

Retrospective Examination of Class Attendance on Corporately Sponsored Weight Loss Programming

The Naturally Slim Experience

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Objective: To examine the effect of class participation in participants enrolled in a corporate sponsored commercial weight loss program. **Methods:** We examined 111,262 participants for percent weight loss (primary outcome) using general linear models and weight loss relative to class participation (secondary outcome). **Results:** We observed a significant trend ($P < 0.001$) for achieving significant weight loss for the entire cohort who lost 3.65% (99% CI, 3.62, 3.69) body weight. Individuals taking ≥ 4 classes ($n = 87,346$) lost 4.97% (99% CI, 4.53, 4.61). Those taking ≥ 9 classes ($n = 74,525$) achieved 4.95% (99% CI, 4.93, 5.01) weight loss. Similar patterns for men and women were observed within each analysis. **Conclusion:** Overall, participants lost a clinically beneficial ($\geq 3\%$) amount of weight following class participation and greater class attendance produced a greater weight loss percentage approaching clinical significance ($\geq 5\%$).

Keywords: corporate health, digital health, online, prevention, Web-based, weight loss

INTRODUCTION

The health risks and associated medical expenses of obesity are well documented and currently affect $\sim 40\%$ of the United States population and most developed countries.¹ Despite the World Health Organization and US Surgeon General's advocacy for intervention, obesity remains a problem worldwide.^{2,3} Obesity also carries with it the concurrent pervasiveness of various co-morbidities (eg, of heart disease, stroke, type 2 diabetes, cancer, etc), which ultimately affects annual healthcare expenditures for individuals and companies.⁴ While the advocacy for decreasing population obesity statistics is nothing new and largely preventable, interventions aimed at attenuating its occurrence typically target improving nutrition and increasing physical activity. However, a key to programming success are behavioral strategies targeting improved participant compliance. This is challenging in a company setting

as the ability to counsel a multitude of employees requires additional staffing. To this end, online programming offers the workplace both convenience and the ability to scale their program offerings along with growth. Our findings are important for the following reasons.

In 2001, the Surgeon General put forth a Call To Action to address obesity in the United States by (1) recognizing that overweight and obesity is a major public health problems, (2) assisting Americans in balancing healthful eating with regular physical activity to achieve and maintain a healthy or healthier body weight, (3) identifying effective and culturally appropriate interventions to prevent and treat overweight and obesity, (4) encouraging environmental changes that help prevent overweight and obesity, and (5) developing and enhancing public and private partnerships to help implement their vision.³ In 2018, the Behavioral Weight Loss Interventions to Prevent Obesity-Related Morbidity and Mortality in Adults: US Preventive Services Task Force Recommendation Statement reinforced this advocacy by stating that clinically significant improvements in weight status are attained by multicomponent behavioral interventions that help individuals lose weight.⁵ The worksite offers a prime setting to provide programming to individuals who desire to initiate and maintain weight loss.

We have undertaken a number of studies examining the efficacy of a commercial weight loss program integrated into various worksites throughout the United States. In 2015, we examined the effect of a voluntary worksite program on weight loss and metabolic syndrome in 3880 participants across 93 companies who participated in weight loss program and demonstrated that participants successfully lost weight following its completion: Women (-4.2 kg), men (-6.0 kg). This weight lost equated to 4.8% and 5.8% for men and women, respectively. We further observed a significant reduction in the prevalence of metabolic syndrome from 43% to 30% in women and 52% to 26% in men. This study was followed by examining the same program in 5998 participants relative to hypertension, demonstrating a significant reduction in hypertension for those individuals losing $\geq 3\%$ weight.⁶ Three percent weight loss has now been proposed as "clinically beneficial."⁷ A point of interest in these two reports is that the achievement of "clinically significant" weight loss was set at 5%.⁸ We have also reported in 9885 participants taking the class on two occasions that participants achieved a net weight loss after two classes (-4.55% , 95% CI, -4.74 , -4.36).^{6,9,10} From this latter study, we concluded that not only does the examined program help participants achieve significant weight loss, but also serves as a behavioral reinforcement tool for those who re-engage in the program after a period of potential recidivism. A question that we posit relates to the effectiveness of such programs relative to class participation. For example, in a recent trial, Horstman et al¹¹ reported that online weight loss programming, delivered at the worksite ($N = 52,461$) produced a 2.8% weight loss for those who attended least one session, with 23% of participants achieving 5% or more weight loss. Further, active participants ($n = 38,836$) lost an average of 3.5% body weight, with 29% achieving 5% weight loss. Finally, program completers ($n = 27,164$) lost an average of 4.3% body weight, with 36% of the cohort achieving 5% weight loss.

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Funding: None Declared.

Conflicts of interest: Dr Earnest is a research scientist at Texas A&M University and consultant to ACAP Health and was responsible for the data analysis and writing of the paper.

Dr Church serves as the Chief Medical Officer at Naturally Slim and was responsible for the writing and editing of the paper.

Clinical Significance: Behaviorally oriented, online weight loss programs offer employees the opportunity to engage in offered classes at the worksite. Our study demonstrates in 111,262 participants that such programming lead to clinically beneficial weight loss and those participating in a greater number of classes achieve greater benefit.

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DOI: 10.1097/JOM.0000000000001807

In the current study, we examine 111,262 participants in an effort determine the effectiveness of programming relative to class participation. The primary outcome for our analysis is percent weight loss following class participation. As a secondary outcome, we explored weight loss characteristics relative to class participation defined as individuals: (1) Participating in four or more classes and (2) participating in nine or more classes. For our primary outcome, we hypothesized that like our previous studies, individuals participating on a corporately sponsored, online, weight loss program, would achieve clinically beneficial weight loss defined as $\geq 3\%$.⁷ For our secondary outcome, we hypothesized that individuals participating in more classes would achieve greater weight loss. Finally, we performed a tertiary analysis to further explore age group characteristics for the entire cohort.

METHODS

Participants and Recruitment

Overall, our previous reports have focused on subgroups of a parent data set.^{9,10,12} In the current report, we now describe an analysis of all individuals in what is now a closed cohort containing 111,262 participants (71% female) participating in a corporately sponsored, online, behaviorally oriented, weight loss from program from 2015 to 2018. Participants presented with a body mass index $\geq 25 \text{ kg/m}^2$ from multiple companies participating in an online, corporately sponsored, weight loss program.

Our study was reviewed by an ethics committee (Chesapeake IRB, Columbia, MD) and determined not to require IRB oversight according to the tenets of the US Department of Health and Human

Services regulations at 45 Code of Federal Regulations 46. Data were fully de-identified and did not contain employee names, respective places of employment, or the city/state of their residence.

Program and Course Curriculum

Participants volunteered through their employer to participate in a corporate weight loss course (Naturally Slim, Inc., Dallas, TX), which is composed of 10 weekly classes, followed by seven bi-weekly and six monthly maintenance classes for a total of 52 weeks using a SMART (Specific, Measurable, Attainable, Realistic, Time based) behavioral goal-setting practices.^{13,14} We have presented an outline of course topics in Table 1. We recruited participants via emails delivered by their employer, mailers, and flyers placed at the worksites. During their employment, employees could enroll in subsequent weight loss classes if they so desired. Curriculum for both courses and data collection were delivered online without interaction to in-person contact with Naturally Slim staff. All courses remained the same and focused on elements found in standard behavioral health programs such as self-monitoring, daily weighing, goal setting, stimulus control, modification of eating habits and problem solving, focusing on mindful, healthy eating, and understanding hunger signals. Participants were encouraged to partake in moderate intensity physical activity, primarily walking, per National Institutes of Health consensus development panel on physical activity.¹⁵ While the classes do not eliminate or focus on a specific food group or macronutrient, per se, emphasis is placed on reducing carbohydrate and sugar intake, particularly refined sugar, and maintaining a protein intake of 25% to 30% of total calories. Maintenance lessons were available after the 10 weeks focused on

TABLE 1. Program Session Characteristics

Weeks 1–10 (weekly)		Weeks 11–17 (Bi-weekly)		Last 6 mo (Monthly)	
Sessions	Topic	Sessions	Topic	Sessions	Topic
One	Mindful eating and portion control stimulus control Medical considerations and weight loss	One	Eating management plan review	One	Reinforcement
Two	Stop eating cues Introduction to physical activity	Two	Problem solving	Two	Review: Exercise
Three	Stress and emotions Mindless eating Goal setting and problem solving Physical activity	Three	Vital needs	Three	Maintenance
Four	Hidden sugar Mindful activities Energy balance	Four	Emotions and eating Connecting with your feelings	Four	Tips for continued success
Five	Nutrition 101 Stress management Physical activity and weight maintenance	Five	Physical activity Healthy aging	Five	Types of physical activity
Six	Weight fluctuations Food cravings vs. easily accessible food CDC exercise recommendations	Six	Power of connecting Weight loss sabotage	Six	Continuing your journey
Seven	Emotions and eating Importance of self-monitoring Making exercise a habit	Seven	Keeping the weight off		
Eight	Grocery shopping and meal-planning Metabolic syndrome Cognitive behavioral techniques				
Nine	Serving sizes Social support Dealing with saboteurs				
Ten	Review of eating skills and tools Maintaining motivation Long-term action plan				

reinforcing the foundations skills learned and providing additional information on maintaining weight loss. Promoting activity and healthy handling of emotions are some of the concepts emphasized to help with weight loss during the maintenance portion of the class. Curriculum lessons used a web-based distance-learning platform and participants can watch their lessons any place with Internet access. New lessons were delivered weekly during the foundations portion and further divided into multiple segments so participants could watch them separately based on individual convenience and did not have to be watched continuously. All participants were examined via online, self-reporting for questions regarding their awareness of metabolic risk factors as communicated to them by their personal physician which specifically asked, "Has a health care provider ever told you have (1) high blood pressure, (2) low high density lipoprotein cholesterol (HDL-C), (3) non-alcoholic fatty liver disease, (4), osteoarthritis, (5) pre-diabetes, (6) sleep apnea, (7) high triglycerides, (8) type 2 diabetes or (9) gestational diabetes (Table 1).

STATISTICS

The primary outcome for our analysis was weight change following class participation. Secondary outcomes explored weight loss characteristics relative to class participation defined as individuals: (1) participating in four or more classes and (2) participating in nine or more classes. We performed a tertiary analysis to further explore (1) age group characteristics for the entire cohort (<35 years, 35 to 44 years, 45 to 54 years, 55 to 64 years, > 65 years) in an effort to gain a better understanding age effects within this population and (2) to determine a weight loss trajectory for weight loss in women and men over the duration of the program. For this latter analysis, we first used a conservative model by examining only the baseline and last recorded weight for each participant. Using a less conservative model, we analyzed all available data for each week of participation. This second model depicts the average weight loss of the whole group each week and is the more traditional means for examining weight loss. Throughout our report, we have used the term *clinically beneficial* to denote a weight loss of $\geq 3\%$ ⁷ and *clinically significant* to denote a weight loss of $\geq 5\%$.⁷ We used general linear models for all analyses and all reported *P* values are two sided. Data reported as mean (SD), mean change (99% CI), or *N* (%) unless otherwise noted.

RESULTS

We have presented the characteristics for our primary outcome cohort in Table 2. Overall, participants initiating the program were middle aged 47 (12 years) and presented with an average body mass index associated with Class I obesity (33.80 [6.72] kg/m²). Self-reported health characteristics for the entire cohort are as follows: high blood pressure (40%), low high density lipoprotein (27%), non-alcoholic fatty liver disease (4%), osteoporosis (28%), pre-diabetes (14%), sleep apnea (22%), elevated triglycerides (27%), and type 2 diabetes (9%). Our analysis of four or more classes included a total of 87,346 participants (men [24,676]; women [62,825]) and our analysis for those taking nine or more classes included 74,525 participants (men [21,465]; women [53,193]). In brief, all of our analyses demonstrated a significant trend for weight loss, class participation and gender (*p*-for-trend, *P* < 0.001). Specific findings are presented below.

Primary Outcome

Overall, participants lost 3.52 kg (99% CI, 3.49, 3.56; median, 2.45 kg). When examined by sex, men lost 4.30 kg (99% CI, 4.23, 4.37; median, 3.18 kg) and women lost 3.20 kg (99% CI, 3.16, 3.24; median, 2.23 kg). Forty-seven percent of all cohort participants achieved clinically beneficial ($\geq 3\%$) weight loss, with

similar results noted for men (50%) and women (45%), and 29% of the cohort achieved clinically significant weight loss ($\geq 5\%$) (Fig. 1).^{7,8} Data representing the average percent weight loss for participants is presented in Figure 2.

Secondary Outcomes

Four or More Classes

When examined by participants taking four or more classes, the cohort as a whole demonstrated a 4.41 kg (99% CI, 4.37, 4.45; median, 3.55 kg), weight loss with men and women losing 5.52 kg (99% CI, 5.43, 5.61; median, 4.55 kg) and 3.97 kg (99% CI, 3.93, 4.02; median, 3.18 kg), respectively. When examining the entire cohort, 59% achieved a 3% weight loss and 36% achieved a 5% weight loss. Sixty-five percent of men achieved a 3% weight loss compared to 56% of women. Further, 42% percent of men and 34% of women achieved a 5% weight loss (Fig. 1).

Nine or More Classes

Individuals participating in nine or more classes demonstrated a 4.80 kg (99% CI, 4.75, 4.85; median, 3.86 kg) weight loss, with men and women achieving a 5.94 kg (99% CI, 5.85, 6.04; median, 4.77 kg) and 4.34 kg (99% CI, 4.29, 4.39; median, 3.64 kg) weight loss, respectively. When examining the entire cohort, 64% achieved a 3% weight loss and 41% achieved a 5% weight loss. Sixty-nine percent of men achieved a 3% weight loss compared to 61% of women. Further, 46% percent of men and 39% of women achieved a 5% weight loss (Fig. 1).

Tertiary Outcomes

When examining weeks 1 to 10 (Table 1) and those attending more than 8 of the available classes, we observed that older individuals completed more classes than their younger counterparts: [(1) < 35 years, 47%; (2) 35–44 years, 52%; (3) 45–54 years, 59%; (4) 55–64 years, 67%; (5) > 65 years, 67%]. With regard to the total number of available classes (*N* = 23), we observed the same pattern where younger individuals completed fewer average classes than their older counterparts: [(1) < 35 years, 6.45 (5.62), median 6; (2) 35–44 years 7.38 (6.08), median 9; (3) 45–54 years, 8.69 (6.65), median 10; (4) 55–64 years, 10.05 (7.05), median 10; (5) > 65 years, 10.36 (7.54), median 10]. Overall, men and women followed a similar pattern of weight loss to the results observed for the whole cohort differing only slightly relative to age (Table 3). For example, men for the cohort lost ~4.3 kg, whereby by men < 35 years lost ~1.15 kg less than the average cohort and women ≥ 65 years lost ~0.51 kg more than the cohort: Men: < 35 years (*n* = 5572); –3.15 kg (99% CI, 3.01, 3.29); 35–44 years (*n* = 7843); –3.5 kg (99% CI, 3.38, 3.62); 45 to 54 (*n* = 9330); –4.18 kg (99% CI, 4.07, 4.29); 55 to 64 years (*n* = 7786); –4.72 kg (99% CI, 4.58, 4.86); ≥ 65 years (*n* = 1649); –4.81 kg (99% CI, 4.52, 5.10). Furthermore, women within the cohort lost ~3.11 kg, with women < 35 years ~0.42 kg lost less than the average cohort and men ≥ 65 years lost ~1.54 kg more than the cohort: Women: < 35 years (*n* = 14,398); –2.69 kg (99% CI, 4.52, 5.10); 35 to 44 years (*n* = 19,414); –3.05 kg (99% CI, 2.97, 3.13); 45–54 (*n* = 23,512); –3.59 kg (99% CI, 3.52, 3.66); 55 to 64 years (*n* = 18,805); –4.31 kg (99% CI, 4.66, 4.82) > 65 years (*n* = 2935); –4.65 kg (99% CI, 4.42, 4.88). Finally, based on our exploratory model, we observed that greater class participation led to greater weight loss over time (Fig. 3).

DISCUSSION

Our study demonstrates that the Naturally Slim worksite program is effective in reducing weight and that the greater class

TABLE 2. Baseline Characteristics of Study Participants

All Participants						
	All (N = 111,262)		Men (32,180)		Women (79,064)	
	Mean	SD	Mean	SD	Mean	SD
Age (yrs)	46.56	11.50	47.00	11.57	46.38	11.46
Weight (kg)	96.63	22.07	107.15	22.32	92.34	20.48
BMI (kg/m ²)	33.80	6.72	33.20	6.06	34.04	6.96
Health Questionnaire Characteristics (%)						
High Blood Pressure	40%		48%		37%	
Low HDL	27%		31%		25%	
NAFLD	4%		4%		4%	
Osteoporosis	28%		22%		30%	
Pre-Diabetes	14%		12%		15%	
Sleep Apnea	22%		33%		18%	
Triglycerides	27%		33%		24%	
Type 2 Diabetes	9%		10%		9%	

Participation in Four or More Classes						
	All (N = 87,346)		Men (24,676)		Women (62,825)	
	Mean	SD	Mean	SD	Mean	SD
Age (yrs)	47.39	11.36	47.93	11.50	47.19	11.30
Weight (kg)	96.28	21.80	106.92	21.99	92.11	20.25
BMI (kg/m ²)	33.69	6.66	33.09	5.99	33.92	6.89
Health Questionnaire Characteristics (%)						
High Blood Pressure	40%		49%		37%	
Low HDL	28%		32%		26%	
NAFLD	4%		4%		4%	
Osteoporosis	28%		22%		30%	
Pre-Diabetes	14%		12%		15%	
Sleep Apnea	22%		33%		17%	
Triglycerides	27%		34%		25%	
Type 2 Diabetes	9%		10%		9%	

Participation in Nine or More Classes						
	All (N = 74,525)		Men (21,465)		Women (53,193)	
	Mean	SD	Mean	SD	Mean	SD
Age (yrs)	47.92	11.31	48.43	11.45	47.71	11.25
Weight (kg)	96.18	21.70	91.91	20.17	91.91	20.17
BMI (kg/m ²)	33.61	6.62	33.03	5.95	33.85	6.86
Health Questionnaire Characteristics (%)						
High Blood Pressure	41%		49%		38%	
Low HDL	28%		32%		26%	
NAFLD	4%		3%		4%	
Osteoporosis	28%		22%		31%	
Pre-Diabetes	14%		12%		15%	
Sleep Apnea	22%		32%		17%	
Triglycerides	28%		35%		25%	
Type 2 Diabetes	9%		10%		9%	

BMI, body mass index; HDL, high density lipoprotein; NAFLD, non-alcoholic fatty liver disease.

participation was associated with a greater percentage of weight loss. Overall, individuals participating in the class, regardless of classes attended, lost ~3.65%. This percentage increased to ~4.57% and approximately 4.95% for those attending four or nine or more classes, respectively. When examining the entire cohort, 47% of participants achieved 3% weight loss and 29% achieved a weight loss of ≥5%. A similar pattern was observed for men and women, though a greater percentage of men generally achieved these cut points than women. Finally, our tertiary analysis demonstrated that younger participants attended and completed fewer sessions than their older counterparts, which likely explains the greater weight loss observed in the older age groups. Based on these

findings, we accept our hypotheses for the primary and secondary outcomes posited at the start of this paper. Our findings are important for several reasons.

First, the amount of weight lost has important clinical significance. Based on current guidelines, a weight loss of ≥3% is associated with clinically beneficial improvements in cardiovascular disease risk and associated co-morbidities.⁷ Second, although men and women exhibited similar patterns of weight loss for each of our analyses, men achieved a statistically significant greater amounts of weight loss versus women. Our data also shows that men and women respond to programming with greater class participation. From a clinical stand point, Wing et al¹⁶ demonstrated

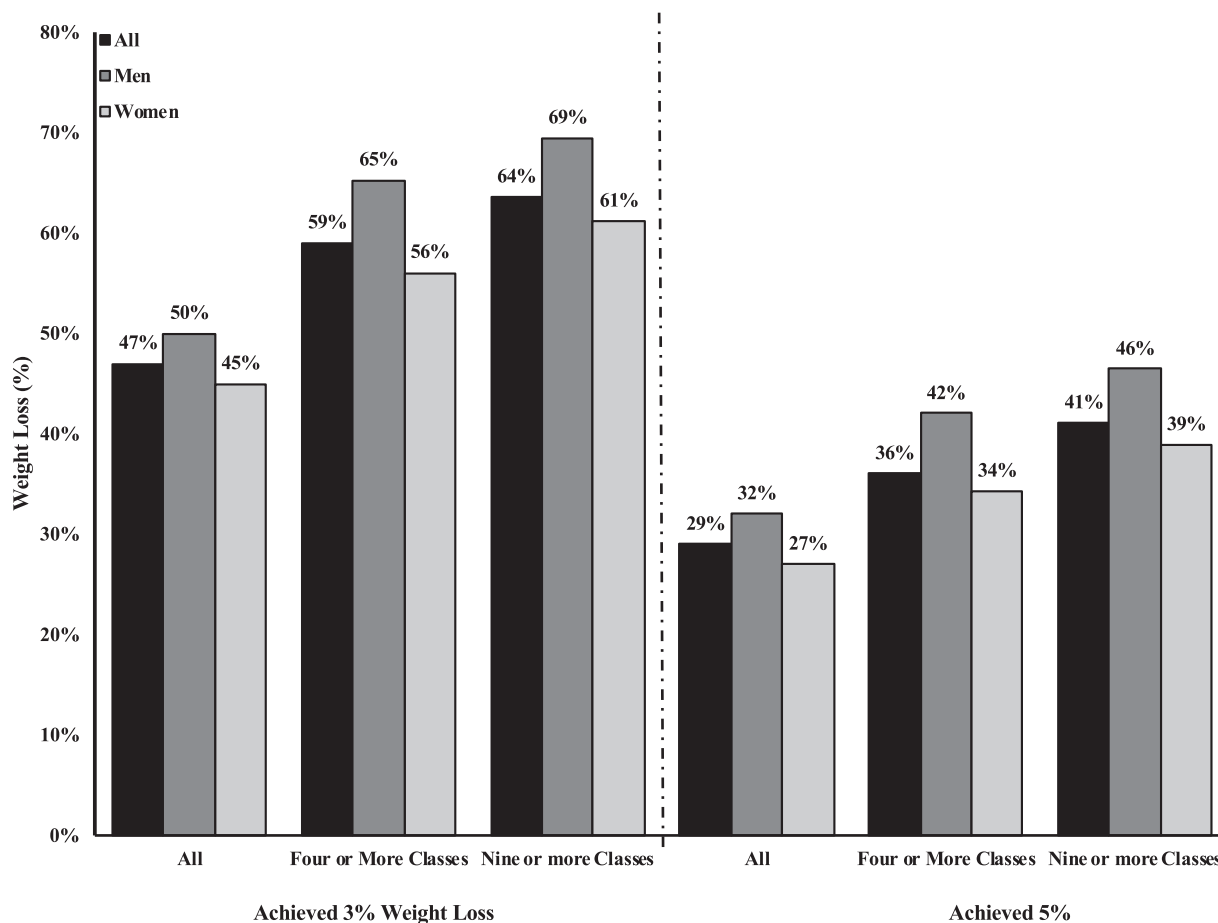


FIGURE 1. Data represent percent of individuals achieving 3% and 5% weight loss.

that the magnitude of weight loss in one year in patients with type 2 diabetes was associated with improvements in glycemia, blood pressure, triglycerides, and HDL cholesterol but not with LDL cholesterol. Specifically, Wing et al showed that those who lost 2% to 5% of their body weight increased their odds of attaining significant improvements in SBP (OR, 1.24 [95% CI 1.02, 1.50]), glucose (OR, 1.75 [1.40, 2.19]), HbA1c (OR, 1.80 [1.44, 2.24]), and triglycerides (OR, 1.46 [1.14, 1.87]), and those who 5% to 10% of their body weight had even greater odds of achieving a 0.5% point reduction in HbA1c (OR, 3.52 [95% CI 2.81 to 4.40]), a 5-mmHg decrease DBP (OR, 1.48 [1.20 to 1.82]), a 5-mmHg decrease in SBP (OR, 1.56 [1.27 to 1.91]), a 5 mg/dL increase in HDL cholesterol (OR, 1.69 [1.37 to 2.07]), and a 40 mg/dL decrease in triglycerides (OR, 2.20 [1.71 to 2.83]).¹⁶ Thus, there appears to be a scale of magnitude relative to the amount of weight lost and risk improvement and should be considered in future studies. While the aforementioned studies examines individuals with type 2 diabetes, we have shown significant improvements in a number of risk factors within a smaller cohort of participants undertaking the Naturally Slim program.⁶ Though our findings show that weight loss is associated with improved risk factors, one cannot ignore the potential for a reduction in health care cost reductions associated with such programming.

Current cost-benefit estimates suggest that health care costs range from \$201 to \$644 per employee per year depending on their obesity class status and may increase to ~\$4720 to \$7606 per person per year depending on the presence of varied cardiovascular disease

risk factors and concurrent diabetes.^{17–20} Using a computational model, Fallah-Fini et al used Markov computational models from the Coronary Artery Disease Risk Development in Young Adults (CARDIA) and Atherosclerosis Risk in Communities (ARIC) studies in an effort to examine potential healthcare costs associated with obesity versus normal weight individuals.^{21,22} In their study, they showed that a metabolically healthy 20-year-old presenting with obesity increased lifetime third-party payer costs by an average of ~\$14,059, incurred ~\$14,141 in additional costs due to lost productivity and imposed a total societal cost of ~\$28,020. Being overweight (vs normal weight) increased third-party payer costs \$5055, \$5358 and \$10,365 for the aforementioned, respectively. Finally, a 50-year-old, having *obesity* added ~\$15,925 to third party payer costs, ~\$20,120 in productivity losses and ~\$36,278 for total societal costs versus being *overweight* (third party costs, \$5866, loss of productivity ~\$10,205, societal costs \$16,169 (\$15,899 to \$16,438)).²³

Fourth, and perhaps most importantly, the behavioral aspect of such programming efforts should be emphasized. A primary example of the behavioral aspect of weight loss impact was demonstrated in the Look Ahead Trial, where individuals participated in a multiphase intervention aimed at promoting a sustainable >7% weight loss using various nutritional and group behavioral strategies from months 7 to 12, individual participant contact in years 2 to 4 and short-term refresher groups every 6 to 8 weeks.²⁴ After 4 years, participants were offered monthly individual visits and refresher groups. Overall, participants demonstrated a 8.6%

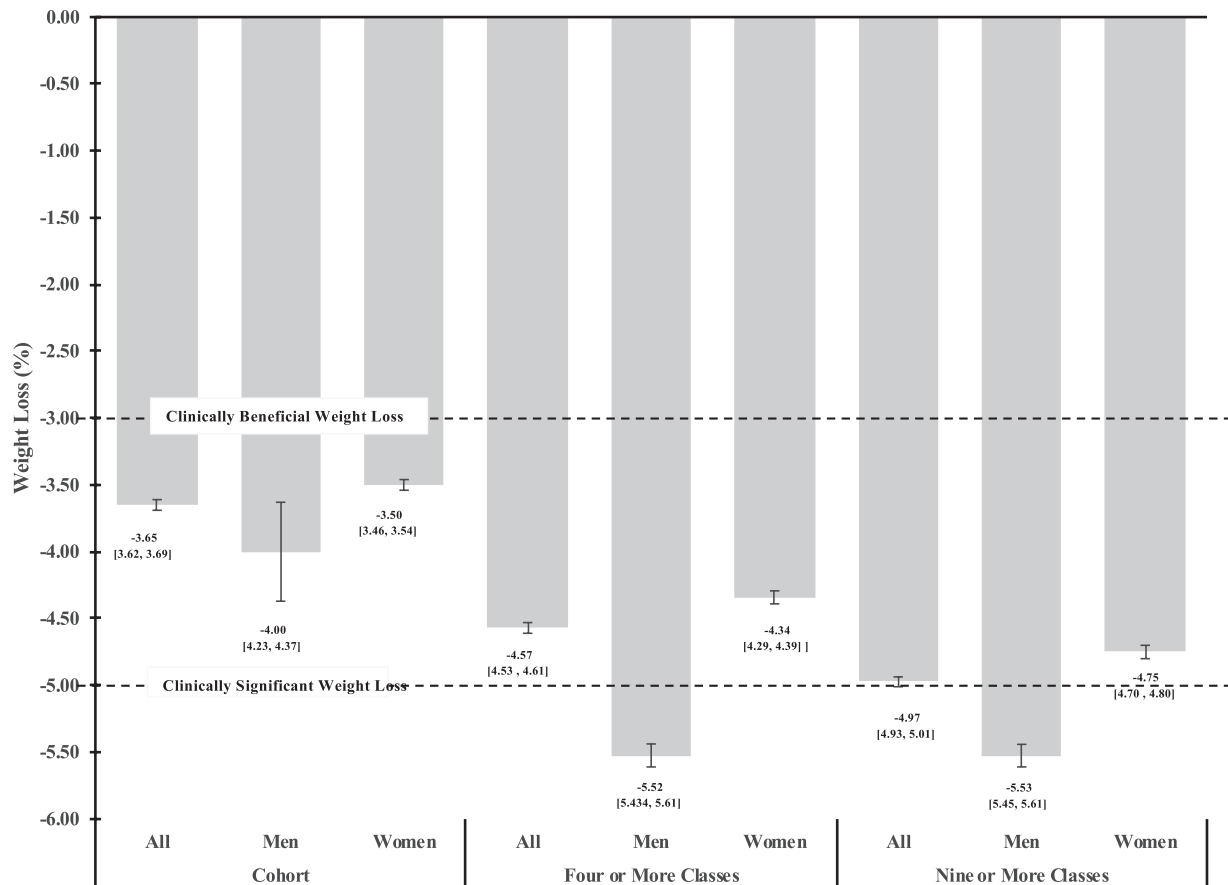


FIGURE 2. Data represent the average percent weight loss for participants irrespective of class participation (ie, all) and those participating in four or nine or more classes, respectively.

weight loss at year one, a maintenance of ~5% at 4 years and 6.0% at the end of intervention at approximately 9.7 years.²⁵ In another behaviorally oriented study, the Diabetes Prevention Program demonstrated a significant weight loss after 1 year (~7 kg) and gradual recidivism through year four, ultimately remaining ~2 kg lower than at trial entry through year 10.²⁶ While the strengths of Look

Ahead and Diabetes Prevention Program are their strong clinical approaches, questions remain regarding the implementation of weight loss programming in the workplace. An important point from all these reports is a means of providing behavioral support or the availability of program re-engagement via the ability to re-take offered programing.¹⁰

TABLE 3. Tertiary Analysis of the Study Cohort by Age Group

Age Group Analysis						
Age (yrs)	N	Men		Women		
		Mean	99% CI	N	Mean	99% CI
Weight Loss (%)						
<35	5,572	-3.15	(-3.01, -3.29)	14,398	-2.69	(-4.52, -5.10)
35-44	7,843	-3.50	(-3.38, -3.62)	19,414	-3.05	(-2.97, -3.13)
45-54	9,330	-4.18	(-4.07, -4.29)	23,512	-3.59	(-3.52, -3.66)
55-64	7,786	-4.72	(-4.58, -4.86)	18,805	-4.31	(-4.66, -4.82)
>65	1,649	-4.81	(-4.52, -5.10)	2,935	-4.65	(-4.42, -4.88)
Achieved ≥5% Weight Loss (%)						
<35	5,572	24%		14,398	20%	
35-44	7,843	27%		19,414	23%	
45-54	9,330	34%		23,512	28%	
55-64	7,786	39%		18,805	35%	
>65	1,649	41%		2,935	39%	

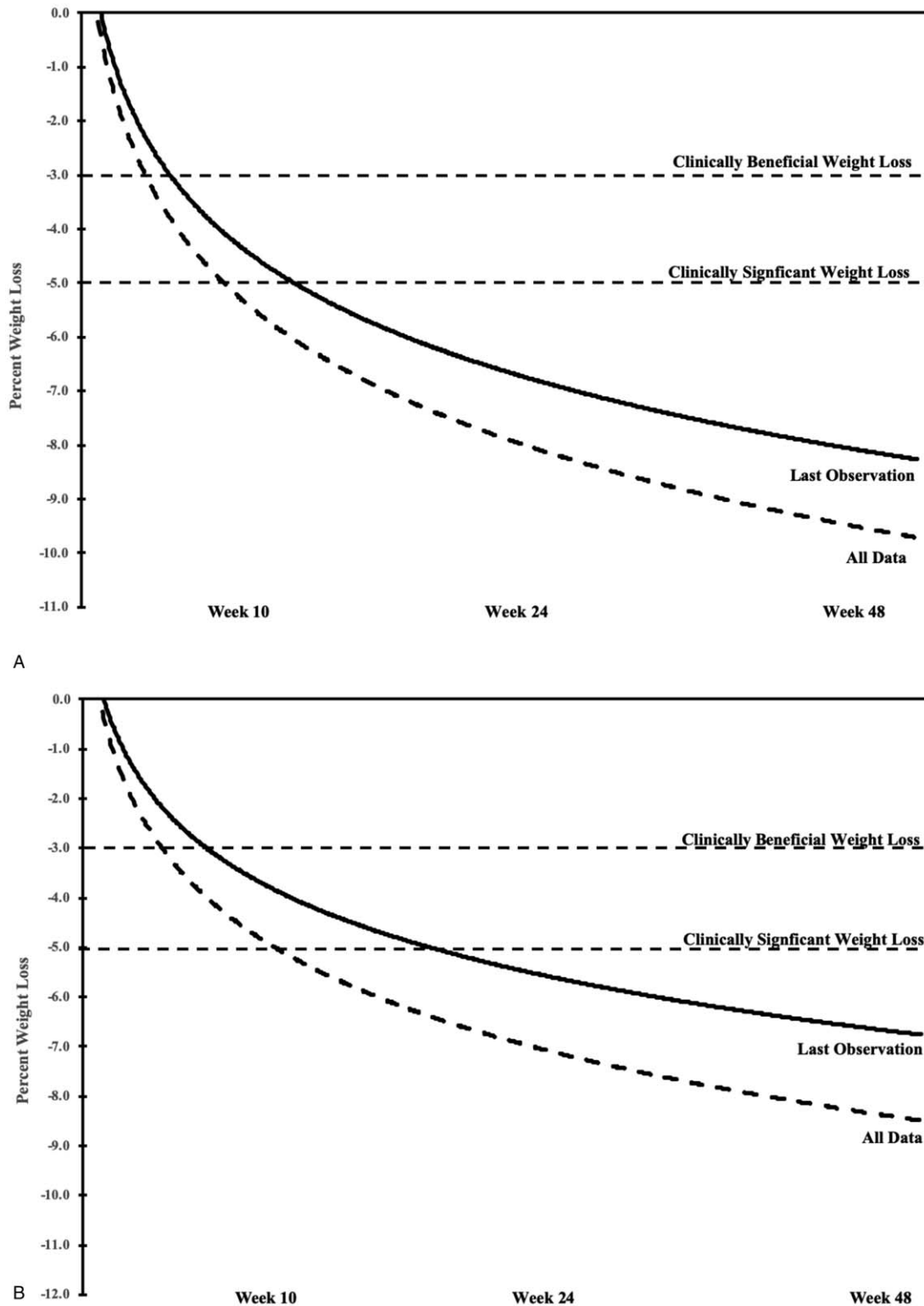


FIGURE 3. Modeled analysis of weight loss relative to weeks of class participation for men (top panel) and women (bottom panel).

Several reports support the premise that weight loss programs are effective when conducted in-person, as well as programs using web-based or telephonic-based programs.²⁷⁻²⁹ In 2001, Tate et al,³⁰ demonstrated the effectiveness of a structured Internet behavioral

weight loss program in 91 healthy, overweight adult hospital employees aged 18 to 60 years with a body mass index of 25 to 36 kg/m². In their randomized, controlled trial lasting >6-months, one group (n = 32) received one personal weight loss lesson and

access to a Web site with organized links to Internet weight loss resources. Another group ($n = 33$) received additional behavioral procedures. At the study's conclusion, the behavioral therapy group lost (mean [SD]) 4.0 (2.8) kg after 3 months and 4.1 (4.5) kg after 6 months, while those in the Internet based only group smaller weight loss changes: 1.7 (2.7) kg at 3 months and 1.6 (3.3) kg at 6 months. Despite the relatively small sample size, those undertaking a structured behavioral treatment program with weekly contact and individualized feedback demonstrated better weight loss compared with those given links to educational Websites only. In 2010, Touger-Decker et al³¹ reported on the effectiveness of a 12-week workplace intervention using an In-person and Internet-based delivery approach. All participants received identical interventions with dietitian visits at baseline and weeks 6, 12, and 26. Overall, no significant treatment effects were observed between treatment approaches and both groups demonstrated significant weight body fat, and energy intake at week-12. While this study utilized a dietitian, the findings reinforce the use of online programming within the workplace.

Recently, Horstman et al¹¹ evaluated the effectiveness of an online intervention on self-reported weight loss outcomes associated with a commercial intensive lifestyle intervention delivered electronically to employees across 96 companies. Of the 52,461 participants examined, those attending at least one session, lost an average of 2.8% of their body weight and 23% achieved a $\geq 5\%$ weight loss. Active participants ($n = 38,836$) lost an average of 3.5% body weight, with 29% achieving 5% weight loss. Completers of the program ($n = 27,164$) lost an average of 4.3% body weight, with 36% of the cohort achieving 5% weight loss. As with our study, greater amounts of weight loss were exhibited by individuals engaged in greater levels of participation. We further propose that the greater weight loss observed in our cohort for older participants was due to participating in a greater number of classes (ie, >8). A major strength of our study is that we have nearly doubled the number of participants examined in the Horstman study and show similar benefits, now adding to the literature the practical utility of such online programming efforts. Our findings are further reinforced by our previous study demonstrating that program re-engagement facilitates the net weight loss effect of such programming.¹⁰

LIMITATIONS

Our study is not without limitations. Limitations to our study include the lack of a control group and absence of dietary records. However, a 2012 systematic review and meta-analysis by Waters et al³² of 85 trials showed that no change in control group weight is typically observed in trials using control groups and that control groups receiving standard care typically lose ~ 1 kg more than control groups receiving no intervention. We also cannot report on follow-up data showing potential changes in other cardiovascular disease risk factors. In our previous studies examining this same program, however, we have demonstrated significant reductions in hypertension, metabolic syndrome, and associated risk factors.^{6,9} Therefore, it is not unreasonable to expect similar findings within our current analysis. It should also be noted that the prevalence of risk factors in the current study is self-reported. A strength of our study is that we examined a large cohort of individuals demonstrating a net weight of clinically beneficial or near clinically significant weight loss. In the current study, we have demonstrated that an online weight loss programs is effective in a corporate environment and that greater class number participation demonstrates greater benefit to participants. Based on the data presented in Figure 3 and our previous findings relative to program re-engagement, company's offering online, worksite programming should make efforts to encourage continued class participation and re-engagement when needed.

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