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Long-term Weight Loss Maintenance in Obesity: Possible Insights from Anorexia Nervosa?

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Successful and sustained weight loss is critical to reduce the morbidity and mortality associated with obesity. Unfortunately, while many individuals with obesity are able to lose weight, in clinical samples, few are able to sustain substantial weight loss for a significant amount of time. The National Weight Control Registry (NWCR) has usefully collected information regarding the techniques by which individuals have been able to successfully lose weight and maintain it.

The NWCR, established in 1994, is an online registry of individuals who report that they have been able to lose at least 30 pounds and to maintain that weight loss for at least one year. In fact, the reported weight loss averages 68 pounds, maintained for approximately six years (1). Exploration of the dietary practices of members of the NWCR provides information about some of the behaviors that support such long-term weight loss maintenance, though conclusions from these data must be interpreted with caution given members of the NWCR represent only a small proportion of dieters and the data gathered are cross-sectional. Members of the registry endorse eating a diet that is generally low in fat and calories and restricted in diet variety. Deviation from this dietary pattern is associated with weight regain, even among individuals who have maintained weight loss for many years (1). There is also evidence that, the longer individuals maintain substantial weight loss, the less likely they are to regain weight, and the more likely they are to report that they need fewer strategies, less effort, and less attention to maintain weight loss (2). These findings suggest that, although the behaviors that support weight loss maintenance may be guided initially by the conscious exertion of rigorous self-control, over time, these behaviors become less effortful and more automatic. Given that the members of the NWCR represent only a small subset of dieters and successful weight loss maintainers, additional research is critical to determine whether the dietary and behavioral patterns found in this group are generalizable to successful weight loss maintainers more broadly.

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Limitations aside, there are remarkable parallels between the behavioral patterns of successful weight loss maintainers from the NWCR and individuals with chronic anorexia nervosa (AN). Individuals with AN generally report eating a diet low in fat and calories, and a restricted variety of foods. In the year following discharge from inpatient treatment, individuals with AN who revert back to this pattern of consuming a diet low in energy density and diet variety are more likely to remain stuck in their illness than those who are able to alter this pattern. While full recovery from AN is possible, for many affected, even highly motivated, individuals, the disorder remains long-standing with high rates of relapse and mortality and resistant to treatment interventions, consistent with this pattern of eating behavior having become ingrained and automatic.

Beyond behavioral similarities, individuals with AN and successful weight loss maintainers have documented physiological similarities primed to promote weight re-gain. Both groups have significantly lower resting energy expenditure, lower levels of leptin and thyroid hormone, and higher levels of ghrelin than BMI-matched controls (3, 4). Thus, consistent with weight loss, both individuals with AN and successful weight loss maintainers manifest the metabolic profiles opposing further weight loss and promoting weight re-gain. However, both groups override these powerful biological drives and maintain a reduced weight. For patients with anorexia nervosa, persistent maintenance of a reduced weight means persistent illness. These striking behavioral and metabolic parallels suggest a possible shared mechanism underlying the ability to alter eating behavior.

We have recently described an approach that has yielded novel insight into the mechanisms underlying food choice among individuals with AN (5). We developed a task which asks individuals to rate a series of pictures of high- and low-fat foods for “health” and for “taste.” Both patients with AN and healthy controls rated high fat foods as less healthy than low fat foods. Somewhat unexpectedly, compared to controls, patients with AN rated high-fat foods as less tasty. In general, food choice is driven by tastiness rather than healthiness, and some element of self-control is required to choose to eat healthy but less tasty foods. In part two of our task, participants are asked to choose between a neutrally-rated reference food and each of the other foods which they might prefer to eat for a snack. As expected, individuals with AN chose low-fat over high-fat items far more than did healthy controls. At a behavioral level, results suggested that, because individuals with AN rated unhealthy foods as not tasty much more than did controls, less effort (i.e., less self-control) was required to choose the healthy foods.

Furthermore, when choosing what to eat, individuals with AN engaged neural circuits connecting the dorsal striatum and the dorsolateral prefrontal cortex more than did controls. Dorsal frontostriatal circuits play an important role in the development and expression of learned automatic (i.e., habitual) behavior, and the involvement of these circuits is consistent with the notion that, in individuals with long-standing AN, food restriction has become habitual and therefore requires less effortful self-control.

An important direction for future study would be to document whether there are similarities in behavior between individuals with AN and successful weight loss maintainers on this food choice task. Additional study to probe the neural mechanisms associated with food

choice among successful weight loss maintainers would also be warranted. Testing the hypothesis that food restriction becomes less effortful and more habitual with time is a fundamentally longitudinal question and thus, longitudinal study design will be a crucial element of instructive research in examining the temporal course of habit development and entrenchment. Furthermore, it is worth exploring whether there may be trait-level factors (e.g. personality traits) or other similarities (e.g. exercise patterns) between successful weight loss maintainers and individuals with AN, which if substantiated, might indicate that both groups share a proclivity to forming habits and may have some innate ability to tolerate the physiological and psychological effects of starvation and/or reduced caloric intake.

Obesity is not an eating disorder, and we are not suggesting that the sustained weight loss of individuals in the NWCR is pathological. Furthermore, behaviors aside from those noted here, such as regularly eating breakfast and attendance at booster sessions, have also been associated with weight loss maintenance and may not have obvious parallels among individuals with AN. However, given the notable similarities in physiological predisposition to re-gain weight and in enduring patterns of food restriction between individuals with obesity who have succeeded in the maintenance of significant long-term weight loss and individuals with enduring AN, we speculate that similar neural mechanisms may be engaged by both groups. We emphasize that while the method of developing an ingrained, habitual pattern of behavior, and the neural circuits thereby engaged, may be employed by both groups, the outcome results in different impacts on health. The exploration of these ideas has the potential of deepening our understanding of the mechanisms by which adaptive and maladaptive behaviors are learned and become persistent, and thereby lead to new or improved interventions to facilitate the former and interrupt the latter.

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