



The prevalence of weight loss maintenance among American adults

MT McGuire^{1*}, RR Wing¹ and JO Hill²

¹University of Pittsburgh Medical Center, Pittsburgh, PA, USA; ²University of Colorado Health Sciences Center, Denver, CO, USA

BACKGROUND: Previous studies suggest that few individuals achieve long-term weight loss maintenance. Because most of these studies were based on clinical samples and focused on only one episode of weight loss, these results may not reflect the actual prevalence of weight loss maintenance in the general population.

DESIGN: A random digit dial telephone survey was conducted to determine the point prevalence of weight loss maintenance in a nationally representative sample of adults in the United States. Weight loss maintainers were defined as individuals who, at the time of the survey, had maintained a weight loss of $\geq 10\%$ from their maximum weight for at least 1 y. The prevalence of weight loss maintenance was first determined for the total group ($n = 500$), and then for the subgroup of individuals who were overweight (body mass index BMI $\geq 27\text{kg/m}^2$ at their maximum ($n = 228$)).

RESULTS: Weight loss was quite common in this sample: 54% of the total sample and 62% of those who were ever overweight reported that they had lost $\geq 10\%$ of their maximum weight at least once in their lifetime, with approximately one-half to two-thirds of these cases being intentional weight loss. Among those who had achieved an intentional weight loss of $\geq 10\%$, 47–49% had maintained this weight loss for at least 1 y at the time of the survey; 25–27% had maintained it for 5 y or more. Fourteen percent of all subjects surveyed and 21% of those with a history of obesity were currently 10% below their highest weight, had reduced intentionally, and had maintained this 10% weight loss for at least 1 y.

CONCLUSIONS: A large proportion of the American population has lost $\geq 10\%$ of their maximum weight and has maintained this weight loss for at least 1 y. These findings are in sharp contrast to the belief that few people succeed in long-term weight loss maintenance.

Keywords: weight loss; weight loss maintenance; point prevalence; population survey

Introduction

Obesity increases the risk of coronary heart disease, type 2 diabetes, hypertension and some forms of cancer.¹ Although weight losses as modest as 10% of initial body weight have been shown to improve many risk factors for these diseases,^{2,3} the long-term benefits of weight loss are contingent on maintenance of such losses.

Evidence from clinical weight loss studies suggests that few individuals maintain their weight losses. In one of the earliest reports of long-term weight loss, Stunkard and McLaren-Hume found that of 100 obese individuals who were referred to a nutritional weight loss program, only 2% had lost and maintained at least 20 lb 2 y after treatment. Since this early observational study, results from clinical weight loss studies continue to suggest that long-term weight loss cannot be achieved. On average, participants in behavioral weight loss programs lose about 9% of their initial

body weight during a 20-week study, maintain about a 6% weight loss at 1 y,⁵ but regain back to baseline 4–5 y after treatment.^{6,7} However, the results from these studies may not represent the true prevalence of weight loss maintenance in the general population since individuals who participate in such treatment studies are not representatives of all individuals who attempt to lose weight.^{8–10}

Although many cross-sectional^{11,12} and prospective¹³ studies have assessed the prevalence of weight loss in the general population, only one study has examined the prevalence of weight loss *maintenance* in the general population. The Iowa Women's Health Study (IWHS) used self-reported weight information and defined weight loss maintainers as women who had lost at least 10% of their weight between the ages of 18 and 30 y and had maintained this weight loss ($\pm 5\%$) between the ages of 30 and 50 y. Using these strict criteria for weight loss and maintenance, only 1% of the total sample was classified as weight loss maintainers; among the women who were overweight at the age of 18 y, 8% were weight loss maintainers.¹⁴ The IWHS evaluated weight loss only between the ages of 18 and 30 y. Because women tend to gain weight between the ages of 18 and 50 y,¹⁵ it is likely that many subjects achieved their highest weight at later ages and consequently tried to lose weight at

*Correspondence: MT McGuire, University of Minnesota, Division of Epidemiology, 1300 South Second Ave. #300 Minneapolis, MN 55454, USA.
E-mail: mcguire@epi.umn.edu
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later points in life. With these limitations, the IWHs may not represent the actual prevalence of weight loss maintenance in the United States.

The purpose of the present study was to determine the point prevalence of weight loss maintenance among a representative, random sample of American adults. Weight loss maintainers were defined as individuals who, at the time of the survey, had maintained a weight loss of $\geq 10\%$ from their maximum weight for at least 1 y. The prevalence of weight loss maintenance was first determined for the total sample and then for individuals in the total sample who had intentionally lost weight. Similar analyses were conducted among the subgroup of individuals who were overweight at their maximum.

Method

Study sample

A nationally representative, random digit dial telephone survey was conducted among the 48 continental United States and the District of Columbia. Individuals were included in the survey if they were at least 18 years of age, were not currently pregnant, and if they had not been pregnant within the past year.

To determine the sample size needed to detect the prevalence of weight loss maintenance, the random sampling population survey formula¹⁶ was used:

$$n = \frac{Z^2 P(1 - P)}{D^2}$$

where P = expected frequency; Z = confidence level; and D = limit around the estimate. Due to the lack of previous research on weight loss maintenance, the variance [$P(1-P)$] was maximized to obtain the most conservative sample size estimate, that is, P was estimated to be 50%. The two-tailed limit around the estimate (D) was estimated to be 5% and $Z = 1.96$ (or $\alpha = 0.05$). The sample size was determined to be $n = 384$ and was rounded to $n = 500$.

A multistage cluster sampling design was used to generate a sampling pool of phone numbers for this survey. As part of this design, a proportion of primary sampling units (first six digits of a 10-digit telephone number which are loosely related to census tract areas) was randomly chosen from a geographic area based on the proportion of the individuals who live in that geographic area. Two separate stages were then implemented to randomly choose the final four numbers to create 10-digit telephone numbers. These numbers were then placed in a sampling pool from which individual telephone numbers were chosen and called.

Survey respondents from within each household were chosen using the next birthday method. Respondents were told that the survey was regarding health behaviors. Of the 2382 numbers that were randomly

chosen and called, there were 1210 terminated interviews (not eligible, non-residential number, phone disconnected, language barrier), 299 busy phone calls, 373 refusals, and 500 completed calls. Busy calls and refused calls were not re-contacted. The mean cooperation rate (completed calls divided by the sum of completed calls and refusals) was 57%. Approval for this study was received from the institutional review board at the University of Pittsburgh Medical Center.

Measures

Responses to survey questions were recorded into a computer-aided-interview-device. Gender, ethnicity and education level was assessed. At the time of the survey, age was mistakenly excluded from the interview. Attempts were made to re-contact the respondents to ask how old they were at the time of the original survey. From this effort, age was obtained from 407 respondents (81%), 68 respondents refused to reveal their age when re-contacted and 25 could not be contacted. Gender, ethnicity or education level did not differ between those with or without age information ($P > 0.05$).

Participants were asked to indicate their maximum lifetime weight (excluding pregnancy) and their current weight. The computer program calculated a value that was equivalent to a 10% weight loss from maximum (maximum weight $- 0.10 \times$ maximum weight). If a participant's current weight was at or below the calculated weight, she was asked how long she had been at or below the calculated weight. Individuals who had been at or below this calculated weight for at least 1 y at the time of the survey were classified as weight loss maintainers. If a participant's current weight was above the calculated weight, she was asked if she had ever been at or below the calculated weight. Participants were asked if their weight losses were intentional or unintentional. Several studies have found that self-reported current,^{18,19} and recall of previous weights are valid measures of actual weight.²⁰⁻²² In a recent study,²³ self-reported weight information was compared between weight loss maintainers and weight loss counselors or health care providers. The correlation's of maximum and current weight were 0.98 and 0.97, respectively (mean discrepancy = 5.4 and 1.5 lb, respectively).

Results

The demographic characteristics of the 500 survey respondents are presented in Table 1. On average, the respondents were 45.6 ± 15.8 years of age. Fifty-nine percent of the sample were female, 80% were white, and 65% had completed some education beyond high school. Weight information was obtained from 474 respondents. The characteristics of the current sample

Table 1 Demographic characteristics of telephone survey respondents

	Study characteristics (<i>n</i> = 500)
Female, <i>n</i> (%)	293 (59)
Age mean $\pm$ s.d. ^a	45.6 $\pm$ 15.8
Ethnicity, <i>n</i> (%)	
Caucasian	400 (80)
African-American	53 (11)
Asian	8 (2)
Other	36 (7)
Education, <i>n</i> (%)	
$\leq$ High school	175 (35)
Vocational/some college	152 (30)
$\geq$ College	173 (35)
Overweight at maximum (BMI $\geq$ 27 kg/m ²), <i>n</i> (%) ^b	228 (47.8)
Currently overweight (BMI $\geq$ 27 kg/m ²), <i>n</i> (%) ^b	148 (31.2)

^a*n* = 407. ^b*n* = 474.

were quite similar to the US demographic characteristics reported in the 1990 Census.²⁴ Forty-eight percent reported being overweight (body mass index BMI $\geq$ 27 kg/m²) at their maximum weight and 31% reported being overweight at the time of the survey.

Prevalence of weight loss maintenance: total sample

Table 2 indicates the prevalence of weight loss and maintenance in the total sample. Of the 474 respondents who had weight information, 255 (54%) had at some time during adulthood lost at least 10% of their highest weight; slightly more than half (*n* = 145) reported that this weight loss was intentional. At the time of the survey, 110 had maintained the 10% weight loss for at least 1 y and thus met the criteria for weight loss maintenance. Thus, the prevalence of weight loss maintenance in the general population was 23.2 $\pm$ 3.8% (110/474) and among those who had at some time lost 10% of their weight, the prevalence was 43.1 $\pm$ 6.1% (110/255). These 110 individuals had been maintaining a 33.7 $\pm$ 7.1 lb. weight loss (17.0 $\pm$ 8.2% from maximum weight) for an average of 7.9 $\pm$ 9.5 y.

Considering only those who reported intentional weight loss, 14.6 $\pm$ 3.2% (69/474) of the total sample and 47.6 $\pm$ 8.1% (69/145) of those who had

ever intentionally lost at least 10% of their weight met criteria for weight loss maintenance (lost at least 10% of their maximum weight and maintained it for at least 1 y). On average, these 69 individuals had maintained a 37.7 $\pm$ 28.7 lb weight loss (17.9 $\pm$ 9.3% from maximum weight) for 7.7 $\pm$ 8.4 y. Compared with the rest of the sample, a larger proportion of these weight loss maintainers were women (70% vs 57%; *P* < 0.05) and white (88% vs 79%; *P* < 0.07); the maintainers were also heavier at their lifetime maximum weight (maximum BMI = 31.5 $\pm$ 7.3 vs 27.8 $\pm$ 7.9 kg/m²; *P* < 0.01).

Prevalence of weight loss maintenance: overweight at maximum weight.

Because heavier individuals were more likely to have intentionally lost their weight and maintained it, the prevalence of weight loss maintenance was next calculated among the subgroup of individuals who were overweight at their maximum weight (maximum BMI $\geq$ 27 kg/m² Table 3). Forty-eight percent (228/474) of the sample reported they were overweight at their maximum weight. Sixty-two percent of these (142/228) indicated that they had at some time lost at least 10% of their maximum weight, and 37.7% (86/228) were currently 10% below their maximum weight. Sixty-nine subjects had maintained this weight loss for at least 1 y. Thus, in the overweight sample, 30.3 $\pm$ 5.9% (69/228) of all subjects and 48.6 $\pm$ 8.2% (69/142) of those who had ever lost 10% of their weight had achieved weight loss maintenance. These 69 individuals had lost an average of 41.9 $\pm$ 27.6 lb (18.8 $\pm$ 9.5% from maximum weight) and maintained it for 7.0 $\pm$ 8.2 y. Eighteen percent (46/228) of the overweight sample had not only maintained a 10% weight loss for over a year but also had succeeded in achieving normal weight (BMI < 27 kg/m²) criteria.

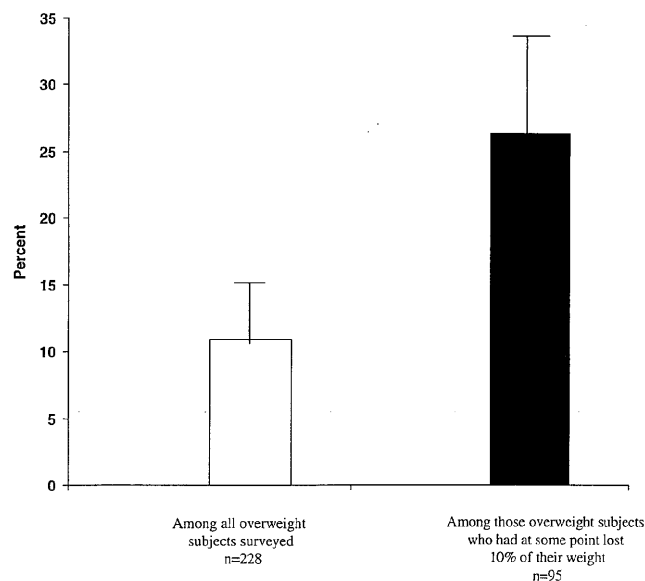
Finally, focusing only on intentional weight loss among overweight persons, 20.6 $\pm$ 5.3% (47/228) of the overweight population and 49.5 $\pm$ 10.0% (47/95) of those who had intentionally lost 10% of their highest weight were weight loss maintainers; 28 of these weight loss maintainers had reduced to a normal weight status. These 47 weight losers had maintained an average 45.5 $\pm$ 31.7 lb weight loss (19.5 $\pm$ 10.6%

Table 2 Number of respondents meeting specific weight loss and maintenance criteria, *n* = 474

Criterion	Total	Intentional weight loss	Unintentional weight loss	Intention not known
A The number of participants who ever lost $\geq$ 10% of their maximum weight (<i>n</i>)	255	145	107	3
B The number of participants who meet criterion A and who are currently $\geq$ 10% below their maximum weight (<i>n</i>)	139	89	49	1
C The number of participants who meet criteria A and B, and have maintained $\geq$ 10% weight loss for $\geq$ 1 y (<i>n</i>)	110	69	40	1
D The number of participants who meet criteria A, B and C, and have maintained $\geq$ 10% weight loss for $\geq$ 5 y (<i>n</i>)	55	36	19	0

Table 3 Number of individuals who were overweight at their maximum who meet specific weight loss and maintenance criteria, $n = 228$

Criterion		Total	Intentional weight loss	Unintentional weight loss	Intention not known
A	The number of overweight participants who ever lost $\geq 10\%$ of their maximum weight (n)	142	95	45	2
B	The number of overweight participants who meet criterion A and who are currently $\geq 10\%$ below their maximum weight (n)	86	60	25	1
C	The number of overweight participants who meet criteria A and B, and have maintained $\geq 10\%$ weight loss for ≥ 1 y (n)	69	47	21	1
D	The number of overweight participants who meet criteria A, B and C, and have maintained $\geq 10\%$ weight loss for ≥ 5 y (n)	34	25	9	0

**Figure 1** Percentage of overweight subjects who succeeded in losing $\geq 10\%$ of their weight intentionally and keeping it off for 5 y.

from maximum weight) for 7.2 ± 8.5 y. Women comprised 57% of the weight loss maintainers and 42% ($P < 0.07$) of the sample of respondents who were overweight at maximum but did not achieve weight loss maintenance.

Long-term maintenance

Since 1 y might not be sufficient duration to be considered successful weight loss maintenance, the data were also calculated for a 10% intentional weight loss that was maintained for 5 y or more. Figure 1 shows the prevalence of intentional 5 y weight loss maintenance in the total sample of overweight respondents, and among the subgroup of overweight respondents who had lost at least 10% of their maximum weight.

Discussion

This is the first study of weight loss maintenance in a nationally representative sample of American adults.

The results of this survey contrast sharply with the belief that no one ever succeeds in losing weight or maintaining their weight losses. Our data suggest that weight losses of 10% or more of maximum body weight are very common in the US. Over half of the total population and 62% of all overweight persons have, at some point during their life, lost 10% of their body weight.

Although we usually assume that weight loss is the result of intentional efforts, 42% of those in our survey who lost weight reported that their weight loss was unintentional. Not surprisingly, non-overweight individuals were more likely than overweight persons to report that their weight loss was unintentional.

Our results provide strong evidence that success in maintenance of weight loss is substantially better than generally thought. A great deal of information now suggests that overweight individuals can significantly improve health by achieving and maintaining a weight loss of 10% of their body weight.^{2,3} Therefore, we defined weight loss maintainers as those who had maintained a weight loss of at least 10% from maximum weight for at least 1 y. Focusing only on those who reported intentional weight loss, 14% of the total population and 21% of overweight subjects were weight loss maintainers. The statistics were even more impressive if we consider only those who had, at some time in their life, intentionally lost 10% of their body weight: of the total sample, almost one-half of these individuals had maintained their weight loss for at least 1 y while one-quarter had maintained their weight losses for more than 5 y. In addition, many of the overweight individuals who had intentionally lost weight had gone from a BMI ≥ 27 to a BMI < 27 kg/m². Hopefully these data will help refute the belief that attempts to lose weight are 'ill-fated'.²⁵

There are several explanations why the results from the present study differ from previous clinical weight loss studies. One reason is due to the different methods used to measure weight loss. Schachter²⁶ proposed that clinical weight loss programs have such low success rates because they only evaluate one weight loss attempt, and success rates may be much higher when multiple attempts are assessed. The present study evaluated weight loss regardless of how

long or how many attempts it took to occur. We also measured weight loss from each individual's *maximum* weight, perhaps therefore maximizing the likelihood of finding a 10% weight loss.

The present study's results may also differ from those typically reported from clinical weight loss studies due to sample characteristic differences. Individuals who seek assistance for weight loss tend to be heavier,²⁷ have more medical problems,^{9,10} and have higher rates of binge eating²⁸ than individuals in the general population. Since the individuals who attend clinical weight loss treatments may be more difficult to treat, the results from such programs may not represent the true prevalence of weight loss maintenance in the United States. Compared to the 1990 US census data, the present study was successful in obtaining a nationally representative sample. Moreover, 31% of the survey respondents reported that they were currently overweight, which is comparable to the most recent NHANES study of obesity which found that 33% of all Americans were overweight.²⁹

An important finding in this study was that unintentional weight loss occurs frequently in the general population. Recently, researchers have tried to distinguish between intentional and unintentional weight loss. For example, the Iowa Women's Health Study found that 25% of the women had intentionally lost at least 20 lb, but 29% had lost that amount of weight unintentionally.³⁰ Data from the National Health Interview Survey show that 38% of men and 40% of women unintentionally lost some weight during a 1 y period.³¹ Unfortunately, these studies and our study included only one question on whether weight loss was intentional, and thus it is not possible to determine what respondents considered intentional weight loss. Many episodes of weight loss may be difficult to classify (the respondent may have been trying to lose weight, but may also have been aided by an underlying illness) or may include both intentional and unintentional components. Also, our survey did not inquire about whether the maintenance of the weight loss was intentional or unintentional; some individuals may unintentionally lose weight but then work hard to intentionally maintain their improved appearance or health status. The present data suggest that intentional weight loss occurs most frequently in those with a history of obesity, and that intentional weight losses are maintained somewhat longer than unintentional weight loss.

A limitation to the present study is that the results are based on self-reported data, but as previously stated, several studies have shown self-reported previous and current weights are valid measures of actual weight.^{18–23} In addition, many large-scale epidemiologic studies, such as the Harvard Alumni Study,^{32,33} Nurses's Health Study,³⁴ Iowa Women's Health Study,¹⁴ and Behavioral Risk Factor Surveillance Study,^{35,36} have used self-reported weight as the basis for several analyses. The present study's cooperation rate (completed interviews divided by the sum

of completed interviews and refusals) was 57%, which is lower than the 80% cooperation rate reported in other national telephone surveys.³⁵ It is possible that a selection bias may have caused the rates of weight loss maintenance to be under- or over-estimated. However, since individuals were told that the survey was regarding health behaviors and weight information was not gathered until the middle of the study, it is not likely that an over-sampling of weight loss maintainers actually occurred. A future study which includes the call-back of refused and busy phone calls may determine if the rates calculated in this study were not accurate.

With these caveats aside, the results from the present study demonstrate that the inability to maintain weight loss should not be used as a reason to avoid attempting to lose weight. Rather, educational efforts are needed to increase awareness among both overweight individuals and health care providers of the health benefits of modest weight loss, so that reasonable and achievable goals are established. More extensive study of the behavioral and physiological characteristics of weight losers may help improve obesity treatment programs, both in terms of producing initial weight loss and increasing the duration of weight loss maintenance.

Finally, we hope these results will provide an incentive for overweight persons who could benefit from weight loss. Based on these results and other studies of weight maintainers,^{37–39} we reject the notion that weight loss maintenance is impossible. While we acknowledge that maintenance of weight loss is difficult, we estimate that over 20% of overweight persons have achieved successful weight loss maintenance.

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