

EDITORIAL

Long-Term Outcomes Following Behavioral Weight Management Programs: Worth the Weight

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Obesity is one of the most important and rapidly growing public health problems. In the United States alone, obesity (categorized as a body mass index ≥ 30 kg/m²) affects 42% of adults,¹ and its prevalence is estimated to grow to 50% by 2030.² Obesity-related conditions, such as coronary artery disease, stroke, and type 2 diabetes, are associated with high premature but preventable deaths.¹ Higher health care costs are also associated with increasing body mass index, and those with severe obesity (body mass index ≥ 35 kg/m²) experience an excess cost over \$3000 per adult.³ Existing weight loss strategies are aimed to reduce the long-term adverse effects of obesity. These include behavioral weight management programs (BWMPs), pharmacologic therapies, and surgical interventions.^{4,5} BWMPs are often multifaceted in nature and aim to promote weight loss by targeting a patient's nutrition, physical activity, self-monitoring, self-efficacy, peer support, and weight relapse prevention.⁴ While BWMPs are widely available, they are often heterogeneous and may be associated with weight regain.⁶ The impact of weight regain on cardiovascular risk remains uncertain.

See Article by Hartmann-Boyce et al

In this issue of *Circulation: Cardiovascular Quality and Outcomes*, Hartmann-Boyce et al⁷ examined the extensive body of literature on weight regain following BWMPs to characterize the impact of initial weight loss and then weight regain on cardiometabolic risk factors (blood pressure, glycemic control, and cholesterol) and on incident cardiovascular disease and T2DM. Among

over 17 000 studies, they found only 124 randomized control trials which reported on ≥ 1 cardiometabolic outcome with at least 12 months of follow-up. Few studies (N=8; 4 with high risk of bias) contained data on cardiovascular morbidity or mortality. Mean (SD) weight difference at program end was -2.2 (± 1.8) kg, and weight regain in intervention versus comparator was not associated with difference in incident CVD (2.7 [−1.36 to 6.68] per 1000 person-months). Similarly, of 15 study arms that reported on incidence of T2DM, mean weight gain between intervention and comparators was -4.1 (± 2.5) kg, and weight regain was not associated with the outcome (-31 [−72 to 10] cases/1000 person-months). Overall, due to the sparsity of high-quality data, conclusions could not be drawn about CVD or T2DM incidence after BWMP.

With regard to cardiometabolic risk factors, mean weight changes at program end were -4.7 kg for incidence or remission of hypertension (N=6 intervention arms), -2.1 (± 3.0) kg for insulin resistance (N=29 intervention arms), -2.0 (± 2.8) kg for cholesterol outcomes (N=108 intervention arms), 2.4 (± 2.8) kg for glycemic control (N=128 intervention arms), and -2.2 (± 2.8) kg for systolic blood pressure (N=110 intervention arms). Overall, the study found evidence that BWMP improved cardiometabolic risk factors except for glycemic control out to 5 years, though weight regain reduced these favorable effects over time. The authors should be commended on this timely and relevant analysis which provides comprehensive data synthesizing a complicated and often disparate literature. This is important because BWMP constitute the backbone of weight management in clinical practice. Patients identified as having overweight or

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obesity are deemed to be high risk for future cardiovascular events and should be offered first-line preventive therapies with lifestyle changes alongside pharmacologic therapies, when indicated.⁴ While much of the evidence available has sought to understand the short-term efficacy of BWMPs, the authors of the present study add insight when counseling patients regarding the benefits of these programs over the long-term and in the context of weight regain. Importantly, the treatment effect of BWMPs persists for all but glycemic control despite weight regain over 5 years.

Despite the study's strengths, there are some limitations. First, the results describe an aggregate effect of BWMP, which is challenging to interpret given the wide range of interventions offered—from strategies using diet alone to diet combined with exercise and from in-person counseling to telephone-based virtual interventions. While combining these data allows for synthesis of relatively few studies, the heterogeneity of each intervention limits the generalizability of the results. Second, beyond the inherent heterogeneity across BWMPs, there is also heterogeneity among populations of participants in these studies. BWMP produce highly variable results among individuals, with differing levels of self-efficacy, motivation, and response to lifestyle changes.⁸ Finally, as the authors acknowledge, one-quarter of the studies included had high risk of bias. However, removing these more biased data did not significantly change the overall results and conclusion.

The present study has interesting implications for the impact of weight regain that may occur after pharmacologic therapies. With the plethora of pharmacologic agents in the pipeline for obesity,⁹ the question of what happens when a patient stops the agent is paramount. In the STEP 1 trial extension study, adults with overweight or obesity who had been treated with semaglutide 2.4 mg weekly for 68 weeks were followed for an additional year after drug withdrawal.¹⁰ After withdrawal, patients regained two-thirds of their prior weight loss, and most cardiometabolic risk factors reverted toward baseline. Thus, the STEP 1 trial extension study showed similar patterns in risk factors with weight regain as the present study showed with BWMPs, though it only looked out to 1 year after intervention.

What is still unknown is whether these temporary improvements in weight and cardiometabolic risk factors after weight loss intervention (behavioral or pharmacological) lead to long-term clinical benefit. In other words, is it better to have lost and regained than never to have lost at all? In this study, weight loss following BWMP and subsequent regain are associated with favorable, although modest changes in cardiometabolic risk factors, yet, long-term data are insufficient in characterizing the association between weight changes and cardiovascular death, myocardial infarction, or stroke.⁷ Understanding long-term clinical outcomes is important because

BWMPs are often resource intensive, and the emerging pharmacologic therapies are expensive. On a population level, it is critical to fully evaluate the economic impact of these weight loss strategies, especially in a condition that leads to high health care costs.³

Much remains to be understood about various weight loss interventions, their long-term impact, and how this impact may be diminished by weight regain. This study highlights the critical need for high-quality evidence to allow clinicians and patients to make informed choices about weight management strategies.

ARTICLE INFORMATION

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