
Lessons from Patients Who Have Successfully Maintained Weight Loss

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Introduction

Our ability to help people lose weight is better than our ability to help people maintain their weight loss. To improve our success in weight-loss maintenance, we need to understand better the behaviors associated with success in keeping weight off and to develop ways of helping people to achieve and maintain these behaviors.

The National Weight Control Registry (NWCR) is a project aimed at understanding what behaviors are associated with long-term success in weight management. The originators of this project, Drs. Rena Wing and James Hill, set out in 1993 to identify a large number of individuals who have succeeded at long-term weight-loss maintenance and to search for similarities in the behavioral strategies used by this group. The hope was to learn from these individuals who have successfully maintained weight loss in order to help others to achieve greater success. The NWCR is the largest group of individuals ever assembled who have successfully maintained weight loss, and the project has generated more than 15 scientific publications. In this article, we will briefly summarize the key findings from 12 years of studying these successful individuals.

The National Weight Control Registry: Who Are These Individuals?

There are currently almost 5,000 participants in the NWCR. It is important to realize that these individuals do not represent a random sample of people who have succeeded in losing weight and keeping it off, and thus the NWCR cannot be used to estimate the success rate for weight loss and maintenance in the general population. All of these participants volunteered for the NWCR, usually after seeing or hearing about the project through the media.

The criteria for entry into the NWCR are that the applicant must have maintained a weight loss of at least 30 pounds for a minimum of 1 year. Applicants are asked to



Top: James O. Hill, Ph.D. and Holly R. Wyatt, M.D.; bottom: Rena R. Wing, Ph.D., and Suzanne Phelan, Ph.D.

verify their weight loss; they do this by a variety of techniques, including letters from physicians, copies of official documents containing body weights, and before-and-after pictures.

The average participant is 45 years of age. Most participants are women (80%), Caucasian (97%), and married (67%). On average, NWCR members report losing 67 pounds and keeping it off for an average of 5.5 years. The average current body mass index (BMI) of NWCR members is approximately 10 units lower than their pre-

weight-loss BMI (from 35 to 25 kg/m²). This degree of success in long-term weight management is rare, and it is far beyond that achieved by any formal behavioral weight-management program.

One important question is whether men and minority men and women are succeeding in weight-loss maintenance but are not having their accomplishments captured by the NWCR. This is certainly possible. Alternatively, it may be that Caucasian women are expending the most effort toward weight management and consequently represent the group that is most successful. Unfortunately, we cannot answer this question at present.

About half (46%) of NWCR participants report being overweight before the age of 12 years, and 72% report being overweight before the age of 18 years. Many report a strong family history of obesity, with 46% reporting one parent being overweight or obese and 27% reporting both parents being overweight or obese. Almost all NWCR subjects (90%) have previously experienced unsuccessful attempts at weight loss.

One of the criticisms of the NWCR is that it ostensibly may capture people who are “metabolically” easy weight losers and that these people may not be representative of the more typical obese individual. Although we cannot refute this criticism, most participants in the NWCR were obese as children or adolescents, and this form of obesity is thought to be more difficult to reverse than obesity that begins in adulthood. In addition, most NWCR participants have been unsuccessful in many previous attempts to lose weight, suggesting that they may not be “easy losers” as some have assumed.

About half of registry participants (45%) reported losing weight on their own, and the remainder (55%) reported that they received some type of help to lose their excess weight (for example, through a commercial weight-loss program or consultation with a dietitian). The majority of men (53%) lost weight on their own, whereas the majority of women (60%) used a formal weight-loss program. We have found no real differences between those who lost weight on their own and those who used a formal program to lose weight.

Almost all of the data collected from the NWCR are self-reported. Participants provide information through questionnaires that ask about their food intake, physical activity, and other behaviors. We know that self-reports of behavior are not as accurate as objective measurements. In particular, most people underestimate energy intake and overestimate physical activity. This is clearly a limitation of this project and of weight-related population studies in general.

Lessons of Weight Control

- There is an important difference between weight loss and weight maintenance
- People who have successfully maintained weight loss share similarities in how they keep weight off
- Many people wishing to lose weight experience an important “trigger” event in their lives that becomes self-motivating
- Maintenance of weight loss becomes easier over time
- Weight loss is reported to improve the overall quality of a person’s life
- Maintaining weight loss does not increase eating disorders
- Successful weight-loss maintenance is achievable

Key Findings from the NWCR

1. Weight loss is different from maintenance of weight loss

A surprising finding was how little similarity there was in how participants lost their excess weight. The single similarity was that most NWCR participants reported modifying both diet and exercise to achieve their successful weight loss. Very few (<10%) reported using diet only to lose weight, and almost none reported using physical activity alone.

We intentionally did not ask about specific commercial diets used, but we were unable to identify any particular type of dietary strategy that was common to these individuals. The NWCR participants reported using a wide variety of reported methods to lose their weight, including restricting intake of certain types or classes of foods, limiting quantities, and counting calories. The dietary strategies used for weight loss changed over the years, probably reflecting changes in the popular dietary strategies of the population. The bottom line is that we were unable to identify particular dieting strategies for weight loss that were associated with successful weight maintenance.

2. Individuals who have successfully maintained weight loss have similarities in how they keep weight off

There was much more similarity in the strategies used for weight-loss maintenance. We found four strategies that were common to a large proportion of NWCR participants. These were: 1) eating a low-calorie, low-fat diet; 2) eating breakfast almost every day; 3) frequent self-monitoring; and 4) engaging in high levels of physical activity.

a. Dietary Composition: In general, NWCR participants reported eating low-calorie diets that are moderately low in fat and high in carbohydrates. Registry members reported eating 1,381 kcal/d. In interpreting these data, it is important to recognize that 55% of NWCR members report that they are still trying to lose weight and also to consider that dietary intake is typically

National Weight Control Registry (NWCR)

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underestimated by 20–30%. Thus, Registry members are probably consuming closer to 1,800 kcal/d. However, even with this adjustment, it is apparent that Registry members maintain their weight loss by continuing to eat a low-calorie diet.

The composition of the diet used by individuals who have successfully maintained weight loss has changed over the years, but not very much. Ten years ago, we reported that NWCR participants were consuming a high-carbohydrate diet with 24% of calories coming from fat. Because of the popularity of low-carbohydrate diets over the past few years, we recently analyzed the diet composition of newer NWCR members. We found that those who joined the NWCR more recently reported a higher fat composition with 29% of total calories coming from fat. This increase likely reflects the recent popularity of the low-carbohydrate diets. However, the newer NWCR members are still eating a diet containing less than 30% fat, which is still considered a low-fat diet.

Although the average diet composition of NWCR participants remains high in carbohydrates, some NWCR participants report following a low-carbohydrate diet. Ten years ago, almost none of the NWCR members were eating a low-carbohydrate diet. Although this number has increased over time, only a minority (17%) of NWCR members currently report consuming a low-carbohydrate diet. Several studies have shown that low-carbohydrate diets can produce substantial weight loss; but the question remains as to whether or not low-carbohydrate diets can be effective in maintaining this weight loss. Although we have seen more NWCR participants using low-carbohydrate diets over the past few years, coinciding with the popularity of such diets, the fact remains that very few of the almost 5,000 NWCR participants are eating low-carbohydrate diets.

A large body of data support the notion that a low-fat diet can help with weight management. Several studies have shown that total energy intake tends to increase with the fat content of the diet. Furthermore, epidemiological studies have shown that diets lower in fat are associated with lower body weights.

b. Breakfast: Another behavioral strategy used by most NWCR participants is eating breakfast. Most (78%) reported eating breakfast 7 days per week, and only 4% reported that they never eat breakfast. We have not systematically investigated the specific foods eaten at break-

fast by NWCR participants. We know that fruits and cereal are among the foods commonly reported, but we have not obtained a quantitative analysis of the composition of breakfast for NWCR participants.

Other research supports the notion that eating breakfast may aid in weight control. In particular, individuals who eat breakfast may consume fewer calories over the entire day than those who do not eat breakfast. Eating breakfast appears to be useful for weight-loss maintenance.

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c. Self-Monitoring: Self-monitoring appears to be an important ongoing strategy for most of these individuals who have successfully maintained weight loss. Of the Registry members, 75% weigh themselves at least once per week, and 44% weigh themselves daily. In addition, 50% of Registry members report that they still occasionally count calories, fat grams, or both to maintain their weight loss.

Although some obesity experts advise people to “forget the scale,” it seems logical that if the goal is to maintain weight loss, it is important to know one’s weight. Body weight can vary somewhat from day to day; and, in conversations with NWCR members, we have found that most have their personalized range of body weights that are acceptable. This is usually a variation of 3–5 pounds around their target weight. If weight exceeds this range, most of these individuals have a strategy in mind to implement to get back to their acceptable range of body weight.

Other studies have confirmed the role of self-monitoring in successful weight management. Many believe that the importance of self-monitoring behaviors is in increasing awareness of current behavior. Clearly, people tend not to be very accurate in estimating their actual energy intake or actual physical activity, but self-monitoring seems to be effective in helping people to become aware of their current behaviors. This would appear to be an important step in changing behavior.

d. Physical Activity: Almost all NWCR participants (91%) engage in regular physical activity to maintain their weight loss. Only 9% of Registry subjects report

that they are maintaining their weight loss without regular physical activity. On average, women in the Registry report that they currently engage in 2,545 kcal per week of physical activity, and men report an average of 3,293 kcal per week of physical activity.

This amount of physical activity is comparable to walking 28 miles per week or about 1 hour per day of moderately intense physical activity. This amount of physical activity is much higher than the Surgeon General's physical activity recommendations for the general public. The Surgeon General recommends that adults engage in 30 minutes per day of moderate intensity physical activity on most days but at least 3 days per week. Most NWCR subjects far exceed this recommendation.

Walking was the most frequent type of physical activity in the NWCR with 77% of participants engaging in walking. Twenty-eight percent of NWCR participants used walking as their only form of physical activity while 49% used walking in combination with another type of physical activity. Only 9% of NWCR participants reported that they were maintaining their weight without regular physical activity. Fourteen percent of NWCR participants engaged in physical activities other than walking for weight maintenance. As most subjects report getting a large amount of their physical activity by walking, the activity level of NWCR members was also reported as steps/day in a subset of participants who were assessed by a pedometer.

Walking was the most popular single activity, at 77% participation.

The average steps/day of NWCR members was more than 11,000 steps. By comparison, a group of individuals who had not undergone weight reduction was also evaluated by pedometer before starting a weight-loss program. That group, on average, engaged in slightly more than 5,000 steps per day. These results suggest that participants in the NWCR are engaging in substantially more stepping activities (such as walking or running) than obese subjects before weight loss.

Subjects in the NWCR reported participating in a large variety of activities. Table 1 shows the six most frequently reported physical activities of subjects in the Registry. Walking was the most popular single activity. Of the Registry members, 77% reported walking daily. It is also

The Six Most Frequently Reported Activities for NWCR Members

Activity	Males	Females	All
Walking	78.6%	76.1%	76.6%
Cycling	22.4%	20.2%	20.6%
Weight Lifting	24.0%	19.5%	20.3%
Aerobics	4.1%	20.9%	17.8%
Running	27.6%	14.2%	16.8%
Stair Climbing	3.1%	9.5%	9.3%

interesting that a high proportion of subjects reported weight lifting. Of the Registry participants, 24% of men and 20% of women reported regularly engaging in weight lifting. Based on the National Health Interview Survey, conducted in 1991, only 9% of women in the general population reported regularly engaging in weight lifting. Thus, women in the Registry engaged in weight lifting to a much greater extent than women in the general population. The extent to which this contributed to their success in weight-loss maintenance is not clear and deserves further study.

High levels of physical activity have been shown to predict success in weight-loss maintenance in other studies. In fact, it is likely that more physical activity is required to prevent weight regain after weight loss than is required to prevent excessive weight gain in the first place. This suggests that high levels of physical activity may be compensating for some metabolic "defect" in the obese individual who has undergone weight reduction. However, such a defect has not been conclusively identified. For example, the resting metabolic rate in NWCR participants was found to be appropriate for the body size and composition of these individuals. Others have suggested that the resting metabolic rate in individuals who have lost weight may be lower than predicted from body size and composition and that it could constitute a "metabolic defect" predisposing the person to regain weight.

3. Medical events may help in motivating patients to make long-term changes in diet and exercise

Most Registry participants reported a trigger for their weight loss (83%). Medical triggers were the most common for these individuals (23%), followed by reaching an all-time high in weight (21.3%) and seeing pictures or reflections of themselves in the mirror (12.7%).

Because medical triggers have been shown to promote long-term behavior change in other areas of behavioral medicine, we examined whether individuals who reported medical triggers were more successful than those who reported non-medical triggers or no triggers. A medical trigger was broadly defined; it included, for example, a

Successful Behaviors of NWCR Participants for Weight-Loss Maintenance

- Eat a moderately low-fat diet
- Watch total calories
- Eat breakfast
- Self-monitor
- Engage in high levels of physical activity

doctor telling the participant to lose weight or a family member having a heart attack. Findings indicated that people who had medical reasons for weight loss also had better initial weight losses and maintenance over the 2-year course of follow-up. These findings are intriguing, as they suggest that the period after a medical trigger may be an opportune time to initiate weight loss to optimize both initial and long-term weight-loss outcomes.

4. Weightloss maintenance gets easier over time

Our work with the NWCR suggests that weight-loss maintenance becomes more likely with time. Although this may seem obvious, it can provide optimism to help people to get through the early, difficult years of weight-loss maintenance. We found that those people who maintain their weight loss for 2–5 years are much more likely to continue to keep their weight off. Furthermore, we found that NWCR participants who have maintained weight loss longer used fewer weight-maintenance strategies and reported that it took less effort to maintain their weight loss. The pleasure received from maintaining their weight loss did not change over time, so that there was a favorable shift in the balance between the satisfaction derived from weight maintenance and the effort required to achieve that weight.

5. Life is better after weight loss

Another very positive finding from the NWCR is that participants consistently report that life is better after weight loss than before. More than 90% report improvements in their overall quality of life, level of energy, mobility, general mood, self-confidence, and physical health.

There are only two areas in which any worsening due to weight loss was noted. Among the NWCR members, 14% reported a worsening in time spent thinking about food (although 49% reported improvement in this regard), and 20% reported worsening in time spent thinking about their weight (51% reported improvement in this regard). Of the members, 6% reported that their successful weight loss had worsened their relationship with their spouse, whereas 56% reported that it had been improved. Thus, overall weight-loss maintenance appears to produce marked improvements in quality of life for the majority of individuals.

We see improvements in overall quality of life after weight loss that, with continued maintenance of weight loss, are maintained over time.

Very few NWCR participants reported declines in any aspect of quality of life after maintenance of their weight loss.

6. Weight-loss maintenance does not increase eating disorders

Some have raised concerns about the vigilance required to maintain long-term weight loss, and worry that this may be associated with increased risk of eating disorders or depression. No such adverse psychological effects of weight loss have been observed among participants in the NWCR. Rates of binge eating and vomiting are also very low in Registry members: 8% report four or more binges per month, and only 1.8% report any episodes of vomiting for weight-loss purposes in the past month. These data are strikingly lower than those reported in populations with eating disorders.

7. Successful weight-loss maintenance is achievable

The individuals in the NWCR demonstrate that long-term weight loss maintenance is possible. Because the public frequently receives very negative messages about being able to achieve and to maintain weight loss, it may be helpful to report more regularly on the success of people in maintaining weight loss—namely, that many can and do succeed.

One criticism that we frequently encounter is that participants in the NWCR are not representative of the overall population of individuals who attempt weight loss. On one hand, this is a truism because, unlike the typical dieter who loses weight only to regain it, participants in the NWCR have achieved long-term success. Nonetheless, some questions remain: How are these populations different? Are they metabolically different? We cannot say that this is not the case, but we have found no metabolic measures on which they differ. Are they behaviorally different? Successful weight-loss maintenance requires knowing what to do (that is, what behaviors to achieve) and how to keep doing these things over the long term. What the NWCR participants do to maintain weight loss is not really surprising to obesity experts. They eat a moderately low-fat diet, watch total calories, eat breakfast, self-monitor, and engage in high levels of physical activity. What may distinguish successful NWCR participants from those who attempt but fail at weight loss is the ability to be consistent in positive behavior changes over time.

A major problem in maintaining changes in eating and physical activity patterns is that the environment in which we live encourages behaviors opposite to those

that predict success in long-term weight-loss maintenance. One way to look at how the NWCR participants may differ from typical dieters is that they are better able to “push back” against the environment. If weight loss maintenance requires “swimming upstream” against the environment, then these are the best swimmers.

One way to look at how the NWCR participants may differ from the typical dieter is that they are better able to “push back” against the environment.

It is becoming clear that we will be unable to maintain eating and physical activity behaviors that promote healthy body weights until we are able to address the environment that supports our current unhealthy eating and physical activity patterns. It is likely that as we are able to have an impact on the environment, more and more people who try to keep their weight off will succeed.

What Does This Mean for Your Overweight or Obese Patient?

Despite the limitation of the studies with the NWCR, we believe that the results can help you help more of your patients to be successful in weight-loss maintenance. These results suggest that although many strategies work for weight loss, there is much more similarity in the behaviors of individuals who have successfully maintained weight loss. Each of the behaviors identified to be associated with successful weight-loss maintenance in the NWCR is backed by other research. We cannot be certain that these behaviors will lead to successful weight maintenance in all people, but the behaviors *can* provide a good start for helping your patients to maintain weight loss. Promoting behavior change in the context of a medical practice may present an especially powerful “teachable moment” for initiating long-term successful weight loss. However, your major challenge may be more in helping your patients to achieve these behavior changes rather than in just suggesting them. It is easy to tell patients to eat better, exercise, and self-monitor. In the reality of our modern world, however, these are difficult behaviors. Making temporary behavior changes leads to temporary weight loss. Your job is not done when your patients have achieved their weight loss; in fact, this is when the hard part begins. ■