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Missing the Target: A Scoping Review of the Use of Percent Weight Loss for Obesity Management

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ABSTRACT

Introduction: To co-create comprehensive targets for obesity management, we need to understand the genesis and current use of percent weight loss targets in research. The goals of our scoping review are to (1) synthesize the literature on percent weight loss targets for adults with obesity and (2) discuss the percent weight loss targets in context with their health benefits.

Methods: We searched Cochrane, MEDLINE, and EMBASE for English language, pharmaceutical, and/or behavioral intervention studies in adults with obesity where the explicit aim of the study was weight reduction defined as a percent of body weight. Reviewers screened citations and extracted data including study characteristics.

Results: From 16,164 abstracts, we included 30 citations which were mostly randomized controlled trials (RCTs) ($n = 17$) or quasi-experimental studies ($n = 12$) published between 1992 and 2024. Most of the studies had target weight loss goals between 3% and 10% of body weight ($n = 28$), while $n = 2$ had body weight loss goals of 15% or 30%. The proportion of participants who met the percent weight loss target ranged from 5.9% (nutrition only study) to 85% (pharmaceutical study). The studies reported different reasons for targeting a percentage of weight loss such as disease-specific outcomes, reduced risk of disease, or patient-reported outcomes.

Conclusion: Percent weight loss targets were based on similar research and were often not feasible nor sustainable for most participants. The design of these interventions and evaluation of obesity management would benefit from more patient-focused parameters which could help to co-design comprehensive targets for research and practice.

1 | Introduction

> The longer you can look back, the farther you can look forward.
>
> Winston Churchill

Obesity management can be challenging due to the heterogenous nature of obesity as a disease and a risk factor for complications [1]. Specific weight loss percentages are the most common targets (as part of an intervention) or outcomes in obesity trials. This is partially because regulatory bodies often require that the effectiveness of obesity management interventions (i.e., pharmaceuticals) demonstrate a minimum percent body weight loss, as percent weight loss can be easily translated across different interventions, populations, genders, etc. and clinical care. When it comes to percent weight loss targets aimed to manage obesity, there is little debate about the effectiveness of behavioral, pharmacotherapy, and surgical interventions to successfully achieve many established targets [2–6]. However, given the recent focus for obesity management to include patient-centered, individualized targets, and personalized goals, it is necessary to consider how these percent body weight loss targets were developed and their purpose, so we may advance to new frameworks and address research implementation gaps [7, 8].

For obesity management targets, current guidelines such as those from the American College of Cardiology/American Heart Association/The Obesity Society [9] suggest that a weight loss of ≥ 5% of body weight is considered to be a minimally effective amount of weight loss to improve a number of health outcomes and be clinically meaningful. The concept of ≥ 5% body weight loss originates from a narrative review in 1992, where a search of two databases for weight loss studies in people living with obesity and medical complications (such as type 2 diabetes, hypertension, and hyperlipidemia) found that for these patients, modest weight reduction of approximately 10% or less improved glycemic control, reduced blood pressure, reduced cholesterol levels, and increased longevity [10]. In 1995, it was suggested that ranges between 5% and 10% may be sufficient to see reduction in complications associated with obesity [11]. Based mostly on the 1992 review, the Food and Drug Administration (FDA) published guidance in 1996 [12] that set an efficacy benchmark of 5% body weight loss due to the relationship between diet-induced reductions in body weight of 5%–10% and reduced blood pressure, indexes of glycemia, and levels of triglycerides and increased levels of high-density lipoprotein cholesterol. The FDA further considered 5% weight loss as informative to compare the frequency of 5% weight-loss responders between treatment groups. Since then, through the early to mid-2000s, several trials, including the Look AHEAD trial [13], Diabetes Prevention Program (DPP) [14], and the DiRECT trial [15], have found similar benefits with a percent body weight loss between 5% and 10% and a systematic review [16], expert review [17], and perspective paper [18] have also found supportive evidence of improvements in risk factors or incidence of disease in populations "at risk" from their obesity with "modest" weight loss. Although these reviews suggest greater weight loss may produce better health benefits, they also suggest targeted health measures beyond weight loss should be considered for individual patients [17, 18]. Lastly, as recent as 2025, the FDA revised its guidance documents to suggest that "a drug is considered effective for weight reduction and maintenance in patients with obesity or overweight with comorbidities if, after 1 year of treatment at the maintenance dosage, the difference in mean percentage weight reduction between the investigational drug and control-treated groups is at least 5% and the difference is statistically significant" [19].

While there may be evidence to support the utility of percent body weight loss, particularly to compare trials and set efficacy standards, there continues to be a discussion in areas of obesity research that focus on percent body weight loss targets and the feasibility or sustainability for people living with obesity. The evidence to support percent body weight loss is largely based on a few, well-resourced trials (mostly USA-based), and/or narrative reviews from small, cohesive groups of like-minded individuals. Further, there are uncertainties about what their percentage body weight loss targets mean for clinical significance and impact on other health outcomes in people living with obesity. In fact, Douketis et al. 2005 [16] noted that behavioral and pharmacological weight loss studies involving people living with obesity have methodological limitations that reduce their applicability to clinical practice, such as high attrition rates, lack of appropriate usual care groups, and lack of reporting of outcomes in high-risk groups. These methodological and implementation gaps continue to impact the ability of weight loss intervention research findings to be translated into clinical targets and patient-centered health benefits.

It has recently been suggested that a more comprehensive approach to obesity management and treatment should be implemented. The target for treatment should not be based solely on weight, but rather on a more patient-centered, personalized, and tailored approach to obesity management. Such an approach could consider the full health impacts, including differences in ethnicity, age, sex, regional adipose distribution, duration, and severity of obesity [1, 19, 20], and would acknowledge the recent movement that an individual's bodyweight is not a controllable factor [21, 22] and therefore should not be the focus of obesity management targets. Thus, a more comprehensive and holistic (less weight centric) approach would better support the notion of obesity as a chronic disease, reduce shame and stigma associated with obesity, and allow people to consider how their actions and behavior can impact their health beyond weight. This approach is also supported by multiple national and international organizations and consortiums, including the Canadian Adult Obesity Clinical Practice Guidelines [23], the framework from the European Association for the Study of Obesity [24], the International Consortium for Health Outcomes Measurement (ICHOM) set of Patient-Centred Outcome Measures for Adults living with Obesity [25], and a recently published core set of patient-reported outcome measures for measuring quality of life in clinical obesity care [26]. Lastly, it aligns with definitions from the World Health Organization (WHO), which state that "overweight and obesity are defined as abnormal or excessive fat accumulation that presents a health risk" [27]. The WHO also states that health goes beyond the absence of disease and includes physical, mental, and social well-being. Taken together, these statements and frameworks suggest that

weight alone is not the only goal for the management of obesity as it does not fit with the definition and state of health.

As such, we agree that percent weight loss as a sole target is not ideal and understand it is not novel to consider more holistic, patient-centered, and comprehensive approaches to obesity management. However, to understand the evidence on targets of obesity management and in anticipation of an international co-design workshop with patient partners, researchers, and clinicians to think about how comprehensive targets could work in research and practice, we need to understand the genesis and current use of targets in obesity management and the use of percent weight loss in research. Previous reviews have confirmed the efficacy of interventions for weight loss [28, 29] and made the relationship between weight loss and improvements in health outcomes clear [28–30], but no other review has summarized the literature that directly states a percent body weight loss goal as their study aim and investigated why these targets were developed. Therefore, the goals of our scoping review are to (1) synthesize the literature that aims to achieve percent body weight loss targets for the management of obesity in adults and (2) discuss the percent body weight loss targets in context with their health benefits and outcomes.

2 | Methods

We conducted a scoping review following the PRISMA checklist extension for scoping reviews [31]. This methodology was chosen to be more inclusive of a broad range of literature for this historical review of the evidence. Moreover, scoping reviews are a preliminary assessment of the size and scope of available research literature and aim to identify and map ongoing research evidence [32].

2.1 | Search Strategy

The search terms, databases, and strategy were developed in consultation with a research librarian at McMaster University. We searched Cochrane, MEDLINE, and EMBASE from inception to July 29, 2024 (Appendix S1). We completed targeted searches of these databases and manually searched reference lists of similar and on-topic systematic reviews for citations that were not captured in our search. Results from the search were deduplicated and uploaded to a secure internet-based platform for screening (DistillerSR, Evidence Partners Inc., Ottawa, Canada).

2.2 | Study Selection and Eligibility

To be included, studies were written in English, published in a peer-reviewed journal, and met the following criteria: (1) adults ≥ 18 years of age with obesity defined as BMI ≥ 30 kg/m^2 or the equivalent for other ethnicities (including mixed populations if average BMI was ≥ 30 kg/m^2 for > 80% of the population or if not sub-divided, then average BMI was ≥ 30 kg/m^2 for the entire study population); (2) a pharmaceutical drug and/or behavioral/lifestyle intervention to treat or manage obesity where the aim (goal or target) of the study or the intervention was weight reduction defined as a percentage of body weight (i.e., < 5%); and (3) any experimental or observational study design. Studies were excluded if (1) they reported data on participants that were younger than 18 years of age, did not have obesity, or were pregnant; (2) the intervention was surgical, focused on genetic obesity, and/or was not focused on the management of general obesity (i.e., obesity prevention or diabetes management); (3) the paper was a Phase 2 trial, overview, systematic review, scoping review, commentary, or a case report; (4) the aim of the study did not include percent body weight (such as a standard weight loss in pounds or kilograms for all participants); and (5) the study only reported outcomes in terms of percentage of body weight lost in the absence of a percentage body weight aim (goal or target). We focused on pharmaceutical and behavioral interventions as these studies allow for more individual control and autonomy to reach a target, which better aligns with the call for targets to be more patient-centered and co-developed. Additionally, surgical interventions are not always accessible and the anticipated weight loss and health benefit outcomes are largely dependent on surgical techniques and beyond an individual's control. For this scoping review, in the cases of multiple publications derived from larger trials (i.e., post hoc analysis or secondary publications), we relied on the primary trial publication that reported on the intervention aim (percent body weight loss as a target) to align with our inclusion criteria and did not include the secondary/post hoc publications. Outcomes of studies were not used for the inclusion of studies.

A team of researchers conducted the screening and data extraction. For title and abstract screening, a combination of two experienced and content knowledgeable team members (M.R., D.F.L., and D.S.) screened the first 150 citations in duplicate and resolved conflicts. This created a consistent and accurate training set of inclusion and exclusion criteria which was used to train and employ artificial intelligence (AI) [33]. A human team member (M.R., D.F.L., and D.S.) screened all citations as the first screener and AI was used as a second screener. Once 95% recall was reached, AI was used as a single screener to complete the remaining citations [33]. Articles marked for inclusion by either a human team member or AI went on to full-text screening which was completed independently and in duplicate by two human team members and required consensus for inclusion or exclusion. Conflicts were resolved through discussion or third-party consultation. We used DistillerSR's AI tool to check for screening errors [33] which identified any possible inappropriate exclusions at the full-text level. This tool used AI predictions against reviewed references to identify any that might have been erroneously excluded. Any inconsistencies in the included studies were discussed and resolved among the two reviewers and verified by a third reviewer.

2.3 | Data Extraction and Analysis

We developed, piloted, and deployed standardized forms for data extraction which were housed in a web-based systematic review software program. Two team members independently verified all extracted data and disagreements were resolved

through discussion and/or third-party consultation. Conflicts were resolved by the lead researcher of this review (MR). For each primary study, one team member (D.F.L., M.R., or M.G.) extracted study characteristics (including the study aim, sample size, methods, target/goal of intervention, population demographics, study outcome types and time points, study length, location, and setting), and the health outcome (if any) that percent weight loss was associated with. Correlation and/or statistical analysis are beyond the scope of this type of review.

3 | Results

3.1 | Study Selection

Our search yielded 16,164 citations after duplicates were removed (Figure 1). We assessed 454 full-text citations for eligibility and excluded 424 of these studies mostly because they did not state an aim of weight loss as a percentage of body weight, or the study was not focused on obesity management through a pharmaceutical or behavioral design. The remaining 30 citations were published between 1992 and 2024 and were mostly randomized control trials (RCTs) ($n = 17$) [13, 34–49] or quasi-experimental studies ($n = 12$) [50–61]. There was one observational study [62].

3.2 | Study Characteristics

The characteristics of the included studies can be found in Table 1. The studies in our review were conducted in more than 10 countries, including the United States, Denmark, United Kingdom, Malaysia, China, Spain, Australia, Iran, Brazil, Germany, and some that took place in multiple countries (Figure 2A). These studies took place in hospitals, universities, community-based settings or centers, and clinics. Approximately 63% (19/30) of the studies were focused on lifestyle or behavioral modifications (healthy active living), while five were nutrition only and the other six used pharmaceuticals aimed to reduce percent body weight (Figure 2B and Table 2). None of our included studies used physical activity only as their preferred method to reduce percentage weight loss. Almost half of the studies were between 6 and 12 months in duration ($n = 13$). Intervention studies were as short as 6 weeks ($n = 1$) in duration or as long as 2–4 years ($n = 5$). The sample sizes ranged from eight participants to 5145 participants and included participants with BMIs in Class 1 (BMI in the range of 30–34.9 kg/m^2) ($n = 15$), Class 2 (BMI in the range of 35–39.9 kg/m^2) ($n = 9$), and Class 3 (BMI of over 40 kg/m^2) ($n = 5$) (Figure 2D). Participants were mostly between the ages of 50–65 years old ($n = 13$); however, 11 studies had participants under 50 years old, and five studies had participants over the age of 65 years old. The mean age of participants was

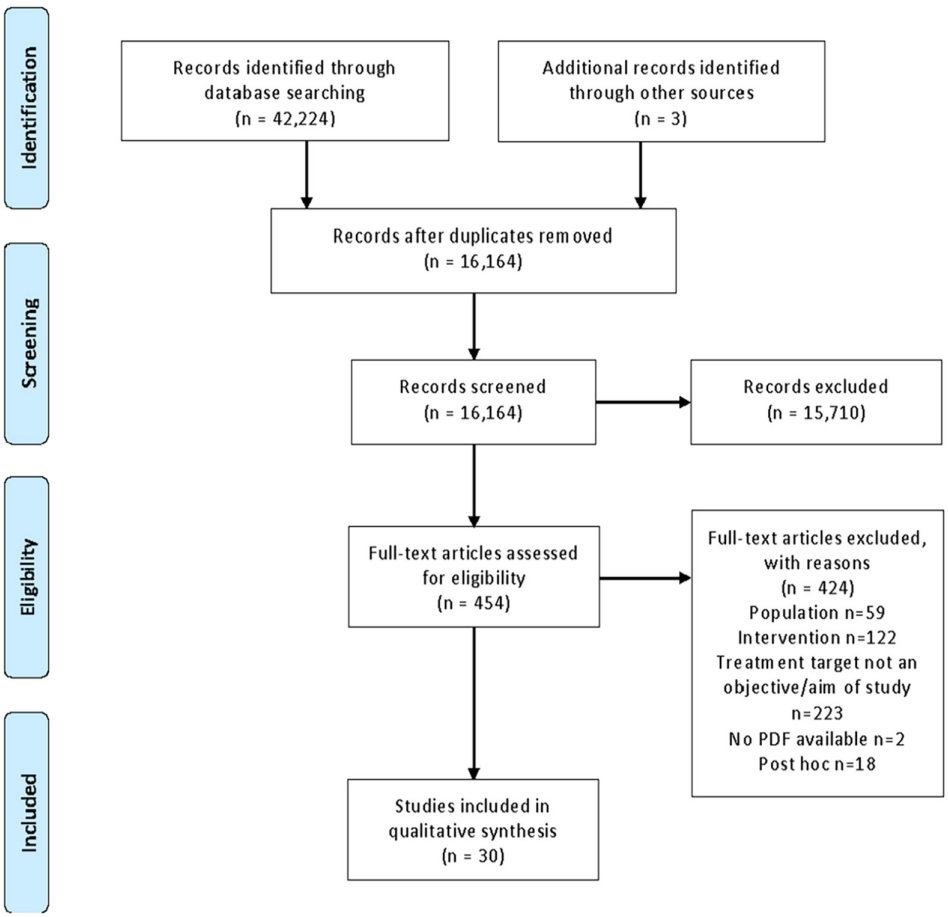

FIGURE 1 | PRISMA flowchart adapted from Andrea C. Tricco, Erin Lillie, Wasifa Zarin, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med.2018;169:467-473. doi:10.7326/M18-0850.

TABLE 1 | Summary of characteristics of included studies.

Author, year, country	Study design	Setting	Aim and % body weight target	Sample size	Participant characteristics	Intervention approach	Study duration	Primary and/or powered outcome*
Ahmad Zamri 2020 [50] Malaysia	Quasi-experimental study	Community	To examine the association of weight loss magnitude with changes in cardiometabolic risk markers in women with overweight and obesity from low socioeconomic areas engaged in a lifestyle intervention Weight loss goal: 5%	243 I: 129 C: 114	Age C: 41 (8.7) I: 42.4 (8.6) BMI: 31.3 (4.1)	Individual diet and physical activity (PA) counseling, self-monitoring tools (food diary and PA diary), group exercise (brisk walking and pillow dumbbell), and a reduced calorie diet	12 months	Weight loss of 5%–10%
Almeida-Pittito 2010 [51] Brazil	Quasi-experimental study	Clinics	To determine the effect of a behavioral intervention considering whether the number of goals achieved in a lifestyle intervention is indicative of metabolic improvement in the profile of a population at high cardiovascular risk Weight loss goal: ≥ 5%	387	Age: 60.2 (11.4) BMI: Diabetic: 25.8 (3.5) Without diabetes: 24.2 (4.0)	Individualized and group dietary and exercise counseling	2 years	Anthropometric and metabolic outcomes according to the number of goals achieved
Andonian 2024 [34] USA	RCT	Remote virtual	To compare a remotely supervised weight loss and exercise intervention to lifestyle counseling for effects on cardiovascular disease risk, disease activity, and patient-reported outcomes in older patients with rheumatoid arthritis (RA) and overweight/obesity Weight loss goal: 7%	20	Age: 66.7 (5.4) BMI C: 33.6 (3.5) I: 31.3 (1.6)	Participants remotely completed three components via videos: hypocaloric diet, aerobic training, and resistance training. Registered dietitian provided an individualized hypocaloric diet. Weekly live virtual nutrition and exercise classes, weigh-ins, and food diaries.	16 weeks	Composite metabolic syndrome z score (MSSc)

(Continues)

TABLE 1 | (Continued)

Author, year, country	Study design	Setting	Aim and % body weight target	Sample size	Participant characteristics	Intervention approach	Study duration	Primary and/or powered outcome*
Auwad 2008 [62] United Kingdom	Observational (cohort longitudinal)	Tertiary hospital	This study investigates the effects of moderate weight reduction on women with obesity and (i.e., BMI ≥ 30 kg/m^2) urinary incontinence Weight loss goal: 5%–10%	64	Median Age: 52.5 IQR 44.0–62.8 Median BMI: 36.2, IQR 34.1–39.1	Diet and exercise program and Orlistat for those who did not lose 5% of their starting weight within 9 months	20 months	Urinary leakage and quality of life
Bender 2018 [35] USA	RCT	University	To assess feasibility and efficacy to reduce T2D risks in Filipino Americans with overweight/obesity Weight loss goal: 5%	67 C: 37 I: 33	Age: 41.7 (12) BMI: 30.5 (4.4)	3-month culturally adapted weight loss lifestyle intervention (Fit & Trim) followed by a 3-month maintenance period.	3 months	Feasibility and weight loss
Bischoff 2022 [52] Germany	Quasi-experimental study	Teaching hospital	To assess the impact of lifestyle intervention on NAFLD in the individuals with severe obesity in a real-world setting. Weight loss goal: 5% (for BMI < 35 kg/m^2) or > 10% (for BMI ≥ 35 kg/m^2)	114	Age: 45.4 (13.3) BMI: 43.6 (7.7)	Weekly group sessions focused on behavior therapy and dietary counseling, group exercise, and meetings with physician.	48 weeks	Weight loss, glucose metabolism, liver steatosis, and liver fibrosis.
Brinkley 2023 [36] USA	RCT	Teaching hospital	To determine the feasibility of adding a behavioral weight loss intervention to exercise-based cardiac rehab in adults with overweight/obesity and CHD Weight loss goal: 5%	34 I: 19 C: 15	Age: 64.5 (7.9) BMI: 36 (6.4)	Standard cardiac rehab and caloric restriction (through a combination of meal replacements, approved meal plans, and individual nutrition and behavioral counseling) with a registered dietitian	6 months	Feasibility and body weight (secondary)

(Continues)

TABLE 1 | (Continued)

Author, year, country	Study design	Setting	Aim and % body weight target	Sample size	Participant characteristics	Intervention approach	Study duration	Primary and/or powered outcome*
Cooper 2012 [37] USA	RCT	NR	To assess whether adoption of a physical activity program in addition to a dietary intervention would promote additional weight loss compared to a dietary intervention alone Weight loss goal: 5%.	90	Age: 47.1 (6.4) BMI: 43.9 (5.7)	12-month lifestyle intervention of diet (caloric restriction dependent on baseline weight) plus physical activity	12 months	Body weight loss
De Simone 1992 [53] Italy	Quasi-experimental study	Outpatient clinic	To evaluate the effects of a low-energy diet-without concomitant sodium restriction-on blood pressure. Weight loss goal: 30%	8	Age: 43.7 (3.9) BMI: 40.2 (1.3)	Prescribed a 1700 kcal/day diet without sodium restriction for 4 weeks. Then prescribed at 600 Kcal/day diet until weight loss goal reached, then returned to 1200 kcal/day. If they did not reach 30% weight loss in 6 months they were excluded.	6 months	Blood pressure, heart rate.
Ezequiel 2012 [54] Brazil	Quasi-experimental study	NR	The aim of this study was to investigate the impact of weight loss on creatinine clearance and urinary albumin excretion (UAE) in non-diabetic patients with obesity and metabolic syndrome . Weight loss goal: 5%	35 Responders (R): 14 Non-responders (NR): 21	Age: R 44.3 (10.3); NR 43.9 (12.1) BMI: R 36.3 (6.7); NR 34.2 (4.7)	Medical Nutrition Therapy calorie restricted diet consisting of 50% carbohydrate, 20%–25% protein, and 25%–30% fat	12 weeks	Creatinine clearance and urinary albumin excretion

(Continues)

TABLE 1 | (Continued)

Author, year, country	Study design	Setting	Aim and % body weight target	Sample size	Participant characteristics	Intervention approach	Study duration	Primary and/or powered outcome*
Fanning 2018 [38] USA	RCT	Community (YMCA)	To compare different combinations of diet and/or exercise training for weight loss in older adults with cardiovascular disease or the metabolic syndrome. Weight loss goal: 7%–10%	249 C: 82 I1:86 I2: 81	Age: 66.9 (4.7) BMI: 34.4 (3.7)	Cognitive behavioral intervention with group and individual sessions for diet and/or exercise weight loss goals with a phased approach	18 months	Mobility
Jamal 2016 [39] Malaysia	RCT	University	To compare the effectiveness of a group-based lifestyle modification program among individuals with obesity and an existing dietary counseling program Weight loss goal: 6%	194 I: 97 C: 97	Age: 40.5 (9.3) BMI I: 32.4 (4.8) C: 32.4 (3.8)	Group Support Lifestyle Modification in workplace: self-monitoring, cognitive behavioral therapy, dietary change, and increased PA delivered in seminars or group sessions	24 weeks	Weight loss
Jensen 2022 [40] Denmark	RCT	University hospital	To evaluate the effect of weight loss induced by dietary carbohydrate restriction on health-related quality of life and cognition in type 2 diabetes Weight loss goal: 6%	67 I: 34 C: 33	Age I: 66.4 (6.9) C: 67.0 (8.8) BMI I: 33.6 (4.6) C: 33.2 (5.2)	Carbohydrate-reduced high-protein diet, consisting of 50% or 30% of total energy (E%) from carbohydrate, 17E% or 30E% from protein, and 33E% or 40E% from fat	6 weeks	Impact of weight loss on HbA1C change
Knop 2023 [41] Nine countries in Asia, Europe and North America	RCT	Outpatient centers	To evaluate the efficacy and safety of oral semaglutide 50 mg taken once per day plus lifestyle intervention in people with overweight or obesity Weight loss goal: 5%	667 I: 334 C: 333	Age: 50 (13) I: 49 (13) C: 50 (12) BMI: 37.5 (6.5) I: 37.3 (6.3) C: 37.7 (6.8)	Participants received oral semaglutide 50 mg or placebo once per day for 68 weeks as an adjunct to lifestyle intervention, followed by 7 weeks of off-treatment follow-up.	75 weeks	Change in body weight

(Continues)

TABLE 1 | (Continued)

Author, year, country	Study design	Setting	Aim and % body weight target	Sample size	Participant characteristics	Intervention approach	Study duration	Primary and/or powered outcome*
Look AHEAD Research Group 2007 [13] USA	RCT	Multi-center. Hospitals and universities	Examine weight-related outcomes in both arms of the Look AHEAD trial by race/ethnicity and by SES with the goal of understanding whether benefits associated with trial enrollment were equally distributed across participants in the trial Weight loss goal: 7%	5145 I: 2570 C: 2575	Age I: 58.6 (6.8) C: 58.9 (6.9) BMI Females: I 36.3 (6.2); C 36.6 (6.0) Males: I 35.3 (5.7); C 35.1 (5.2)	Group and individual meetings, diet modification (portion controlled including the use of liquid meal replacements) and increased PA to 175 min per week	12 months (trial total 10 years)	Effect of weight loss on the development of cardiovascular disease
McBride 2008 [55] USA	Quasi-experimental study	University hospital and clinics	Investigate the translation of the multi-center Diabetes Prevention Program into a cardiac rehabilitation program Weight loss goal: 5%–7%	37	Age: 51.9 (8.3) BMI: 37.4 (6.0)	Weekly group sessions for 12 weeks consisting of 1 h of education and 1 h of supervised PA with food and exercise logs	11 months	Weight loss goal attainment and impact on CV risk factors
Messier 2020 [42] USA	RCT	University	The effects of intensive dietary weight loss and exercise on gait mechanics in adults with overweight and obesity and knee osteoarthritis Weight loss goal: 10%	454	Age: 66 (6) BMI: 33.6 (3.7)	Partial meal replacement, calorie-deficit diet, and strength and aerobic exercise program	18 months	IL-6 and knee compressive force

(Continues)

TABLE 1 | (Continued)

Author, year, country	Study design	Setting	Aim and % body weight target	Sample size	Participant characteristics	Intervention approach	Study duration	Primary and/or powered outcome*
Minneboo 2015 [56] Netherlands	Quasi-experimental study	Hospital	To quantify the impact of a commercial weight management program on weight change in patients with obesity and coronary heart disease Weight loss goal: 5%–10%	35	Age: 59 (43–73) BMI: 35.3	The commercial weight management intervention (Weight Watchers) promotes a hypo-energetic and balanced diet, increased physical activity, and group support. The program included weekly 30-min in-hospital meetings with an experienced coach	14 weeks	Weight change
Mu 2024 [43] China, Hong Kong, Brazil, and South Korea	RCT	Hospitals and trial centers	To compare the efficacy and safety of semaglutide 2.4 mg versus placebo, as an adjunct to a reduced calorie diet and increased physical activity Weight loss goal: 5%	375 I: 249 C: 126	Age: 41 (11) I: 41 (11) C: 40 (11) BMI: 34 (4.8) I: 34 (4.9) C: 34 (4.6)	Titrated increase dose to the maintenance dose of 2.4 mg at week 16. All participants received a lifestyle intervention that included a 500 kcal deficit and 150 min of physical activity a week.	20 months	Body weight
Ostovan 2013 [57] Iran	Quasi-experimental study	Outpatient specialized center	To evaluate the weight and BMI loss over 6 months in outpatients to follow intensive lifestyle instructions Weight loss goal: 5%–10%	140	Age: NR BMI: 30 (0.2)	Lifestyle counseling was delivered by a dietician, exercise specialist and physician in individual sessions. Participants who did not lose 5% of their initial body weight after 3 months were assigned to receive 120 mg orlistat three times daily for 3 months in addition to counseling sessions.	6 months	Body weight and BMI

(Continues)

TABLE 1 | (Continued)

Author, year, country	Study design	Setting	Aim and % body weight target	Sample size	Participant characteristics	Intervention approach	Study duration	Primary and/or powered outcome*
Pathak 2015 [58] Australia	Quasi-experimental study	University	Evaluates the impact of weight and risk factor management on progression of Atrial fibrillation (AF). Weight loss goal: > 10%	355	Age: 63 (11) BMI Group 1: 33.6 (4.7); Group 2: 32.7 (4.4); Group 3: 32.9 (4.8)	Physician lead clinic, one on one counseling using motivational and goal setting; high protein, low glycemic index and calorie reduction; low intensity exercise three times per week Meal replacement sachets if weight loss was not achieved.	48 months	AF burden and AF freedom
Papamargaritis 2024 [44] Ireland and UK	RCT	Outpatient centers	To investigate the clinical effectiveness of a targeted prescribing pathway for liraglutide 3 mg Weight loss goal: ≥ 15%	392 C: 132 I: 260	Age: 51.3 (10.8) C: 51.8 (10.8) I: 51.1 (10.8) BMI: 46 (7.6) C: 45.5 (7.3) I: 46.2 (7.8)	In addition to standard care, liraglutide 3-mg prefilled pens were prescribed to all participants in the intervention arm. Initiated at 0.6-mg dose daily and gradual increase to maximum of 3 mg daily.	2 years	Proportion of participants achieving > 15% weight loss
Promrat 2010 [45] USA	RCT	Hospital	To examine the effects of lifestyle intervention using a combination of diet, exercise, and behavior modification on clinical parameters of non-alcoholic steatohepatitis Weight loss goal: 7%–10%	31 I: 21 C: 10	Age C: 47.6 (12) I: 48.9 (10.9) BMI C: 33.7 (4.7) I: 33.9 (5.3)	Intensive lifestyle intervention based on the Diabetes Prevention Program including meetings with nutritionist, personalized calorie goal based on starting weight, and moderate physical activity encouraged.	48 weeks	Change in NASH histological activity score (NAS)

(Continues)

TABLE 1 | (Continued)

Author, year, country	Study design	Setting	Aim and % body weight target	Sample size	Participant characteristics	Intervention approach	Study duration	Primary and/or powered outcome*
Salas-Salvado 2019 [46] Spain	RCT	Hospitals and universities	To evaluate the long-term effectiveness of an intensive weight loss lifestyle intervention on primary cardiovascular prevention Weight loss goal: 5%–10%	626 I: 327 C: 299	Age: 65 (5) BMI: 32.5 (3.5)	Intense weight loss intervention including, energy restricted diet, PA promotion, and behavioral support with both group and individual sessions	12 months	Weight loss
Scragg 2020 [59] United Kingdom	Quasi-experimental study	Hospital	To determine whether a very low-calorie diet (VLCD) is an acceptable and feasible therapy to achieve and maintain a ≥ 10% weight loss in patients with clinically significant NAFLD. Weight loss goal: ≥ 10%	30	Age: 56 (12) BMI: 42 (8)	Very low-calorie diet (~800 cal) for 8 weeks; one on one phone support; home scales were provided if needed	32 weeks	Feasibility and acceptability of the very low-calorie diet including percentage of participants achieving ≥ 10% weight loss and sustaining it for 6 months
Stolley 2017 [47] USA	RCT	Community center	To report the effect of a 6-month interventionist-guided versus self-guided weight loss program on anthropometric, body composition, and behavioral outcomes Weight loss goal: 5%	246 I: 125 C: 121	Age: 57.5 (10.1) BMI: 36.1 (6.2)	Moving Forward Interventionist-Guided program (MFG). Decreased calories by 500 kcal daily, increased fruit and vegetable consumption and minimum 150 min of activity a week. Twice weekly in-person classes with supervised exercise, social support and access to health promotion resources.	12 months	Weight loss, body composition, and behavioral changes

(Continues)

TABLE 1 | (Continued)

Author, year, country	Study design	Setting	Aim and % body weight target	Sample size	Participant characteristics	Intervention approach	Study duration	Primary and/or powered outcome*
Torres 2011 [60] Brazil	Quasi-experimental study w/ longitudinal follow-up	Outpatient clinic	Evaluate long-term weight loss in overweight hypertensive patients receiving dietary counseling Weight loss goal: 5%–10%	102 I: 58 C: 44	Age: 55.1 (0.9) BMI: 32.2 (0.5)	Dietary counseling face to face, individually tailored to each patient	48 months	Weight loss and percentage of weight loss achieved
Wadden 2023 [48] Argentina, Brazil, USA	RCT	Medical research centers	Efficacy of tirzepatide at 72 weeks post randomization in adults with obesity or overweight who successfully lost ≥ 5% of baseline weight during a 12-week lead-in period that provided intensive lifestyle intervention. Weight loss goal: ≥ 5%	579 I: 287 C: 292	Age: 45.6 (12.2) BMI: 38.6 (6.7)	Reduced-calorie diet, physical activity (≥ 150 min per week) and frequent behavioral counseling with or without Tirzepatide MTD 15 mg	72 weeks	Weight change at 72 weeks
Wang 2013 [61] Taiwan	Quasi-experimental study	Hospital	Examined the influence of dietary management and physical exercise in patients with obesity and CKD Weight loss goal: 3%	38	Age: 42.5 (11.3) BMI: 31.2 (6.0)	Tailored lifestyle intervention including increased physical exercise, diet plan, and education on weight control.	8 weeks	Weight changes, BMI, blood pressure, body fat, muscle mass, and physical fitness.
Wing 2004 [49] USA	RCT	Clinical centers	Examines demographic, psychosocial, and behavioral factors related to achieving ≥ 7% weight loss and physical activity goals in the DPP lifestyle participants. Weight loss goal: 7%	1079	Age: 50.6 (11.3) BMI: 33.9 (6.8)	A goal-based behavioral intervention, delivered by coaches, which includes frequent contact, physical activity, and reduced caloric intake dependent on baseline weight	3.2 years	Weight loss and self-monitoring records

Note: BMI and age reported in mean (SD) unless otherwise noted.
Abbreviations: C, control; I, intervention; RCT, randomized controlled trial.
*Primary outcome if explicitly stated, otherwise, general outcomes from full study are reported.

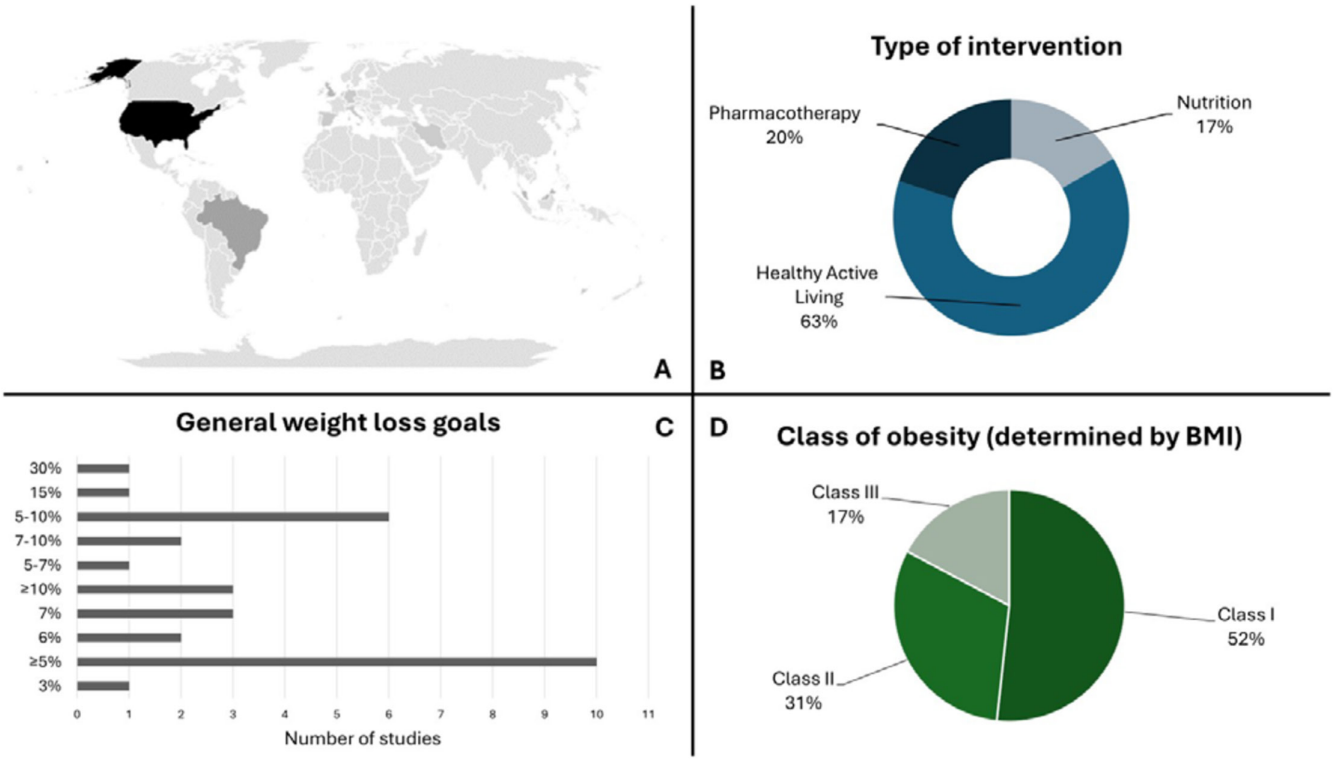

FIGURE 2 | Characteristics of included studies and baseline characteristics of participants. (A) Countries of included studies where darker shading represents more studies from this country. (B) Type of intervention. (C) Percent body weight loss targets. (D) Class of obesity of included participants.

not reported in one study. All but two of the included studies had target weight loss outcome goals between 3% and 10% of body weight (Figure 2C) with the majority of studies aiming for 5% body weight loss ($n = 10$) or a range between 5% and 10% body weight loss ($n = 6$).

3.3 | Intervention Categories and Components

The majority of studies included in this review used a combination of behavioral modifications to promote healthy active living and reduce percentage of body weight in participants (a total of 19). Some of these behavioral modifications consisted of very intensive interventions with multiple components such as the Look AHEAD study [13], which used self-monitoring, problem-solving, goal setting, dietary modifications and exercise programs. This program also required participants to reduce their caloric intake and meet a total caloric intake of 1200–1800 kcal/day using liquid meal replacements. Pathek et al. (LEGACY trial) [58] also used a prescriptive and intensive program, which consisted of structured motivational and goal-directed counseling, high protein and low glycemic index meals with calorie-controlled foods, and a progressive exercise regime. Others provided more general guidance to reduce calories and increase physical activity levels [50, 57] or modified existing programs for their population by tailoring components or changing the duration of the intervention [39, 49, 55] or modified well-known eating styles such as the Mediterranean diet [46]. One study provided participants with weekly fitness trainer meetings, a gym membership, and nutrition education [38]. The behavioral modification studies in our review delivered the programs through individual and/or group sessions using face-to-face, telephone, and virtual options.

Five studies included in our review focused on food intake or diet/nutrition only to try and meet their percent weight loss targets. These studies were diverse in both their participants and the programs. Jensen et al. [40] used a low carbohydrate, high protein diet in adults with diabetes, whereas Scragg et al. [59] used meal replacement products to achieve a calorie restriction resulting in the consumption of only 800 kcal/day (very low-calorie diet) in their participants with NAFLD. Similarly, De Simone et al. [53] also prescribed a very low-calorie diet with intake dropping as low as 600 kcal per day. Ezequiel et al. [54] focused on a calorie restricted diet and macronutrient proportions of 50% carbohydrate, 20% to 25% protein, and 25% to 30% fat. Lastly, Torres et al. [60] worked with overweight and hypertensive adults to provide individualized nutritional counseling.

Finally, six studies investigated pharmacological agents to meet percent weight loss targets. This was either in the context of a pharmaceutical study [41, 43, 44, 48] or a combination of healthy active living with pharmaceuticals to meet percent weight loss targets for those who were not successful with lifestyle modifications only [57, 62]. Participants were also provided with lifestyle literature, encouraged to exercise, and met with a registered dietitian to review food records. Wadden et al. [48] provided participants with an intensive lifestyle intervention (1200–1500 kcal intake per day based on weight or sex, physical activity of ≥ 150 min per week, and frequent behavioral counseling) along with tirzepatide for those who reached ≥ 5% body weight loss from the intensive lifestyle program. With the

TABLE 2 | Weight loss goal, weight loss achieved, and stated link for weight loss to health outcome.

Author, year	% weight loss goal	Proportion of participants who met percentage weight loss target	Associated health outcome/benefit and reference (if applicable)
Behavioral/healthy active living studies			
Ahmad Zamri 2020 [50]	5%	More participants in the control group lost between 5% and 20% weight at 6 months post-intervention and 12 months after the maintenance period end compared to the participants in the intervention group (i.e., 16.7% vs. 9.3% and 9.6% vs. 7.8%, respectively).	Improved cardiometabolic risk markers (referenced AHA Guidelines and DiRECT trial)
Almeida-Pittito 2010 [51]	≥ 5%	NR	Reduced risk of diabetes (referenced other primary studies)
Andonian 2024 [34]	7%	NR	Improved rheumatoid arthritis (RA) activity and immune function (referenced other primary studies in RA patients)
Bender 2018 [35]	5%	At 3 months, 36% of intervention group lost ≥ 5% of weight, compared to 6% in the waitlist group. At month 6 (3 months of Fit & Trim), 47% the waitlist group lost ≥ 5%.	Reduced risk of diabetes (referenced DPP)
Bischoff 2022 [52]	5% to > 10% depending on BMI	Weight loss goals (i.e., > 5% or > 10% of initial body weight depending on baseline BMI) were achieved in 89.7% of participants	Improved components of metabolic syndrome, liver function, and risk of liver steatosis (referenced NAFLD guidelines)
Brinkley 2023 [36]	≥ 5%	66.7% of participants in the intervention group achieved goal compared to 16.7% in the control group.	Improve cardiovascular outcomes (referenced review and primary study)
Cooper 2012 [37]	5%	Average weight loss was 8%. 56% of participants in the diet and PA intervention achieved ≥ 5% weight loss versus 44% in the diet only intervention	Reduced common carotid artery intima-media thickness (no clear reference for weight loss to health outcome association)
Fanning 2018 [38]	7%–10%	NR	Improved social cognitive outcomes and quality of life (referenced other primary studies)
Jamal 2016 [39]	6%	At week 24, 19 participants (19.6%) achieved 6% targeted weight loss in the intervention compared to four (4.1%) in the comparison group	Improved mortality and quality of life (based on DPP; reference systematic reviews and meta-analyses)
Look AHEAD Research Group 2007 [13]	7%	37.8% of participants met the individual weight loss goal (≥ 10% of initial weight) and 55.2% met the group average goal (≥ 7%)	Improved cardiovascular risk factors *trial stopped early due to futility (referenced protocol/evidence and DPP trial)
McBride 2008 [55]	5%–7%	The average weight loss at 12 weeks was 4.6% of the initial body weight	Reduced risk of diabetes (referenced DPP and primary studies)

(Continues)

TABLE 2 | (Continued)

Author, year	% weight loss goal	Proportion of participants who met percentage weight loss target	Associated health outcome/benefit and reference (if applicable)
Messier 2020 [42]	10%	The Diet group lost an average of 9.5% (8.9 kg), the Diet with Exercise group lost 11.4% (10.6 kg), and the Exercise group lost 2.2% (1.8 kg)	Improved pain, function, mobility, and health-related quality of life (no clear reference for weight loss to health outcome association)
Minneboo 2015 [56]	5%–10%	The target of 5% weight reduction (5.1 kg) was achieved by 20 patients (57%) of the 35 patients who completed the program	Secondary prevention of cardiac events (no clear reference for weight loss to health outcome association)
Pathak 2015 [58]	10%	Group 1: ≥10%; 38% Group 2: 3%–9%; 28% Group 3: ≤3%; 33%	Improved atrial fibrillation (referenced AHA guidelines)
Promrat 2010 [45]	7%–10%	Eight participants (40%) achieved a 10% or greater weight reduction. Percent weight reduction in the intervention group was 9.3% (7.5) versus 0.2% (6.1) in control.	Improvements of biochemical and histological features of NASH (referenced DPP and Look AHEAD)
Salas-Salvado 2019 [46]	5%–10%	Weight loss ≥5% occurred in 33.7% of intervention participants compared with 11.9% in the control group	Improved cardiometabolic abnormalities (referenced Look AHEAD trial and systematic review)
Stolley 2017 [47]	5%	44% of participants lost at least 5% (compared with 19% of control).	Improve anthropometrics, body composition, and behavioral outcomes (referenced breast cancer survivor guidelines)
Wang 2013 [61]	3%	Mean weight reduction was −4.4% ± 3.5% (−12.1% to 4.9%) and 63% of participants achieved > 3% goal	Improve renal function (no clear reference for weight loss to health outcome association)
Wing 2004 [49]	7%	37% met the weight loss goal	Reduced risk of diabetes (referenced DPP)
Nutrition (including dietary counseling) studies			
De Simone 1992 [53]	30%	40% of participants met weight loss goal to be included in the study	Lower blood pressure (referenced other primary studies)
Ezequiel 2012 [54]	5%	40% of the participants had achieved the target weight loss	Improved chronic kidney disease and attenuate renal damage (no clear reference for weight loss to health outcome association)
Jensen 2022 [40]	6%	Body weight decreased by 5.8 kg (5.9%) in both groups after 6 weeks	Improved quality of life (referenced DiRECT and U-TURN trials)
Scragg 2020 [59]	≥10%	34% of patients achieved and sustained ≥10% weight loss, 51% achieved ≥7% weight loss, and 68% achieved ≥5% weight loss at 9 months	Improved liver health, cardiovascular risk, and quality of life (referenced DiRECT trial and other NAFLD-specific citations)

(Continues)

TABLE 2 | (Continued)

Author, year	% weight loss goal	Proportion of participants who met percentage weight loss target	Associated health outcome/benefit and reference (if applicable)
Torres 2011 [60]	5%–10%	Weight loss between 5.0% and 9.9% was observed in a significantly higher percentage of patients in the dietary counseling group (28% vs. 11%). A weight loss of at least 10% was only observed in dietary counseling group patients.	Improved blood pressure (referenced meta-analysis)
Pharmacotherapy (± intensive lifestyle modifications) studies			
Auwad 2008 [62]	5%–10%	65% achieved ≥ 5% weight loss and 31% lost ≥ 10% of initial weight	Improved urinary incontinence (no clear reference for weight loss to health outcome association)
Knop 2023 [41]	5%	85% of participants lost 5% or more of their body weight compared to 26% in control group	Efficacy and safety of drug for weight loss (referenced STEP trials)
Mu 2024 [43]	5%	85% of participants lost 5% or more of their body weight compared to 31% in control group	Efficacy and safety of drug for weight loss (no clear reference for weight loss to health outcome association)
Ostovan 2013 [57]	5%–10%	110 subjects (78.5%) lost ≥ 5% of their initial body weight during the 3 months intense lifestyle phase. At the end of study, significantly more subjects in the orlistat group (94.7%) lost ≥ 5% of their initial weight than did those in the counseling group (79.4%)	NR. Study did not link weight loss with health outcomes
Papamargaritis 2024 [44]	≥ 15%	25.4% participants in the intervention group met weight loss target, compared to 6.5% in control group.	Improvements in cardiometabolic risk factors and in some parameters of quality of life (reference Look AHEAD and DiRECT trials, other primary studies, and a meta-analysis)
Wadden 2023 [48]	≥ 5%	Average weight loss in the lead in period (intensive lifestyle) was 6.0% (71.8%) with an additional 6.2% reduction with Tirzepatide (87.5%)	Improved control of obesity-related complications and decreased cardiovascular mortality (referenced AHA guidelines and Look AHEAD trial)

Abbreviation: NR = not reported.

addition of the drug, they aimed for another ≥5% body weight loss. Papamargaritis et al. [44] included participants with Class III obesity and aimed for ≥15% weight loss using standard care and liraglutide 3 mg. Mu et al. [43] used semaglutide 2.4 mg as an adjunct to a reduced calorie diet and increased physical activity to achieve 5% weight loss in participants with Class I obesity. Knop et al. [41] also used semaglutide, but an oral dose of 50 mg once per day in addition to a lifestyle intervention. They also strived for 5% body weight loss in participants. In a study of 140 participants with Class I obesity [57], lifestyle counseling was delivered by a dietician, exercise specialist, and physician in individual sessions. Participants who did not lose 5% of their initial body weight after 3 months, were assigned to receive 120 mg orlistat three times daily for 3 months in addition to counseling sessions. Similarly, in Auwad et al. [62], orlistat was used to help participants who did not achieve the target of 5% weight loss after 9 months of a diet and exercise program.

3.4 | Targeted Weight Loss and Health Outcomes

Further to the study categories and components, we also examined the study's purpose for setting a percent weight loss goal/target outcome and the health benefits or risk factors associated with the targeted percent weight loss outcome (Table 2). Studies had a variety of reasons for targeting a specific percent weight loss in their participants spanning from disease specific outcomes, such as improvements of biochemical and histological features of NASH [45], improved quality of life [40], or overall reduced risk of diabetes [35, 49, 51, 55]; however, one study did not clearly link their targeted percent weight loss to a health outcome [57]. The majority of studies reported the proportion of participants who met the targeted percent weight loss goal ($n = 27$ out of 30), but 33% ($n = 10$) of studies did not provide post-study results for BMI or weight change (data not shown). Also important to note is that for many studies, the health-related outcomes were not the powered outcome of the study, as can be seen when comparing the Table 1 primary/powered outcome column with the Table 2 associated health outcome column. Despite the varying health-related reasons for targeting a specific percentage weight loss in participants, most studies cited the same references to support the association between weight loss and the desired health outcomes. The majority of the included studies refer back to the DPP [14], Look AHEAD [13], or the DiRECT trial [15] (see Appendix S2 for details of these interventions) to support the reason or rationale for setting the percentage body weight goal of their study and the health benefit/outcome linked to that goal. Many also reference the 2013 American Heart Association/American College of Cardiology/The Obesity Society (AHA/ACC/TOS) guideline for the management of overweight and obesity in adults [9].

4 | Discussion

This scoping review describes the evidence on percent weight loss targets in trials aimed at managing obesity for adults and discusses these targets in relation to their health outcomes. To consider how comprehensive targets for obesity management could work in practice and understand the evidence for an international co-design workshop, it is important to understand historic use of targets. No other review has summarized the literature that directly states a percent body weight loss goal as their study aim and investigated why these targets were developed or used in these studies beyond effectiveness. While weight loss and percentage weight reduction are important targets and components of obesity management studies, and we did not find a large number of studies that set percent weight loss targets for the interventions, we question the focus on percent weight loss in studies as an intervention goal or aim rather than just an outcome, especially in studies which are not for the sole purpose of efficacy and safety for regulatory approval. We found highly heterogeneous studies in terms of size, design, duration, selection criteria, and choice of intervention that all used percent weight loss as a target for their study. In mapping the reasons for setting the percent weight loss targets, we confirmed that a consistent small pool of well-resourced studies were referenced to support weight loss and the benefits for health outcomes without much mention for how the supporting studies may be different from the current intervention studies. Additionally, some of the studies in our review did not report post-intervention weight change or proportion of participants meeting the percent weight loss target, which leads to questions about the success and sustainability of these interventions for weight loss and long-term obesity management.

Previous reviews examining the literature on weight loss and obesity-related complications have challenged the concept of weight loss goals to go beyond percentage changes in total body weight. Horn et al. [1] acknowledged the multitude of factors that impact body composition and adipose tissue distribution, including lifestyle, ethnicity, race, age, and sex. Importantly, this variation in visceral and subcutaneous fat greatly influences obesity-related complications and responses to weight loss interventions. Horn et al. [1] also note that some benefits associated with weight loss interventions may not be solely due to weight reduction, since some medications may have pleiotropic modes of action that exert additional beneficial effects. Related to this, Ross et al. [63] focused on behavioral and lifestyle interventions and concluded that while weight reduction is a useful index to reduce obesity-related complications, evidence suggests that a rigid focus on weight loss aims/goals are not justified and eliminates opportunities to focus on lifestyle behaviors that are associated with benefit across a wide range of health outcomes. Their review found that with or without weight loss, modest behavioral changes such as an increase in physical activity combined with a healthy diet are associated with significant reductions in metabolic risk and morbidity. The relationship between percent weight loss and outcomes is complex and varies with the nature of interventions studied for a range of safety, efficacy, and acceptability metrics. Targeting percent weight loss for obesity management also misses the fact that most chronic disease targets (such as diabetes or hypertension) are represented by absolute levels of biological parameters associated with better clinical outcomes (absolute level of glycated hemoglobin and absolute levels of blood pressure) and not by the percentage reduction in the levels of the biological parameters. Therefore, it is important to consider while there are similarities between chronic disease targets, obesity has some unique features requiring different kinds of targets.

Overall, a small pool of well-resourced studies continues to be referenced to support weight loss and the benefits for

health outcomes. The majority of the included studies from our review refer back to the DPP [14], Look AHEAD [13], or the DiRECT trial [15] to support the rationale for setting the percentage body weight goal of their study and the health benefit/outcome linked to that target. While the evidence to correlate weight loss and health benefits may be valid and well documented, there was heterogeneity in the participant populations of the individual studies included in our review compared to the trials referenced to defend their percentage body weight targets in terms of baseline populations and components of interventions including type, duration, intensity, and complexity. For example, few of the studies in our review included participants with obesity as a stand-alone component of participant selection. Most studies in our review recruited participants with clearly identified, a priori, serious obesity-related complications such as diabetes, NAFLD, and CVD [36, 45, 51, 52, 54]. This is inconsistent with the participants in the DPP [14], Look AHEAD [13], or the DiRECT [15] trials which recruited participants with diabetes and obesity. In addition, the included studies from our review that refer to these large, multi-component, and complex trials often focus on much smaller components of the trials, sometimes even one single aspect such as one intervention that used just a carbohydrate-reduced, high protein diet [40] but cited both the DiRECT and U-TURN (the U-TURN trial in particular uses an intensive multi-component lifestyle approach). This disconnect between foundational evidence, populations, and methods in new interventions, and real-world clinical challenges can reduce the implementation and readiness of obesity management programs that meet the needs of clinicians and patients in practice.

Clinical significance or meaningfulness was also a gap in the included studies. It was often unclear whether the success of the included studies was determined by achieving the percentage weight loss target, or the intended clinical health benefits outcome that weight loss is meant to improve. Moreover, we also question whether these percent weight loss goals are feasible or sustainable for both clinicians and patients considering the results of these studies showed variable proportions of participants achieving these goals. For example, in a pilot and feasibility study, Scragg et al. [59] found that while 90% of people completed their intervention, only 34% achieved the percentage weight loss target (i.e., ≥ 10%). Further complicating the percentage weight loss narrative included improvements in liver health that were not related to percent weight loss, and improvements in insulin sensitivity that were not sustained during the maintenance phase, but participants reported a significant increase in quality of life 9 months following treatment. Previous reviews [63] have found that with or without weight loss, there can be improvements in the health outcomes of participants due to the intervention itself. Said another way, regardless of weight loss, the act of increasing physical activity, for example, provides health benefits, such as decreased blood pressure, albeit the effect size is often modest. In addition, without the use of pharmacotherapy, healthy behavior changes generally achieve 3%–5% weight loss, most of which is not sustained in the long term [64]. Thus, there remains uncertainty about how to define the success of these weight loss studies (weight loss vs improvements in health outcomes) and the mechanisms for these improvements (weight loss on its own vs the intervention itself) especially given the methodologic limitations that restrict their application to everyday clinical practice [16].

5 | Implications for Research

Our review has several implications for obesity management research which will lend itself to future improvements in practice and policy. Obesity research should critically appraise previous weight loss target trials and consider how closely any new studies align to the aims, populations and intervention components of these previous trials. Even with complex, multi-disciplinary and intensive interventions, there are still significant proportions of participants that do not reach the target goals, which suggests these goals are not realistic nor sustainable for most participants. Given the complex factors influencing obesity, a more comprehensive approach to developing goals of obesity management should be implemented for research studies. Targets should not be based solely on weight, but rather on a more patient-centered approach to obesity management, including differences in ethnicity, age, sex, regional adipose distribution, medication use, duration and severity, and/or complications of the disease. This type of research would better align with patient/person-focused approaches and priorities that guideline groups are calling for such as the Canadian Adult Obesity Clinical Practice Guidelines [23] and the framework from the European Association for the Study of Obesity [24]. It also aligns with recent work done by international researchers and consortiums such as the International Consortium for Health Outcomes Measurement (ICHOM) set of Patient-Centred Outcome Measures for Adults living with Obesity [25], a recently published core set of patient-reported outcome measures for measuring quality of life in clinical obesity care [26], and the Lancet Commission for the definition and diagnostic criteria of clinical obesity [65]. Specifically, a co-created approach like an *obesity management dashboard* would support evidence-based practice [66] and integrate clinical experience (such as a sustainable weight loss target outcome), research evidence (such as patient's cardiometabolic blood samples aligning with chronic disease targets, meeting guideline recommendations, and efficacy averages for the employed intervention), and patient experience (such as important patient-specific outcomes and non-weight related outcome targets including quality of life and physical, mental, and social function). Future research needs to be co-designed with stakeholders (patients, clinical providers, and researchers) to identify outcomes that will support person-focused approaches. Recent work [67] with healthcare providers and people living with obesity resulted in a consensus report with eight patient-reported outcomes and measures including self-esteem, physical health/functioning, mental/psychological health, social health, eating, stigma, body image, and excess skin as potential targets for treatment [25]. As the obesity management space is evolving and there are significant efforts to advocate for improved care and access to treatments, a barrier to these efforts is the data being collected and reported as targets for success. The initial approval of a treatment will focus on the effectiveness based on percent weight loss, but yet the Health Technology Assessments that determine if a treatment should be covered are being denied due to the lack of data on the targets that go beyond percent weight loss. There

is a need to align treatment targets not only for research and practice, but also thinking ahead for policy changes.

6 | Conclusion

Despite widely accepted targets for percentage weight loss, such as the > 5% weight loss, there is limited evidence to support this strategy for obesity management and as a target for success of an intervention. As obesity care experts, we suggest moving away from a simplistic percent weight loss as the sole obesity treatment target in research, despite its ease of use and measurement. Research should examine a combination of other health parameters and weight loss, along with patient reported outcomes, such as prevention, remission, resolution, or improvement of obesity-related complications, improvement of quality of life and mental well-being, and improvement of physical and social functioning and fitness, as a way to move forward in reporting obesity management outcomes and measuring success of such studies. These parameters may better reflect the state of health improvements among people affected by obesity and help to co-design comprehensive targets could work in both research and practice.

Author Contributions

All authors were involved in conception and design of the study. M.R., D.F.L., and D.S. were responsible for overseeing the search of databases and literature. M.R. handled the management of the database. M.R., D.F.L., and D.S. were involved in the screening of citations. M.R., D.F.L., and M.G. were responsible for data extraction and verification. All authors were involved in interpretation of data. All authors supported in the drafting of the manuscript, which was led by D.S. and M.R., and all authors supported in revising and formatting of the manuscript. All authors have provided final approval of the version of the manuscript submitted for publication, and all authors agree to be accountable for all aspects of the work.

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Conflicts of Interest

Elisabeth van Rossum: is involved in clinical trials with Rhythm Pharmaceuticals for targeted therapy for rare genetic obesity and served as a speaker for Medcape/WebMD (all payments to the institution, no personal payments).

Soo Huat Teoh: speaking honorariums from Novo Nordisk, Astra Zeneca, iNova Pharmaceuticals, Zuellig Pharma Therapeutics, and Taisho Pharmaceutical Group. Advisory board for iNova Pharmaceuticals and Zuellig Pharma Therapeutics.

Ian Patton: no direct honorarium or relationships but through my role with Obesity Canada. I have served on advisory boards for Novo Nordisk, Boehringer Ingelheim, Eli Lilly, and Pfizer.

Luca Busetto: personal fees for participation in advisory boards for Novonordisk, Eli Lilly, Pfizer, Boehringer-Ingelheim, and Burno Farmaceutici. Personal fees as speaker for Rythms Pharmaceuticals, and Pronokal.

Deborah Bade Horn: consulting for Amgen, Lilly Inc, and Novo Nordisk. Speaking for Lilly and Novo Nordisk. Clinical research as with all payments to the institution for Lilly and Novonordisk.

Diana Sherifali: has received consulting fees from ICI Medical Communications and has received a speaking honorarium from Novo Nordisk when presenting her research related to health coaching.

Nicole Pearce: is a staff member at Obesity Canada and owns the Global Obesity Learning Centre.

Donna Fitzpatrick-Lewis: has no conflicts to declare.

Megan Racey: has no conflicts to declare, but her role as a Research Coordinator at McMaster University is funded in part by the Heather M. Arthur Population Health Research Institute/Hamilton Health Sciences Chair in Inter-Professional Health Research.

Michelle Greenway: has no conflicts to declare related to her role as a PhD student at McMaster University.

Sanjeev Sockalingam: has received honoraria from Bausch Health and Novo Nordisk.

Jun Wada: receives speaker honoraria from Astra Zeneca, Bayer, Boehringer Ingelheim, Daiichi Sankyo, Kyowa Kirin, Novo Nordisk, and Mitsubishi Tanabe and receives grant support from Bayer, Chugai, Kyowa Kirin, Otsuka, Shionogi, Sumitomo, and Mitsubishi Tanabe.

David Macklin: has received honoraria, consulting feeds, and licensing fees for speaking, training, and advisory board positions from Novo Nordisk, Eli Lilly, Boehringer Ingelheim, Rhythm Pharmaceuticals, Shoppers Drug Mart, and Myndset App.

Sean Wharton: has received honoraria and/or serves on advisory boards for Novo Nordisk, Eli Lilly, BI, Astra Zeneca, Amgen, Bausch health Canada, Regeneron, and funding for clinical Trials: Novo Nordisk, Eli Lilly, BI, Astra Zeneca, and Amgen.

Patricia Nece: has received consulting fees from Eli Lilly and Structure Therapeutics.

Morgan Emile Gabriel Salmon Leguede: has no conflicts to declare.

Carel Le Roux: reports grants from the EU Innovative Medicine Initiative, Irish Research Council, Science Foundation Ireland, Anabio, and the Health Research Board. He serves on advisory boards and speakers panels of Novo Nordisk, Roche, Herbalife, GI Dynamics, Eli Lilly, Johnson & Johnson, Gila, Irish Life Health, Boehringer Ingelheim, Currax, Zealand Pharma, Keyron, AstraZeneca, Arrowhead Pharma, Amgen, and Rhythm Pharma. ClR is the Chair of the Irish Society for Nutrition and Metabolism. ClR provides obesity clinical care in the My Best Weight clinic and Beyond BMI clinic and is a co-owner of these clinics.

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