

Weight loss maintenance after bariatric surgery: Opportunities and challenges

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Bariatric surgery is an effective treatment for individuals with severe obesity who have a BMI of more than 40kg/m² or more than 35kg/m² and the presence of

comorbidities which are expected to improve significantly with weight reduction (National Institutes for Health and Care Excellence, 2014). Bariatric surgery leads to substantial and sustained weight loss compared to standard care and non-surgical interventions (Gloy et al., 2013); however, there is also considerable evidence that patients frequently regain weight in the long term after bariatric surgery (Karmali et al., 2013). One study with a follow-up period of five years reported an average weight regain of 8kg (± 11 kg) in the 2-5 year period following surgery (Aftab et al., 2014). Weight loss must be maintained to ensure that the health and economic benefits associated with bariatric surgery are optimised. It is important to improve our understanding of whether behavioural interventions are effective in reducing weight regain after bariatric surgery and, if so, when and how to intervene. There are a number of ways in which psychological and behavioural science can contribute to the development of effective interventions for weight loss maintenance (Sniehotta, Simpson, & Greaves, 2014).

When should we intervene?

Weight loss is likely to peak at approximately 1-2 years after bariatric surgery. After maximum

weight loss is achieved, individuals are at risk of weight regain over time (Courcoulas et al., 2013). Weight loss and weight regain is influenced by a complex interaction of physiological mechanisms and behaviour. Weight loss during the initial 1-2 year post-surgical period is primarily an effect of physiological mechanisms such as changes in gut hormones and appetite control (Chakravarty, Tassinari, Salerno, Giorgakis, & Rubino, 2015), whereas psychological factors are mainly associated with patients' physical activity and dietary behaviour, rather than actual weight loss, at this early stage (Bergh, Lundin Kvale, Risstad, & Sniehotta, 2015). There appears to be a transitional period when the physiological effects of surgery may be diminishing and the need for lifestyle modification is increasing, and the timing of the onset of this transitional period may differ considerably between individuals (Courcoulas et al., 2013).

Targeting patients during the transitional period may appear to be a feasible approach. However, there is limited evidence about the precise timing and sequence of weight regain to enable the prediction of this window of opportunity in individual patients. Interventions promoting weight loss maintenance may need to be delivered to patients earlier, before the risk of regaining weight. During the early post-surgical period, it has been shown that patients are aware that surgery is 'doing all the work' (Lynch, 2016). Therefore, it is not clear whether patients would be receptive to interventions encouraging the initiation and maintenance of behaviours required to sustain weight loss at this stage in their post-surgical trajectories. Some patients may resume or develop

new unhealthy behavioural habits (e.g., grazing), which could influence the likelihood of future weight regain. Another option is to intervene before patients undergo surgery, addressing illness and treatment beliefs and highlighting the role of behaviour change for the maintenance of surgical weight loss. Teaching patients strategies to maintain weight loss prior to weight loss itself may indeed be an effective approach (Kiernan et al., 2013).

An evidence base about weight loss, weight loss maintenance and weight regain is accumulating within the non-surgical context. Systematic reviews have shown that behavioural interventions targeting changes in physical activity and dietary behaviour are effective in reducing weight with an average weight loss of 1.56kg or more in the first year (Dombrowski, Knittle, Avenell, Araujo-Soares, & Sniehotta, 2014; Middleton, Patidar, & Perri, 2012). Theory about behavioural maintenance may be important to inform interventions for weight loss maintenance in bariatric surgery patients. A recent systematic review of behavioural theories showed that few theories explicitly address behavioural maintenance. However, five areas were identified where theories suggested distinct theoretical explanations for behaviour change initiation and for behaviour change maintenance. These highlight the importance of developing maintenance motives that facilitate gratification without relying on constant change, active self-regulation, psychological and material resources, social and environmental conditions as well as the development of habits and routines as key to successful long term maintenance of initial behaviour change (Kwasnicka, Dombrowski, White, & Sniehotta, 2016).

Evidence from non-surgical contexts may contribute to understand weight loss maintenance after bariatric surgery. However, there are some key differences in the characteristics of weight change in surgical and non-surgical populations which may limit the applicability. Firstly, bariatric surgery

leads to considerably more weight loss than behavioural interventions (i.e. an average of 26kg more weight loss than behavioural interventions; Gloy et al., 2013). In addition, individuals receiving behavioural interventions tend to experience weight regain around 6 months after the intervention (Dombrowski et al., 2014) whereas weight loss is often maintained for a longer time after bariatric surgery (Courcoulas et al., 2013). Weight regain may be more variable between individuals after surgery compared to after behavioural interventions. Patients undergoing bariatric surgery and individuals who lose weight after participating in behavioural interventions may also differ in their attributions of weight loss. Bariatric surgery patients acknowledge that the surgical procedure is driving post-surgical weight loss and as a result these patients may attribute their weight loss to external factors (Lynch, 2016). Making internal attributions about weight loss may be crucial to promote self-efficacy and maintained weight loss (Bandura, 1997). Due to the number of potential differences, it is not known to what degree insights from weight loss maintenance after non-surgical weight loss can be applied within the bariatric context.

Much of what we know about bariatric surgery is limited to the initial 1-2 year post-surgical period. Future research should adopt methods which can illuminate the temporal processes involved in weight change trajectories over time. Longitudinal methods that employ qualitative enquiry and ecological momentary assessments of behaviour would promote the understanding of determinants of weight regain and weight loss maintenance and how they interact. Intensive measurement methods such as N-of-1 methods could be well suited to reveal the temporal nature and predictors of weight regain (McDonald, Araujo-Soares, & Sniehotta, 2016; McDonald & Davidson, 2016). More recent studies employing objective and ecological momentary assessment methods have revealed that patients are inactive and highly sedentary before

bariatric surgery and make only modest changes in physical activity and eating behaviours after surgery (Bond & Thomas, 2015). Most systematic reviews have focused on identifying predictors of weight loss, but there is limited knowledge about predictors of weight regain (Livhits et al., 2012). Studies of predictors of weight regain have mostly used a short follow-up period (i.e. first year post-surgery; Odom et al., 2010) when weight changes are not necessarily driven by factors under patients' control. Identifying which patients are most able to maintain weight and who are more vulnerable to weight regain could improve pre-surgical procedures such as patient selection and pre-surgical weight management. Future research should consider how predictors of weight regain may change over time, should focus on the measurement of behaviour and behavioural outcomes (i.e. weight), and should work towards establishing an agreed definition of clinically relevant weight regain (Karmali et al., 2013). Research in these areas would facilitate the development of interventions, which can promote weight loss maintenance after bariatric surgery.

How do we intervene?

Behavioural interventions targeting weight regain in bariatric surgery are usually evaluated 1-2 years post-surgery so it may not be surprising that they are often ineffective (Stewart & Avenell, 2016). Studies with longer follow-up (>3 years) show more promising effects (Stewart & Avenell, 2016). There are opportunities to test whether effective behavioural interventions developed in the non-surgical context apply to this area. Interventions that include techniques that encourage individuals to make internal attributions for their weight loss may be effective in preventing weight regain (Evans et al., 2015). Interventions based on theoretical explanations of maintenance may also be applicable to guide the selection of

target variables (Kwasnicka et al., 2016). The delivery of interventions is likely to benefit from the increased use of mobile and online platforms and the development of technology which can measure behaviour and weight loss outcomes in real time including mobile phones, ecological momentary assessment and wireless scales (Evans et al., 2015; Kalarchian & Marcus, 2015). Interventions personalised to the individual are likely to be important due to the great variability in weight change trajectories between individuals. The use of adaptive interventions, which involve the delivery of appropriate intervention to individuals in real time when problem behaviours are detected, is also likely to be a promising avenue for future intervention development (Kalarchian & Marcus, 2015). Finally, it is important that interventions are acceptable to patients and this requires enquiry into what patients want and need at different stages during the surgical journey. The use of technology makes it possible to personalise interventions to the needs and preferences of the individual (McDonald et al., 2016).

Conclusions

Behavioural interventions for individuals undergoing bariatric surgery have great potential in improving long-term outcomes. A key challenge is identifying the 'critical window' when interventions are most needed to prevent weight regain and the selection of potentially effective intervention components. The identification of patient support needs would also benefit from individualised research approaches. To advance our understanding in this clinically important area future research needs to address a number of unanswered questions about the content, intensity, duration, timing and delivery mode of effective and acceptable interventions which may promote weight loss maintenance after bariatric surgery.

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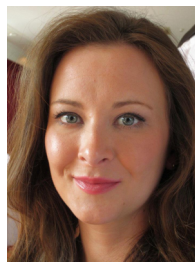
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