grounded on the Social Cognitive Theory 7 training sessions incorporating lecture, role-playing, and discussion. The trainings were equipped with books, poster, film, slides, and pamphlets. 	Significant improvement in nutritional behavior after intervention	Significant increase in outcome value, outcome expectations, knowledge, and self-efficacy after educational intervention. However, self-regulation and social support did not increase substantially post-intervention.
Zoellner et al. (2016)	Effects of a behavioral and health literacy intervention to reduce sugar-sweetened beverages: a randomized-controlled trial	Medically underserved adults in rural region of southwest Virginia, USA (n=296)	<ul style="list-style-type: none"> Intervention was based on the Theory of Planned Behavior 3 small-group classes (90-120 mins/session) by master and PhD-level educators; 1 call where participants taught-back key messages they learned from class; Interactive Voice Response (IVR) calls, every 1-2 wk(s) to reinforce key educational messages, add new learning material, and assist participant for action planning. 	significantly decreased SSB intake at 6 months	Significant increase in attitudes, perceived behavioral control, behavioral intentions, but no significant improvement on subjective norms

Demilew et al. (2020)	Effect of guided counseling on nutritional status of pregnant women in West Gojjam zone, Ethiopia: a cluster-randomized controlled trial	Pregnant women (n=694)	<ul style="list-style-type: none"> Intervention was based on the combination of TPB and HBM Monthly individual home-visit counseling using a client-centered approach (40-60 mins). Session 1 to discuss food selection & preparation. Session 2-3 to discuss iron/folic acid supplementation and balanced diet. Session 4 were given depending on individualized nutritional problems. 	Increased overall quality of dietary practice in the intervention group	Significant increase in subjective norms, attitude, intention, behavioral control, as well as perceived severity, benefit, barrier, and susceptibility.
Mobasheri et al. (2022)	Lifestyle Intervention for Patients with Nonalcoholic Fatty Liver Disease: A Randomized Clinical Trial Based on the Theory of Planned Behavior	overweight or obese patients with nonalcoholic fatty liver disease (NAFLD) (n=87)	<ul style="list-style-type: none"> Intervention was based on the Theory of Planned Behavior 8 education sessions (@1 hour) about healthy nutrition behavior and physical activity given within 20 days. Successful stories of behavior change were told to the participants in every session. Text messaging and posters were used to deliver motivational messages and maintain behavior changes for 12 weeks. 	Significant increase in dietary behavior at 2 and 12 weeks after intervention. Scores of dietary behavior among intervention group were significantly higher than the control group after intervention.	Significant increase in attitude, intention, subjective norms, and perceived behavioral towards healthy nutrition at 2 and 12 weeks after intervention.
Pauley et al. (2018)	Gestational Weight Gain Intervention Impacts Determinants of Healthy Eating and Exercise in Overweight/Obese Pregnant Women	Overweight/obese pregnant women	<ul style="list-style-type: none"> Intervention was based on the combination of TPB and Self-Regulation Participants were divided into 6 groups with different levels of intervention intensity. Intervention intensity was delivered in a "step-up" design. Interventions were given weekly for 6 weeks. 	Energy intake increased in 6 weeks by 197 kcal but did not reach statistical significance.	Significant decrease in subjective norm toward healthy eating. Increased trend for perceived behavioral control and prospective self-regulation towards healthy eating and energy intake. Participants who received a more intensive intervention showed greater increase in perceived behavioral control towards healthy eating.

Lenne and Mann (2020)	Reducing sugar use in coffee while maintaining enjoyment: A randomized controlled trial	Adults who drink coffee in daily basis (n=129)	<ul style="list-style-type: none"> Intervention was based on the Mindfulness Theory Intervention 1: Gradual reduction of sugar added into coffee until sugar-free. Intervention 2: mindfulness training, participants were trained to be mindful on the overall experience while drinking coffee for 14 days. Participants were also encouraged with motivational messages. 	Significant increase in sugar-free coffee consumption within 6 months.	Increased enjoyment, mindfulness, and intentions to sugar-free coffee consumption among participants received mindfulness training.
Rahmidel et al. (2019)	Evaluation of an education program based on the theory of planned behavior for salt intake in individuals at risk of hypertension	People at risk of hypertension (n=140)	<ul style="list-style-type: none"> Intervention was utilized the Theory of Planned Behavior 10 educational sessions (2x/week @90 mins) for lectures and discussion. Participants were provided with booklets containing key information related to effect of salt intake on blood pressure and other diseases, salt intake recommendation, salt composition in foods, and ways to reduce salt intake. 	Average salt intake reduced significantly in intervention group	All TPB constructs increased significantly, except for motivation to comply and perceived power.
Peters et al. (2014)	Adherence in a 1-year whole foods eating pattern intervention with healthy postmenopausal women	Healthy postmenopausal women (n=71)	<ul style="list-style-type: none"> Intervention was grounded on the Social Cognitive Theory 14 weekly educational sessions that included cooking classes with hands-on experience in a teaching kitchen, biweekly educational sessions including food demonstrations and food tastings. Besides, participants also received monthly newsletter, monetary stipend and incentives. 	A 65% decrease of non-adherence scores in both groups of dietary patterns after 4 months and was maintained until the next 8 months.	No changes in positive and negative attitudes from baseline to end of intervention.

Lion et al. (2018)	The effect of the “Follow in my Green Food Steps” programme on cooking behaviours for improved iron intake: a quasi-experimental randomized community study	Mother-daughter pairs (daughter aged 12-18 years)(n=52 7 pairs)	<ul style="list-style-type: none"> Intervention applied the Theory of Planned Behavior 6 weekly educational sessions for mother; 2 sessions for daughters equipped with radio-drama, cooking demo, shopping list, and stew cooking calendar. Participants received shopping reminders via SMS and posters at retail outlets. 	There is No significant difference in the constructs of TPB between intervention and control groups in the addition of green leafy vegetables to stews (+41% vs +5%) and the addition of Knorr to soups (+28% vs +2%) after intervention.	No significant difference in the constructs of TPB towards adding cubes to stews/soups between groups. Increases in perceived behavioral control, subjective norm, and intention towards adding greens to stews/soups were significantly higher in intervention group than control, after intervention.
Shi et al. (2018)	Psychosocial mediators of dietary change among Hispanic/Latina breast cancer survivors in a culturally tailored dietary intervention	Adult women with nonmetastatic breast cancer (n=70)	<ul style="list-style-type: none"> Intervention was grounded on the combination of TTM and SCT Intervention was divided into 3 phases, consisting of increasing motivating, assisting action, and improving environmental support, to facilitate progress through all TTM stages of change. Intervention was delivered in 12 weeks with the total of 24 hours for nutrition educational sessions in classroom, groceries trips to local markets within participants' neighbourhood, and cooking class 	Fruit/vegetable intake increased by 1.0 serving/day of at 6 months, but it decreased by 0.5 serving/d at 12 months. Improved snack preference for fruit/vegetable at 6 and 12 months.	Improvements in stages of change and self-efficacy at 6 and 12 months
Cornelio et al (2016)	Effect of a behavioral intervention of the SALdável program to reduce salt intake among hypertensive women: A randomized controlled pilot study	Hypertensive women (n=92)	<ul style="list-style-type: none"> Intervention utilized the combination of TTM and SCT 2 educational sessions (@60-90 mins): (1) consciousness raising, brainstorming, and role-playing to address barriers; (2) hand-on activities on salt measurement, presentation of natural spices to enhance flavor while reducing salt, and food label reading. A cookbook incorporating spices into recipes was provided to each 	The intervention group reported significantly higher frequency of using <4g/d of salt during cooking. The decrease in total salt added to foods in intervention group was significantly greater than the control.	Significant increase in self-efficacy, intention, and habit to use <4 g/d of salt for cooking.

participant.

The difference in 24-h urinary salt between the two groups was not significantly different.

DISCUSSION

Interventions designed based on health behavior theory generally have shown significant impact on dietary behavior change. Theories can guide interventions by identifying key constructs, selecting participants likely to benefit, informing the selection of behavior change techniques (BCTs) and sequence of intervention strategies, and tailoring BCTs to individual characteristics (Prestwich et al., 2014). Therefore, the application of theory in behavioral interventions is expected to lead to more effective outcomes. Studies with a longer follow-up period for at least 6 months are required to evaluate the maintenance of behavior. In this review, only two studies included a follow-up assessment beyond 6 months. Based on the Transtheoretical Model, individuals are expected to perform the new behavior for at least 6 months at the action stage before progressing to the maintenance stage (Prochaska & Velicer, 1997). At the maintenance stage, individuals have more confidence in sustaining the new behaviors and less temptation to relapse (Prochaska & Velicer, 1997).

Theory of Planned Behavior in Dietary Behavior Change

The Theory of Planned Behavior (TPB) is a conceptual framework that predicts health-related behaviors based on behavioral intention, which is influenced by subjective norms, attitude, and perceived behavioral control (Khani Jeihooni et al., 2021). Those three factors are shaped by behavioral and outcome beliefs, normative beliefs with motivation to comply, and control beliefs with perceived power (Rahimdel et al., 2019). Several studies have applied the TPB to promote dietary behavior change across different populations and health outcomes.

Dietary Behavior Change in CVD Prevention

Khani Jeihooni et al. (2021) implemented eight weekly educational sessions and periodic WhatsApp messages among 350 women aged 20–50 years to improve dietary behavior for CVD prevention. Three-month follow-up showed significant improvements in TPB constructs and overall dietary behavior, although specific dietary behaviors targeted were not clearly reported (Khani Jeihooni et al., 2021).

Salt Reduction for Hypertension Risk

Rahimdel et al. (2019) conducted ten educational sessions and provided booklets on salt intake and reduction strategies. Most TPB constructs improved significantly except for motivation to comply and perceived power (Rahimdel et al., 2019). There was a significant reduction in salt intake, objectively measured via urine sodium and potassium levels (Rahimdel et al., 2019).

Sugar-Sweetened Beverage Reduction

Zoellner et al. (2016) targeted underserved adults in rural Virginia with three group classes, a scripted teach-back call, and eleven IVR calls to reinforce educational messages. The intervention significantly improved all TPB constructs except subjective norms, and reduced

SSB intake by 150 mL/day at six months ($p < 0.001$) (Zoellner et al., 2016). The study highlighted the benefit of systematic comprehension checks through mailed packets, educator-led review calls, and opportunities to re-teach key concepts, which may inform future interventions (Zoellner et al., 2016).

Lifestyle Modification for Nonalcoholic Fatty Liver Disease (NAFLD)

A TPB-based intervention was applied for overweight or obese patients with NAFLD by combining eight educational sessions about physical activity and nutrition with text messages and posters over 12 weeks to facilitate weight loss (Mobasheri et al., 2022). Social modeling techniques were incorporated to enhance participants' confidence (Mobasheri et al., 2022). The intervention improved TPB constructs and dietary behaviors (Mobasheri et al., 2022). However, effects on TPB constructs declined over time, emphasizing the need for strategies to support long-term behavior change (Mobasheri et al., 2022). The study also highlighted food insecurity as an important factor in dietary behavior (Mobasheri et al., 2022).

Iron Intake Among Women

Lion et al. (2018) implemented six weekly sessions for mothers and two sessions for daughters, incorporating practical strategies such as radio dramas, cooking demonstrations, shopping reminders, and SMS/poster reinforcement. The intervention significantly increased perceived behavioral control, subjective norms, and intention toward adding green leafy vegetables to stews, with behavioral changes observed (+41% vs +5% for greens, +28% vs +2% for iron-fortified bouillon) (Lion et al., 2018). However, TPB constructs and behavior related to adding Knorr to stews were less affected (Lion et al., 2018).

Across these studies, TPB-based interventions generally improved constructs such as subjective norms, perceived behavioral control, intention, and attitude, which may in turn influenced dietary behaviors. These findings were consistent with prior review showing that found significant improvements in at least one construct of TPB (Hackman & Knowlden, 2014). Changes on the construct were observed along with increased intake of fruits and vegetables (Kothe et al., 2012). These trends also align with a meta-analysis which found that individuals with healthy food choices had significantly higher intention-behavior and perceived behavioral control-behavior associations (McDermott et al., 2015). Interventions of the included studies in the current review combined educational sessions with follow-up reinforcement strategies (e.g., SMS, posters, IVR calls) and practical behavior-change techniques. The similar trend was reported by Norman et al. (2013). The study found that health-promotive text-messages could produce a moderate short-term weight loss through changes in eating behaviors. This review also noted some challenges in the interventions, including sustainability of effects over time, incomplete reporting of specific dietary targets, and contextual factors such as food insecurity.

Health Belief Model in Dietary Behavior Change

Health Belief Model (HBM) is a framework widely used to predict and explain preventive health behaviors (Alyafei & Easton-Carr, 2024). This model includes six core constructs: perceived seriousness, perceived barriers, perceived benefits, perceived susceptibility, self-efficacy, and cues to action (Alyafei & Easton-Carr, 2024).

Dietary Behavior Change in Diabetes Prevention

Githinji et al. (2022) applied the HBM to improve dietary behaviors related to diabetes prevention among adults in peri-urban communities with increasing rates of overweight and obesity (Githinji et al., 2022). The intervention included five consecutive days of three-hour education sessions followed by mobile-phone messages (three per week) for four weeks, with

culturally tailored materials (Githinji et al., 2022). Results showed significant increases in perceived benefits, self-efficacy, and perceived susceptibility though perceived barriers did not differ between groups (Githinji et al., 2022). Dietary changes included decreased intakes of refined grains and oil, and increased intakes of starchy vegetables and fruits (Githinji et al., 2022). The integration of cultural beliefs to enhance comprehension. However, the extended and consecutive session format may have contributed to fatigue and reduced attention, potentially limiting outcomes (Githinji et al., 2022).

Dietary Behavior Change in Pregnancy

Another study combined the HBM with TPB to improve dietary patterns among pregnant women (Demilew et al., 2020). The intervention consisted of four monthly, home-based counseling sessions (40–60 minutes each) using a client-centered approach, supported by leaflets with key messages (Demilew et al., 2020). Sessions addressed nutrition basics, balanced diet benefits, supplementation, and individualized dietary issues (Demilew et al., 2020). Post-intervention, significant improvements were observed across both TPB constructs (behavioral control, subjective norms, attitude, intention) and HBM constructs (perceived severity, benefits, barriers, susceptibility) (Demilew et al., 2020). Participants also showed improvements in overall dietary practice scores and nutritional status (Demilew et al., 2020). The personalized counseling likely enhanced effectiveness, though the evaluation methods for dietary behavior were not clearly reported.

Currently available evidence suggests that HBM-based dietary interventions can improve key psychosocial constructs (e.g., perceived susceptibility, benefits, and self-efficacy) and promote healthier dietary behaviors. These findings were similar to a current systematic review on HBM-based nutrition education that found HBS constructs as significant predictors of dietary behavior improvements (Siyou, 2025). Culturally tailored approaches and personalized counseling appear to strengthen outcomes, while intervention design factors such as session length and frequency may influence participant engagement and effectiveness. This aligns with an RCT that observed a significant change in diet quality following a culturally-tailored nutrition education (Hammons et al., 2019). Several studies suggested that moderate but sustained education program (30-45 minutes monthly over 6 months) is effective in improving dietary diversity, while intense education program (8 1-hour sessions in 4 weeks) was failed to change dietary intake in hemodialysis patients (Beressa et al., 2024; Nooriani et al., 2019).

Social Cognitive Theory and Transtheoretical Model in Dietary Behavior Change

Social Cognitive Theory (SCT) is a cognitive approach to social learning theory that describes human behavior as a dynamic interplay between environmental influences, personal factors, and actions (Glanz, 2001). It emphasizes the importance of observational learning, reinforcement, self-regulation, and self-efficacy in shaping behavior (Glanz, 2001).

Dietary Behavior Change in Postmenopausal Women

Peters et al. (2014) implemented an SCT-based intervention to increase adherence to a Whole Foods and The Food Power dietary pattern through 14 weekly cooking classes, followed by biweekly and monthly sessions, newsletters, and incentives over a year. Although no significant changes in “positive” and “negative” attitudes were reported, adherence to dietary patterns improved, with non-adherence scores decreasing by 65% at four months and maintained for eight months (Peters et al., 2014). The limited psychosocial measures in this study may not have fully captured SCT constructs. Nevertheless, this was the longest intervention duration among the included studies in the current review.

Dietary Behavior Change in Pregnant Women

Arefi et al. (2022) conducted seven educational sessions using lectures, discussions, and role-playing, supported by multimedia resources. Significant improvements were observed in outcome value, outcome expectations, knowledge, and self-efficacy alongside an overall increase in dietary behavior scores (Arefi et al., 2022). However, self-regulation and social support did not improve substantially (Arefi et al., 2022).

Fruit and Vegetable Intake in Breast Cancer Survivors

Shi et al. (2018) combined SCT and TTM to increase fruit and vegetables intake among women with nonmetastatic breast cancer. The intervention was divided into three phases: motivation, facilitation, and environmental support (Shi et al., 2018). Delivered over 12 weeks, it included classroom sessions, grocery store visits, and cooking classes (Shi et al., 2018). Significant improvements were observed in stages of change and self-efficacy at 6 and 12 months (Shi et al., 2018). Fruit/vegetable intake increased by one serving/day at 6 months but declined slightly at 12 months, while healthier snack preferences persisted (Shi et al., 2018).

Salt Reduction in Women with Hypertension

Another combined approach targeted salt reduction was conducted by (Cornélio et al., 2016). This study aimed to reduce salt intake among women with hypertension through two educational sessions with role-playing, hands-on salt measurement, cooking demonstrations, and distribution of a spice-based cookbook (Cornélio et al., 2016). The intervention group demonstrated improved self-efficacy, intention, and cooking habits consistent with <4 g salt/day, along with greater reductions in added salt compared with controls (Cornélio et al., 2016). However, differences in 24-hour urinary sodium between groups were non-significant, likely reflecting sodium intake from natural food sources (Cornélio et al., 2016).

SCT-based interventions, particularly when combined with TTM, have demonstrated effectiveness in improving self-efficacy, outcome expectations, and dietary behaviors. Slightly different results were found by another review where an SCT-based intervention could significantly improve diet quality, but no SCT constructs contributed into the intervention effects (Stacey et al., 2015). Hands-on methods appear especially valuable for supporting skill development and sustained behavior change. An earlier systematic review of 30 studies showed that cooking classes significantly improved dietary intake (Hasan et al., 2019). However, limitations exist in the incomplete measurement of SCT constructs and challenges in maintaining long-term dietary improvements.

Process Model for Lifestyle Behavior Change in Dietary Behavior Change

The Process Model for Lifestyle Behavior Change (PMLBC) emphasizes strengthening autonomous motivation (e.g., perceived importance, self-efficacy, outcome expectations, and perceived risk) and supporting action planning through coping strategies and social support (Gillison et al., 2015). This model was utilized in a dietary intervention for individuals at risk of diabetes or heart disease. The intervention improved self-efficacy, motivation, and social support at 4 and 12 months. Fiber intake significantly increased, though reductions in total fat were not observed. Consistent with this review, the Norfolk Diabetes Prevention Study, which implemented PMLBC principles, observed significant increases in self-efficacy and perceived behavioral control alongside improvements in dietary intake as reflected from glycemic control (Sampson et al., 2021).

Mindfulness Theory in Dietary Behavior Change

Mindfulness-based eating interventions emphasize awareness of sensory food characteristics and internal hunger-satiety cues (Lenne & Mann, 2020). (Lenne & Mann, 2020)

found that mindfulness training, compared to gradual sugar reduction, significantly improved enjoyment, mindfulness, and intentions to consume sugar-free coffee, with sustained increases in sugar-free coffee intake after six months. This finding was consistent with an earlier review reporting that mindfulness-based interventions effectively reduce binge eating, emotional eating, and external eating (O'Reilly et al., 2014). However, this approach did not show significant impact on nutritional status on individuals with obesity (Daubenmier et al., 2016).

CONCLUSION

Health behavior theories are useful for designing and evaluating behavioral interventions by examining changes in the constructs of health behavior theories following the interventions. All the included studies have measured changes in the constructs and dietary behavior. However, none of them clearly reported whether improvement in the constructs mediate dietary behavior changes. The Theory of Planned Behavior was the most frequently applied framework. Intervention durations varied widely, but duration alone did not appear to determine effectiveness, and few studies included long-term follow-up beyond six months to assess sustained behavior change.

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