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Up to 7 Years of Sustained Weight Loss for Weight Loss Program Completers

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Abstract

Introduction—Two issues remain elusive in weight management programs: significant, long-term weight loss maintenance and widely accessible programs that produce significant weight loss for reasonable costs. The purpose of this study is to determine the long-term weight loss of participants who consecutively renew their annual membership in Take Off Pounds Sensibly (TOPS), a national, nonprofit, low-cost, peer-led weight loss program.

Methods—This completers' analysis was a retrospective cohort study of overweight and obese men and women who joined TOPS in 2005–2011 and consecutively renewed their annual membership at least once. Data were analyzed from June to October 2013. TOPS participants' weights are sent to the national database when they join and at the time of their annual renewal, thus follow-up weight is only available for those who renew their membership. Among 207,469 individuals who joined during the study period, 74,629 (35.9%) had at least one consecutive annual renewal and were included in the study.

Results—Cumulative mean (95% CI) weight change as a percentage of initial weight ranged from –6.0% (–6.0%, –5.9%) for 74,629 participants who renewed at 1 year to –8.3% (–8.7%, –7.8%) for 2,289 participants with 7 years of consecutive annual renewal.

Conclusions—In the subset of individuals who choose to renew their program membership, TOPS can effectively promote maintenance of clinically significant weight loss for an extended period of time. RCTs are needed to further evaluate this low-cost, widely available program, which could be a viable option to treat overweight and obesity.

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Introduction

Despite decades of obesity research, two issues remain elusive in weight management: significant, long-term weight loss maintenance and widely accessible programs that produce significant weight loss for reasonable costs. Significant weight loss is defined as weight loss of 5% or more of initial weight because weight-related comorbidities improve with this amount of weight loss;¹ long-term weight loss is defined as weight loss that is maintained for at least 1 year.² Numerous academic and commercial programs have produced significant weight loss. However, these programs are not accessible to the general population because they are too expensive or they are not geographically available. Furthermore, some interventions have produced significant short-term weight loss,³ but have poor long-term success in maintaining weight loss.⁴⁻¹² To reverse the obesity epidemic, it is essential to find programs that are effective at weight loss and maintenance, low cost, and easy to implement and disseminate widely.

These issues can be addressed by Take Off Pounds Sensibly (TOPS), a nonprofit, peer-led, weight loss program. First, TOPS is effective for weight loss and weight loss maintenance for those who renew their membership in the program for up to 3 years.¹³ Second, TOPS only costs \$90 annually. Third, TOPS's peer-led structure allows the program to be implemented and disseminated widely because any four people can start a TOPS chapter.

Our prior work with a smaller sample looked at outcomes for up to 3 years. The primary objective of this study is to determine the weight change for individuals who renew their annual membership consecutively in the program for up to 7 years; it adds to the previous study because there are more participants and longer follow-up. The secondary objective is to determine the program's long-term retention.

Methods

Study Design

This completers' analysis was a retrospective cohort study of longitudinal weight change of participants in the TOPS national database who consecutively renewed their annual membership and did not include outcomes for participants who did not return. The data source was the subset of the national database of TOPS Club, Inc. of U.S. members who joined from January 1, 2005 to December 31, 2011. The data set contained the following variables: identification number, gender, date of birth, start date, starting weight, renewal date (year), and renewal weight (year). The protocol was designated as expedited and approved by the Colorado Multiple IRB.

The goal of TOPS is to help individuals reach and maintain their weight loss goals by providing its members with administrative and educational materials along with support and accountability.¹⁴ TOPS participants pay \$90 for their annual membership fee and chapter dues. Chapters meet weekly, where participants are weighed privately followed by group educational programming on nutrition, physical activity, and behavior modification. Although weekly weights are recorded at the local chapter, weights are only sent to the national office when members join and when they renew their annual membership. There is

no penalty if members miss weekly meetings and members are encouraged to continue to attend meetings even if they do not lose weight.

TOPS recommends two nutrition plans—the American Academy of Nutrition and Dietetics Food Exchange System¹⁵ and U.S. Department of Agriculture My Plate Program.¹⁶ TOPS encourages members to consult a healthcare provider to determine a goal weight. When members reach their goal weights, they become “KOPS” members, who are working to Keep Off Pounds Sensibly, but they are expected to continue to attend weekly meetings.

TOPS includes components helpful in weight loss and weight loss maintenance: self-monitoring, group support, frequent weighing, and physical activity recommendations.^{17–19} The peer-led, group format of TOPS is grounded in self-determination theory, which suggests that individuals must develop a sense of autonomy, a degree of competence, and a feeling of relatedness to internalize and maintain health behaviors.²⁰ Because TOPS is a community resource where participants are taught self-management skills to help them lose weight and maintain weight loss, it contains essential elements of the chronic care model.^{21,22}

Study Participants

Figure 1 is a diagram of study inclusion. Study participants were individuals aged 18 years who joined TOPS during the study period. Individuals were excluded from the analysis in the following order:

1. age <18 years;
2. history of bariatric surgery;
3. no starting weight;
4. no renewal weight;
5. online members whose weights were self-reported;
6. no gender listed;
7. men and women whose starting weights were <77.6 and <65.8 kg, respectively, because these weights correspond with BMIs of 25 kg/m² based on the average heights for men and women in the U.S.; and
8. data from individuals with duplicate entries were combined, so they were only used once in the analysis.

If an individual had duplicate dates with different weights, the lowest weight was used. If an individual had two dates and corresponding weights in the same calendar year, the first date and weight were used, and the second were deleted. Finally, individuals with invalid follow up weights were excluded.

Members were included in the analysis as long as they renewed their annual membership consecutively. Members with non-consecutive renewal were included until they missed a renewal. For instance, if a member joined in 2005 and renewed their membership in 2006, 2007, and 2009, but failed to renew in 2008, their data were only included for Years 1 and 2.

If members did not renew their membership in the first year they were eligible, they were not included in the analysis, even if they had a subsequent annual renewal.

Measures

The variables used in this study were gender, weight, and year of renewal. Members were divided into seven cohorts based on the year they joined TOPS—2005, 2006, 2007, 2008, 2009, 2010, and 2011. The year that individuals joined determined how many years they were eligible for follow-up. All seven cohorts (207,469 individuals) were eligible for at least 1 year of follow-up, and 184,396 individuals from the 2005–2010 cohorts were eligible for at least 2 years of follow-up. Therefore, for each additional year of follow up, one less cohort was available to be included in the outcomes.

Consecutive retention rates were calculated for each year. They were calculated by dividing the number of individuals who renewed their membership at a specific time point by the number of individuals who were eligible to renew their membership at that time point. Weight change from baseline was calculated in kilograms and as a percentage of starting weight, and was reported as averages for each cohort and gender subgroup for up to 7 years. The percentage of weight change was also classified as weight loss or gain in the following categories: 0–<5%, 5–<10%, or 10% of initial weight.

Statistical Analysis

Data were analyzed from June to October 2013 using SAS, version 9.2. Means (95% CIs) were used to report data with normal distributions, and medians (interquartile ranges [IQRs]) were used to report highly skewed data. Chi-square analyses were used to compare individuals who renewed their membership with those who did not renew their membership based on gender composition, starting weight, and age. To allow for different starting weights for each individual while adjusting for the correlation of multiple measures per individual, data were analyzed using mixed effects repeated measures models with individual random intercepts (SAS Proc HPMixed). The model estimated the differences between the baseline weight and subsequent renewal weights and tested whether the change was significantly different from zero. Independent variables were year of follow up (1, 2, 3, ...) and gender. The trend of weight change over time was tested through linear mixed models.

Results

Baseline characteristics for participants are shown in Table 1. Median (IQR) starting weights for female and male participants who joined TOPS during the study period were 94.2 (27.7) and 116.6 (34.4) kg, respectively. Mean (SD) ages for female and male participants were 55.6 (13.9) and 55.0 (14.2) years, respectively.

Thirty-eight percent of TOPS members renewed their membership in the first year. The average initial weight (95% CI) of women who renewed their membership was 97.8 (97.7, 98.0) kg compared with 98.2 (98.0, 98.3) kg for those who did not; similarly, the average initial weight of men who renewed their membership was 119.2 (118.6, 119.9) kg versus 121.9 (121.3, 122.5) kg for those who did not ($p<0.001$ for both genders). Age data were

available for only 63% of participants. The average age (SD) of the women who renewed their membership was 59.1 (12.8) years versus 53.0 (14.2) years for those who did not; the average age for men who renewed their membership was 58.2 (13.0) years versus 52.2 (14.5) years for those who did not ($p<0.001$ for both genders).

The cumulative annual consecutive retention rates are shown in Table 2. The 1-year retention rate was 36% and the 7-year retention rate was 6%. Of those who did not renew their membership in their first year, 94% were women and 6% were men. A higher proportion of men consecutively renewed their membership than women, except for Year 7.

The data for unadjusted weight change are shown in Tables 3 and 4. Table 3 shows the average weight change in kilograms; Table 4 shows the average percentage of weight change from initial weight. Weight change as a percentage of initial weight was similar between women and men. The average weight change for women and men in the first year was -6.0% and -6.3% , respectively (Table 4). For those participants who remained in the program for >1 year, their average weight loss in the first year ranged from -6.7% to -7.2% for women and from -6.9 to -7.5% for men. For each cohort, the weight change was at least maintained at subsequent membership renewals. For example, the weight change for the 4,983 women who renewed their memberships consecutively for 6 years was -7.2% in Year 1 and -7.9% in Year 6, and the weight change and maintenance was similar for the other cohorts. Figures 2 and 3 demonstrate: the cumulative average percentage weight loss for female and male participants by the number of consecutive annual renewals across the top, and the average weight for each group at each consecutive annual renewal. For example, the initial average weight of the 38,236 women with at least two consecutive annual renewals had an initial weight of 97.4 kg. At their first renewal, the average weight was 90.8 kg; at their second annual renewal, the average weight was 90.7 kg. Their cumulative percentage weight change at the end of 2 years was -6.7% . There was no statistically significant difference between the weight change at Year 1 and subsequent years of follow-up, except for Years 6 and 7 for women ($p=0.001$ and $p<0.001$, respectively).

The adjusted results from the mixed effects regression model showed that men started out significantly heavier than women (a mean of 20.8 kg heavier, $p<0.001$). For each year of consecutive renewal, individuals lost an average of 1.4 kg ($p<0.001$). Compared with women, men lost an additional 0.4 kg/year ($p<0.001$). The adjusted results for percentage weight loss show an average weight loss of 5.9% for the first year. Compared with women, men lost an additional 0.5% of their starting weight in the first year ($p=0.004$). For each year of consecutive renewal, men did not show any significant weight change from the first year ($p=0.31$), but women lost an additional 0.1% per year ($p<0.001$).

Table 5 shows categorical weight change for all individuals who renewed their membership among the cohorts over the 7-year period. Between 50% and 62% of participants with consecutive annual renewal had a cumulative weight loss of 5% of their initial weight over the 7-year study period, whereas 18%–22% gained weight. There was no statistical difference between the proportion of men and women in each weight change category.

Discussion

In this completers' analysis of "consecutive renewers," on average, participants who renewed their membership every year sustained clinically significant weight loss for up to 7 years. Fifty percent of consecutive renewers lost 5% or more of their initial weight in their first year in the program, and 62% of the consecutive renewers had a cumulative weight loss of at least 5% at 7 years. Although only 36% of people who started the program renewed their membership at 1 year and 6% consecutively renewed their annual membership for 7 years, these results are important for several reasons:

1. This is the first study of any weight loss program to report real-world weight changes and program retention for 7 years.
2. Participants who renewed their memberships consecutively were able to sustain a clinically significant weight loss for up to 7 years.
3. The program is low-cost and peer-led; therefore, it is easy to implement and disseminate widely.

Weight regain may be attenuated among individuals who remain in TOPS because it provides ongoing weekly support. When participating in TOPS, people attend weekly meetings during both the weight loss and weight maintenance phases. Furthermore, the maintenance phase also continues indefinitely. By contrast, academic and commercial programs typically have interventions with weekly contact during the weight loss phase of the program and monthly contact during a maintenance phase. Although the maintenance phases of commercial programs can continue indefinitely, in academic programs they tend to be of finite duration. In the TOPS model, there is minimal difference between the weight loss and weight maintenance phases, which reinforces the internalization and maintenance of weight management behaviors.²³ Consequently, participants who continue to participate in the program maintain their weight loss.

One-year weight loss in this real world analysis of TOPS is lower than in the real-world analyses of the Jenny Craig program—6.0% versus 12.3% and 13.0%^{24,25}; however, TOPS costs much less than Jenny Craig, is more accessible to a larger population, and has longer-term weight change data. Furthermore, the 1-year retention rate in this TOPS study is much higher than the published 1-year retention rates of Jenny Craig real-world studies—36% versus 7% and 10%. The group format and low cost of TOPS likely contribute to the higher 1-year retention rate.

Although the weight change in TOPS was lower than reported in completers of Jenny Craig, it is important to note that the weight loss induced by TOPS is still in the clinically significant range.^{26–30} Further, although a formal cost-effectiveness analysis was beyond the scope of this paper, TOPS costs far less than Jenny Craig.

Limitations

The current study has several limitations. First, this analysis only gives information about those who continued in the program, which may have been a self-selected, highly motivated subset of particularly successful individuals, although many participants who renewed their

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memberships also gained weight; we have no data about the weight change of those did not renew. Further, the weight change of those individuals who did renew show a bias for self-selection because the average weight change at 1 year increases with the number of consecutive annual renewals. However, between 18% and 22% of individuals with consecutive annual renewals gained weight in this study. Second, there is no control group. However, completers' analyses for control groups in other behavioral studies lost between 0.1 and 3.3 kg,³¹⁻³⁴ which is less than the renewers in this analysis. Moreover, in the absence of intervention, many U.S. adults tend to gain weight, and some can gain almost 1 kg per year.³⁵ Third, the only demographic information available about the participants is their age and gender. Therefore, we are unable to determine if this program is equally effective among all racial/ethnic groups or socioeconomic strata. However, this real-world analysis of a community-based program with more than 75,000 participants likely includes a heterogeneous population with different races/ethnicities and socioeconomic demographics. Fourth, there is no indication about the extent of the participants' involvement in the TOPS program; however, it is unlikely that individuals would choose to renew membership in an organization in which they were not participating. Finally, there are no data about weight-related comorbidities before and after weight change, but previous studies have shown that modest weight loss in the range achieved by this program is associated with improvements in blood pressure, glucose control, lipid profiles, osteoarthritis, and obstructive sleep apnea.^{27,28,30}

Despite these limitations, this analysis has several strengths. First, this study provides 1-year weight loss outcomes for almost 75,000 individuals, approximately 36% of the 207,469 who initially enrolled, and 7-year outcomes for almost 2,300 individuals, approximately 6% of the 35,661 who were eligible for seven consecutive annual renewals. Second, this is the first time any national weight loss program has published data of all completers who joined and continued a program over a 7-year period. Third, rather than studying the efficacy of a program that can be difficult to implement, this study examines the effectiveness of an existing weight loss program with a far-reaching infrastructure that can be easily implemented and widely disseminated.

Conclusions

In conclusion, TOPS is a low-cost weight loss program that is effective for the subset of participants who stay in the program in both the short and long term. As long-term weight loss is difficult to achieve in any clinical circumstance, TOPS may be a viable option to treat overweight and obesity. The peer-led format, low cost, and ease of implementation and dissemination of the TOPS program allow overweight and obese individuals who may not have access to commercial or academic programs, such as low-income, minority, and rural populations, an opportunity to participate in a structured weight management program that has been effective in some individuals. Future studies should examine the efficacy of the program; determine the individuals for which TOPS may be most appropriate, including initial weight, age, and SES; and follow up with individuals who do not renew their membership.

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NM is responsible for the study concept and design and data acquisition through TOPS, had full access to all of the data in the study, and takes responsibility for the integrity of the data and the accuracy of the data analysis. AF was responsible for data analysis. NM, SP, VC, and AP all took part in data interpretation. NM, SP, and VC all drafted the manuscript. NM, SP, VC, AF, and AP all revised the manuscript for important intellectual content.

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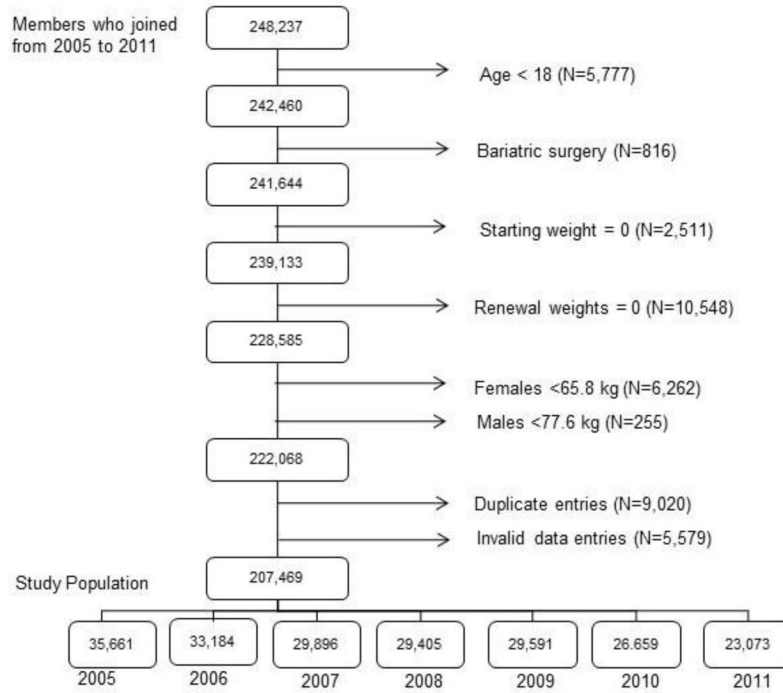
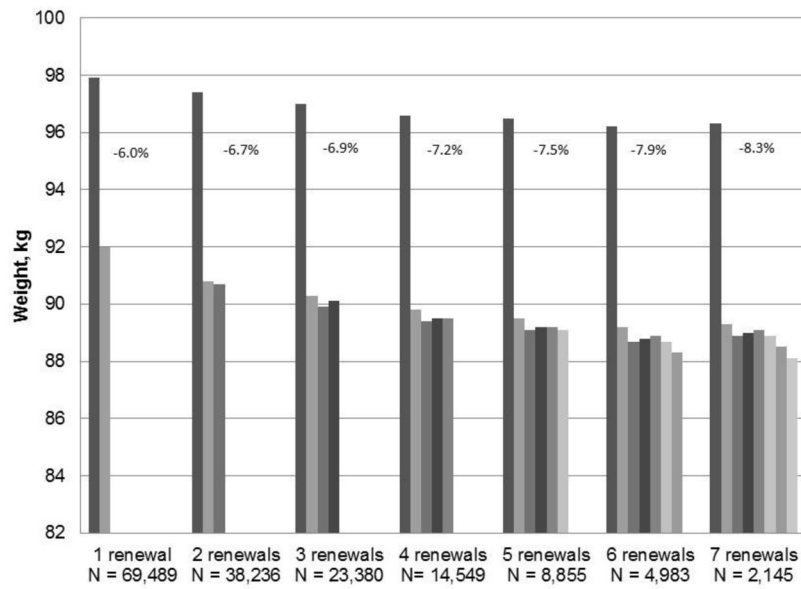
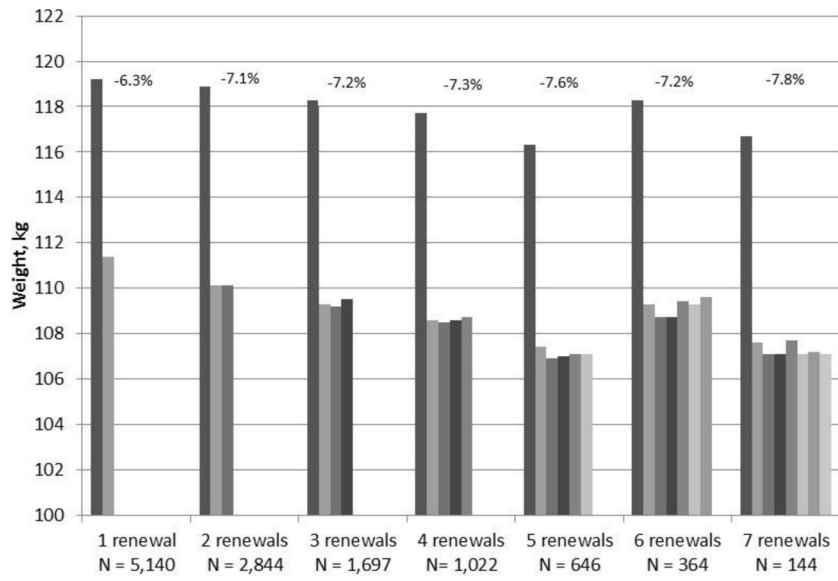


Figure 1.
Study inclusion.



Each group across the x-axis shows the number of consecutive annual renewals and the number of participants with at least that number of consecutive annual renewals. The bars show the average weight at baseline and each subsequent renewal. The numbers across the top of the graph are the average cumulative percentage weight change at the time of the final renewal in each group.

Figure 2. Cumulative percentage weight change of female participants by consecutive annual renewals.



Each group across the x-axis shows the number of consecutive annual renewals and the number of participants with at least that number of consecutive annual renewals. The bars show the average weight at baseline and each subsequent renewal. The numbers across the top of the graph are the average cumulative percentage weight change at the time of the final renewal in each group.

Figure 3. Cumulative percentage weight change of male participants by consecutive annual renewals.

Table 1

Baseline Participant Characteristics

Characteristic	Total (N)	Female	Male	<i>p</i> -value ^a
Number of subjects, N (% of total)	207,469	194,326 (93.7%)	13,143 (6.3%)	--
Age (years) ^b Mean (SD)	55.6 (13.9)	55.6 (13.9) ^c	55.0 (14.2)	< 0.001
Weight (kg) Median (25 th –75 th)	95.4 (83.0–111.6)	94.2 (82.2–109.9) ^d	116.6 (101.9–136.3)	< 0.001

^a Boldface indicates statistical significance ($p < 0.01$).

^b Age was available for 131,073 (63%) of individuals.

^c t-test for difference between male and female participants.

^d Wilcoxon test for difference between male and female participants.

Table 2

Cumulative Annual Consecutive Retention Rates by Gender^a

Years of available eligibility	Gender	Eligible participants (N)	Participants who renewed membership consecutively (N)	Retention rate (%)	p-value ^b
1	Females	199,429	74,592	37.4	<0.0001
	Males	13,619	5,616	41.2	
2	Females	177,328	39,677	22.4	<0.0001
	Males	11,940	2,974	24.9	
3	Females	151,771	24,098	15.9	<0.0001
	Males	10,113	1,766	17.5	
4	Females	123,412	14,930	12.1	0.004
	Males	8,048	1,053	13.1	
5	Females	95,178	9,088	9.5	0.0009
	Males	6,165	663	10.8	
6	Females	66,472	5,112	7.7	0.002
	Males	4,206	375	8.9	
7	Females	34,556	2,197	6.4	0.14
	Males	2,143	149	7.0	

^aTwo-sample z-test for proportions between genders.

^bBoldface indicates statistical significance ($p < 0.01$).

Table 3

Weight Change of Members With Consecutive Annual Renewal

		Average cumulative weight change at renewal, kg, mean (95% CI) ^{*,**}							
Renewal period	N	Starting Weight, kg Mean (95% CI)	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7
No renewal									
Females	124,837	98.2 (98.0, 98.3)							
Males	8,003	121.9 (121.3, 122.5)							
1 year									
Females	69,489	97.9 (97.7, 98.0)	-5.9 (-6.0, -5.9)						
Males	5,140	119.2 (118.4, 119.9)	-7.8 (-8.0, -7.5)						
2 years									
Females	38,236	97.4 (97.2, 97.6)	-6.6 (-6.7, -6.5)	-6.7 (-6.8, -6.6)					
Males	2,844	118.9 (117.9, 119.8)	-8.8 (-9.2, -8.4)	-8.8 (-9.3, -8.3)					
3 years									
Females	23,380	97.0 (96.7, 97.3)	-6.7 (-6.8, -6.6)	-7.1 (-7.2, -6.9)	-6.9 (-7.0, -6.8)				
Males	1,697	118.3 (117.1, 119.5)	-9.0 (-9.5, -8.5)	-9.1 (-9.8, -8.5)	-8.8 (-9.5, -8.2)				
4 years									
Females	14,549	96.6 (96.3, 96.9)	-6.8 (-7.0, -6.7)	-7.2 (-7.4, -7.1)	-7.1 (-7.3, -7.0)	-7.1 (-7.3, -6.9)			
Males	1,022	117.7 (116.1, 119.3)	-9.1 (-9.7, -8.4)	-9.2 (-10.0, -8.5)	-9.1 (-9.9, -8.3)	-9.0 (-9.8, -8.2)			
5 years									
Females	8,855	96.5 (96.1, 96.9)	-7.0 (-7.2, -6.8)	-7.4 (-7.6, -7.2)	-7.3 (-7.5, -7.1)	-7.3 (-7.5, -7.1)	-7.4 (-7.6, -7.2)		
Males	646	116.3 (114.4, 118.3)	-8.9 (-9.8, -8.1)	-9.4 (-10.4, -8.4)	-9.3 (-10.3, -8.3)	-9.2 (-10.2, -8.1)	-9.2 (-10.3, -8.1)		
6 years									
Females	4,983	96.2 (95.6, 96.7)	-7.0 (-7.3, -6.8)	-7.5 (-7.8, -7.3)	-7.4 (-7.6, -7.1)	-7.3 (-7.6, -7.0)	-7.5 (-7.8, -7.3)	-7.9 (-8.2, -7.6)	
Males	364	118.3 (115.5, 121.0)	-9.0 (-10.1, -7.8)	-9.6 (-11.0, -8.2)	-9.6 (-11.1, -8.2)	-8.9 (-10.4, -7.4)	-9.0 (-10.5, -7.4)	-8.7 (-10.2, -7.2)	
7 years									
Females	2,145	96.3 (95.5, 97.1)	-7.0 (-7.4, -6.7)	-7.4 (-7.8, -7.0)	-7.3 (-7.6, -6.9)	-7.2 (-7.6, -6.8)	-7.4 (-7.8, -6.9)	-7.8 (-8.2, -7.3)	-8.2 (-8.6, -7.7)

		Average cumulative weight change at renewal, kg, mean (95% CI) ^{*,**}							
Renewal period	N	Starting Weight, kg, Mean (95% CI)	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7
Males	144	116.7 (112.4, 120.9)	-9.1 (-11.1, -7.1)	-9.6 (-11.8, -7.3)	-9.6 (-12.0, -7.2)	-9.0 (-11.4, -6.6)	-9.6 (-12.4, -6.9)	-9.5 (-12.3, -6.7)	-9.6 (-12.2, -7.1)

* *p*-values <0.001 for difference between cumulative weight change and starting weight.

** There was no statistically significant difference between the weight change at year one and subsequent years of follow up, except for years 6 and 7 for females (*p*=0.001 and *p*<0.001, respectively).

Table 4

Percentage Weight Change for Members With Consecutive Annual Renewal

Renewal period	N	Starting Weight, kg Mean (95% CI)	Average cumulative weight change at renewal, %, mean (95% CI) ^{*,**}						
			YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7
1 year									
Females	69,489	97.9 (97.7, 98.0)	-6.0 (-6.0, -5.9)						
Males	5,140	119.2 (118.4, 119.9)	-6.3 (-6.5, -6.1)						
2 years									
Females	38,236	97.4 (97.2, 97.6)	-6.7 (-6.8, -6.6)	-6.7 (-6.8, -6.7)					
Males	2,844	118.9 (117.9, 119.8)	-7.2 (-7.5, -6.9)	-7.1 (-7.5, -6.8)					
3 years									
Females	23,380	97.0 (96.7, 97.3)	-6.9 (-7.0, -6.8)	-7.1 (-7.2, -7.0)	-6.9 (-7.1, -6.8)				
Males	1,697	118.3 (117.1, 119.5)	-7.4 (-7.8, -7.0)	-7.5 (-7.9, -7.0)	-7.2 (-7.7, -6.7)				
4 years									
Females	14,549	96.6 (96.3, 96.9)	-7.0 (-7.1, -6.9)	-7.3 (-7.5, -7.2)	-7.2 (-7.4, -7.1)	-7.2 (-7.3, -7.0)			
Males	1,022	117.7 (116.1, 119.3)	-7.5 (-8.0, -7.0)	-7.6 (-8.2, -7.0)	-7.5 (-8.1, -6.9)	-7.3 (-7.9, -6.7)			
5 years									
Females	8,855	96.5 (96.1, 96.9)	-7.2 (-7.3, -7.0)	-7.5 (-7.7, -7.4)	-7.4 (-7.6, -7.2)	-7.4 (-7.6, -7.2)	-7.5 (-7.7, -7.3)		
Males	646	116.3 (114.4, 118.3)	-7.4 (-8.1, -6.8)	-7.8 (-8.5, -7.0)	-7.6 (-8.4, -6.9)	-7.5 (-8.3, -6.7)	-7.6 (-8.4, -6.8)		
6 years									
Females	4,983	96.2 (95.6, 96.7)	-7.2 (-7.4, -7.0)	-7.7 (-7.9, -7.4)	-7.5 (-7.7, -7.2)	-7.4 (-7.6, -7.1)	-7.6 (-7.9, -7.4)	-7.9 (-8.2, -7.7)	
Males	364	118.3 (115.5, 121.0)	-7.3 (-8.1, -6.4)	-7.6 (-8.6, -6.6)	-7.7 (-8.8, -6.6)	-7.2 (-8.3, -6.1)	-7.3 (-8.3, -6.2)	-7.1 (-8.2, -6.1)	
7 years									
Females	2,145	96.3 (95.5, 97.1)	-7.2 (-7.6, -6.9)	-7.6 (-8.0, -7.2)	-7.4 (-7.8, -7.1)	-7.3 (-7.7, -6.9)	-7.5 (-7.9, -7.1)	-7.9 (-8.3, -7.5)	-8.3 (-8.7, -7.9)
Males	144	116.7 (112.4, 120.9)	-7.4 (-8.9, -6.0)	-7.7 (-9.4, -6.0)	-7.8 (-9.5, -6.0)	-7.3 (-9.1, -5.6)	-7.6 (-9.4, -5.8)	-7.5 (-9.4, -5.7)	-7.8 (-9.6, -6.0)

* *p*-values <0.001 for difference between cumulative weight change and starting weight.

** There was no statistically significant difference between the weight change at year one and subsequent years of follow up, except for years 6 and 7 for females (*p*=0.001 and *p*<0.001, respectively).

Table 5

Completers' Weight Change Categorized as a Percentage of Initial Weight

Duration of follow-up (total renewing)	Weight category	Males %(n)	Females % (n)	p-value ^a
Year 1 (74,629)	10% weight loss	25.9 (1,331)	24.5 (17,002)	0.35
	5% to <10% weight loss	24.9 (1,282)	25.6 (17,816)	
	0 to <5% weight loss	31.7 (1,627)	32.1 (22,302)	
	>0 to 5% weight gain	13.8 (710)	14.0 (9,714)	
	5% to <10% weight gain	2.7 (140)	2.9 (1,988)	
	10% weight gain	1.0 (50)	1.0 (667)	
Year 2 (41,080)	10% weight loss	30.0 (853)	29.6 (11,335)	0.83
	5% to <10% weight loss	24.3 (691)	24.8 (9,483)	
	0 to <5% weight loss	27.1 (770)	27.7 (10,589)	
	>0 to 5% weight gain	13.4 (382)	12.9 (4,949)	
	5% to <10% weight gain	3.8 (109)	3.5 (1,336)	
	10% weight gain	1.4 (39)	1.4 (544)	
Year 3 (25,077)	10% weight loss	33.4 (567)	31.7 (7,414)	0.08
	5% to <10% weight loss	23.0 (390)	24.3 (5,687)	
	0 to <5% weight loss	24.4 (414)	25.3 (5,922)	
	>0 to 5% weight gain	11.8 (201)	12.7 (2,970)	
	5% to <10% weight gain	4.9 (84)	4.1 (962)	
	10% weight gain	2.4 (41)	1.8 (425)	
Year 4 (15,571)	10% weight loss	34.8 (356)	33.5 (4,874)	0.05
	5% to <10% weight loss	24.2 (247)	24.0 (3,494)	
	0 to <5% weight loss	21.7 (222)	23.7 (3,449)	
	>0 to 5% weight gain	10.6 (108)	12.1 (1,766)	
	5% to <10% weight gain	5.6 (57)	4.5 (661)	
	10% weight gain	3.1 (32)	2.1 (305)	
Year 5 (9,501)	10% weight loss	37.9 (245)	36.1 (3,199)	0.35
	5% to <10% weight loss	20.6 (133)	23.4 (2,072)	
	0 to <5% weight loss	22.4 (145)	22.4 (1,980)	
	>0 to 5% weight gain	10.5 (68)	11.3 (1,003)	
	5% to <10% weight gain	5.6 (36)	4.5 (401)	
	10% weight gain	2.9 (19)	2.3 (200)	
Year 6 (5,347)	10% weight loss	36.0 (131)	39.2 (1,951)	0.22
	5% to <10% weight loss	23.4 (85)	22.2 (1,106)	
	0 to <5% weight loss	19.8 (72)	20.5 (1,021)	
	>0 to 5% weight gain	10.4 (38)	11.2 (556)	

Duration of follow-up (total renewing)	Weight category	Males %(n)	Females % (n)	p-value^a
	5% to <10% weight gain	6.3 (23)	4.4 (220)	
	10% weight gain	4.1 (15)	2.6 (129)	
Year 7 (2,289)	10% weight loss	35.4 (51)	40.4 (867)	0.65
	5% to <10% weight loss	24.3 (35)	21.7 (465)	
	0 to <5% weight loss	18.8 (27)	19.9 (427)	
	>0 to 5% weight gain	13.2 (19)	10.8 (231)	
	5% to <10% weight gain	6.3 (9)	4.4 (95)	
	10% weight gain	2.1 (3)	2.8 (60)	

^aChi-square test of proportions between males and females, by follow-up year.

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