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The effects of two workplace weight management programs and weight loss on health care utilization and costs

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Abstract

Objectives—Compare the impact of two worksite weight management programs, WM (education) and WM+ (education plus counseling), on health care utilization and costs. Secondarily, compare the intervention groups to an observational control group of obese workers. Finally, evaluate the impact of actual weight loss on these outcomes.

Methods—Estimate the change in the WM and WM+ intervention groups. Using propensity score adjustment compare the two intervention groups with the observational control group; and compare those who lost weight with those who did not.

Results—No significant differences between the two intervention groups, or between these intervention groups and the observational control group. Those who lost weight reduced their overall health care costs.

Conclusion—To achieve weight loss and associated morbidity reductions, more extensive and intensive interventions, with more attention to motivation and compliance, are required.

Keywords

Obesity; weight loss intervention; work place; randomized controlled trial; health care utilization; healthcare costs

BACKGROUND

The health care costs of obesity are substantial,(1–4) and a large part of this cost is borne directly or indirectly by the employers of working-age adults.(5) One large study concluded that obese workers had 21% higher health care costs than those of recommended weight,(6) and that obesity, smoking, and stress were the costliest modifiable risk factors to the

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employer-sponsored health plan.(7) A recent study found a gradual increase in health claims costs with each unit of BMI increase, and that specific obesity-related comorbid conditions, such as cardiovascular disease and musculoskeletal disease were the primary drivers of the cost increase.(8) While weight loss can reduce the risk of subsequent illness,(9) the impact of worksite intervention programs not only on weight loss, but also on health care utilization and costs, remains unclear.

Available evidence indicates that there is value in worksite weight loss programs.(10–15) In general, such programs reach individuals that otherwise may not have sought clinical intervention and yield short-term weight loss of 1–2 pounds per week,(12) with a few studies that have demonstrated sustained reduction in weight over the course of 1–2 years.(11, 13, 16, 17) Unfortunately, few of these studies were randomized controlled trials (RCT). Of the RCTs that measured weight or BMI change in workplace programs, most were targeted at disease prevention and management (i.e., diabetes or cardiovascular disease),(13) and those that did show meaningful weight loss often had small sample sizes.(18–20)

Less is known about the impact of worksite weight management programs on health care costs and utilization. Studies on employee wellness programs have shown reductions in health care utilization and costs for employees who use the programs.(21–24) A study by Borah et al.,(25) found decreases in weight with program participation also saw decreases in health care spending by employees, but that study did not specifically examine the impact of a weight management program. A study by Bilget et al.,(26) examining the effects of weight change did not show a reduction in health care costs for employees who lost weight, but that study was not an evaluation of a weight management program and only a 12% of their sample had a meaningful weight change during the study.

We undertook an evaluation of two worksite-based health promotion programs for obese workers at the second largest employer in North Carolina. One program was mostly educational (WM), while the other one was more intensive, and included one-on-one behavioral coaching (WM+).(27)

Results of the primary study outcome of weight loss by study arm have recently been published.(28) While there were no clinically, or statistically, meaningful differences between the two intervention groups in weight loss or weight related behaviors, there were modest reductions in body mass index, and positive, meaningful changes in diet and physical activity for both arms. Greater engagement in the intervention was associated with more weight loss in both arms. Predictors of engagement were younger age, lower baseline BMI, and randomization to the WM+ arm. There were also positive changes in the secondary outcomes of diet and physical activity measures between baseline and follow-up.

In addition to data collected through the evaluation study itself, we also analyzed data on health care utilization and costs for the two groups of workers taking part in the interventions as well as for an observational comparison group of obese workers not taking part in either intervention. The primary aim of the current analyses was to determine the relative impact of WM and WM+ on health care utilization and costs, overall, by type of

claims (inpatient, outpatient, pharmacy), and, specifically, for those classes of claims most likely to be "obesity related".(8) We used a "difference-in-difference" analytical approach, comparing the difference between the two intervention groups in the change in these outcomes from the two year period prior to the intervention to the two years after the intervention. In secondary analyses, we combined the two groups of intervention participants and compared their outcomes to outcomes in the observational control group of obese workers not participating in either of the interventions. Finally, we evaluated the impact of actual weight loss on health care utilization and costs.

METHODS

Study Population Definition

The primary study groups were employees who participated in either the Weight Management (WM) or the Weight Management Plus (WM+) study arm as part of the Steps to Health study.(27) Obese (body mass index ≥30) employees at Duke were randomized 1:1 to the two weight management programs. The WM program is primarily educational, while WM+ also incorporates behavioral coaching sessions. Both programs were delivered to the participants by trained health coaches. The programs were each approximately 12 months in length, but the number and method of contacts between the two programs varied. In WM employees received a face-to-face meeting with their coach in the first month, had follow-up coaching calls in months 6 and 12, and received monthly mailings of health education materials. In WM+ employees received monthly counseling sessions (face-to-face in months 1, 4, 8, and 12, and the rest via telephone), as well as meetings with an exercise physiologist in months 2 and 5. They also received quarterly biometric feedback and targeted health education materials. Trained staff measured heights and weights using a Seca portable stadiometer (baseline only) and a Tanita BWB-800 scale (at all time points), and these measurements were used to calculate body mass index (BMI). To be eligible for the current analysis, participants also must have been enrolled in one of the health insurance programs offered through Duke for a minimum of 9 months in the 12 months prior to randomization and for a minimum of one month following their scheduled completion of the study intervention.

The study design also included a third group: an observational control group of employees who completed a health risk appraisal (HRA) between the dates of the first and last randomization of study participants (January 2011 and July 2012) with a BMI ≥30, but who did not participate in one of the weight management programs.

Employees were excluded from these analyses if they had bariatric surgery, an organ transplant, end stage renal disease, HIV/AIDS, or hemophilia.(29–31)

The overall study design is illustrated in Figure 1.

Data Sources

In addition to data collected specifically through the Steps to Health Study, most data used for the current analyses were obtained through the Duke Health and Safety Surveillance

System (DHSSS).(32) The extracted DHSSS data included all medical claims (inpatient and outpatient), pharmacy claims, and employee demographic and work-related variables.

Health Care Utilization and Cost Outcome Measures

Health care utilization measures include mean monthly rates for emergency room visits, hospital admissions, and days of stay in the hospital. Utilization rates are expressed here as mean events per 1000 months of health plan participation. For each study period (pre- and post-intervention) individual utilization rates were calculated as the sum of events, divided by the number of months of insurance plan participation during the time period.

Analyses included all claims and costs incurred including costs paid by the insurance plan as well as deductibles and copays incurred by the two study group participants and the observational controls. Claims for illnesses unlikely to benefit from study participation during the study time window (i.e. s, fertility treatments,, trauma, and burns) were excluded based on Healthcare Cost and Utilization Project (HCUP) Clinical Classification System (CCS) diagnosis groupings.(29) All costs were adjusted to 2013 dollars using the BLS Medical Care Consumer Price Index (CPI).(33) Categories of expenditures included mean monthly inpatient and outpatient medical inpatient costs, pharmacy costs, and total costs (pharmacy plus medical). Medical costs were further categorized by Major Diagnostic Category (MDC) and drug costs were further categorized by general therapeutic class based on the National Drug Code (NDC) using Redbook classifications. Classification procedures and the choice of MDC and drug categories for these sub-analyses were based on significant associations with BMI observed in our prior work.(8)

Comorbidities and Propensity Score

Medical and pharmacy claims during the 12 months of insurance coverage prior to the index date (randomization date for study subject or HRA date for controls) were used to calculate several measures of disease prevalence and co-morbidity. Individual prevalent health conditions at baseline commonly associated with obesity (coronary artery disease, congestive heart failure, diabetes, hypertension, depression, and peripheral vascular disease) were identified using the HCUP CCS(29), Elixhauser comorbid conditions(34), or the National Committee for Quality Assurance (NCQA) HEDIS classification system.(35, 36)

Two baseline summary measures of comorbidity were calculated: the combined Chronic Illness and Disability Payment System (CDPS) and the Medicaid Rx system (MRX)(37), and the Elixhauser comorbidity measure.(34, 38)

To compare the intervention groups to those not taking part in the interventions, we used propensity adjustment to balance risk factors and covariates.(39) Propensity adjustment using a regression model is designed to simulate results that might be obtained from a randomized control trial,(40) the assumption is that by conditioning on the propensity score systematic differences between treated and untreated subjects are eliminated. The propensity score includes demographic variables (age, gender, and race/ethnicity), health factors (BMI, smoking status), occupational group, and comorbidity scores. For a full list of the included variables in the propensity score see appendix 1.

Covariate balance achieved using the propensity score was assessed by calculating the standardized differences between the intervention arm (WM and WM+) and the controls, for each covariate.(41) We considered absolute standardized differences less than 0.10 as an indication that adequate covariate balance was achieved.(42)

Analyses

Descriptive analyses were used to compare baseline characteristics of study participants and observational controls. Continuous variables were compared by ANOVA, and any variables that departed significantly from normal distribution were compared using the Wilcoxon rank-sum test. Dichotomous or categorical variables were compared using the chi-square test of general association.

We calculated mean utilization and costs by study arm and time period as an initial comparison (using an intent-to-treat approach). Effects of study participation on mean monthly health care utilization and costs relative to the observational controls were estimated using a difference-in-difference regression approach. Our initial model compared those randomized to the WM+ or WM study arms and did not include a propensity score as this was a randomized trial. The comparison of the combined study arm (WM and WM+) to the observational controls used similar models with propensity score adjustment for baseline covariates.

The parameter for the interaction of study arm with follow-up period is the desired difference-in-difference parameter estimate. We used a repeated measures negative binomial model with a log link function based our prior analyses of obesity related costs among this employee population.(28) In order to account for potentially correlated outcome data, all models were based on use of generalized estimated equations (GEE) assuming an exchangeable correlation structure, also based on our prior analyses.

We also compared the pre and post-intervention utilization and costs among WM+ and WM participants based on change in BMI during the intervention. Individuals in the WM+ or WM were classified as those losing weight and those not losing or even gaining weight during the intervention. Effects of weight loss on mean monthly health care utilization and costs relative to the observational controls were estimated using an approach similar to that used for the primary analyses. These analyses employed repeated measures negative binomial models with a log link function with direct adjustment for age, gender, race/ethnicity, smoking status at baseline, BMI at baseline, and baseline comorbidities. Some cost and utilization categories were combined for these sub-analyses for greater model stability.

All statistical analyses were conducted using SAS 9.3.(43)

RESULTS

Table 1 presents sample characteristics for the study by arm. Data from a total of 420 obesity study participants was used in these analyses (n=211 in WM, and 209 in WM+), and data from an additional 923 observational controls were used (see Figure 2 for a CONSORT

diagram). Participants in either study arm were younger than the observational controls (mean age was 43.7 in WM, 43.5 in WM+, 45.1 in controls, p=0.01), less likely to have diabetes (6.2% in WM, 12.9% in WM+, 28.5% in controls, p<0.001), less likely to have hypertension (27.0% in WM, 20.1% in WM+, 30.0% in controls, p=0.015), had a lower Elixhauser Comorbidities Index (0.96 in WM, 0.97 in WM+, 1.19 in controls, p=0.0005), and less likely to have participated in any disease management programs offered in the workplace (21.8% in WM, 18.7% in WM+, 29.0 in controls, p=0.001). There were also differences in the sample distribution by race, or smoking status. After propensity score adjustment standardized differences were less than 0.10 for all covariates included in the propensity score except the Elixhauser Comorbidities Index. Details of propensity score covariates and evaluation can be found in the online supplemental materials.

There were no significant differences in the change in health care costs or utilization between the two study arms (Table 2). Since there were no significant differences, we combined participants in the WM and WM+ arms for subsequent analyses.

When we compared the combined study participants to the observational controls in propensity score adjusted models we also found no significant differences between the intervention groups and the observational group on changes in health care costs or utilization (Table 3).

Finally, we explored the relationship between weight loss and changes in health care costs or utilization in the study participants (Table 4). We found that 355 of 420 study participants had a weight data available at the immediate post-intervention time point. Of those, 197 people had a measured weight loss; the rest had either no change or had gained weight since the pre-intervention assessment. In covariate adjusted regression difference-in-difference models employees who lost weight had a reduction in their mean monthly total costs (from $554 to $434), while those who did not lose weight had an *increase* in total costs (from $441 to $512). Essentially, those who lost weight reduced their monthly health care costs by $191 more than those who did not (p=0.049). This was primarily driven by the medical claims costs ($203 reduction, p=0.023), rather than pharmacy claims costs ($11 reduction, p=0.322). In particular, there was a marked reduction in costs for obesity related MDCs for those who lost weight (from $204 to $131), and again *an increase* for those who did not lose weight (from $135 to $171), that represents a mean reduction of $108 monthly for weight loss (p=0.017).

DISCUSSION

The results of the current analyses show that there were no significant differences in health care utilization or costs between the two intervention groups, or between the intervention groups and the observational control group in adjusted analyses. However, those who actually lost weight, regardless of group, reduced their overall health care costs, particularly in outpatient costs and costs of obesity related illness.

While bariatric surgery and to a lesser extent pharmaceutical treatment can reduce weight, these options have risk of side effects and are costly. Behavioral interventions conducted as

part of RCTs to date, especially in obese individuals who are not highly motivated, have variable results but, usually have not been highly successful, either in terms of weight loss or in terms of impact on health care costs.(10, 15, 44, 45) This is true both in general,(46–48) and for interventions based in the workplace specifically.(30, 45) Our study of two workplace weight management programs is consistent with this pattern. The modest positive effects of weight loss on behaviors and the lack of impact on health care costs and utilization observed in this study indicate that to achieve weight loss through a worksite program, and in particular morbidity reductions strong enough to impact employer health costs, more extensive and intensive interventions are required, with more attention to motivation and compliance. Such interventions may include changes in the work environment,(15) social support in the form of group session(49) or competitions,(50, 51) or more frequent in-person contacts.(52)

Additional factors should be considered and included in future interventions and studies. Qualitative data from interviews and/or focus groups with participants and study personnel could provide context for why some participants were more successful at losing weight resulting in reduced overall healthcare costs. Identification of facilitators and barriers(48, 53) to participation and adherence could inform changes needed to engage participants and elicit greater weight loss.

These analyses also illustrate the utility of the comprehensive workers health information systems capturing longitudinal data such as the Duke Health and Safety Surveillance System.

Strengths and limitations

The strengths of the Steps to Health study include the relatively large sample size, the racial diversity of the sample, and the use of a randomized control study design. Although all data are from this one employer, this employer is the second largest in North Carolina, and the results should be broadly generalizable to the adult working population given the breadth and diversity of the workers in terms of gender, age, and race/ethnicity. The use of both medical and pharmacy claims data further strengthens the findings. Another strength of this study is that it evaluated two established programs in the workplace that had support from management.

While the study attempted to capture a broad spectrum of factors that may evidence change, this resulted in potentially high participant burden. The participants were invited into the study – i.e. their motivation was likely not as strong as for those who seek out weigh loss programs on their own accord. We also conducted a number of statistical comparisons.

Implications and Conclusions

The modest positive effects of weight loss and behaviors and the lack of impact of assignment to two weight management programs on health care costs and utilization observed in this study, and in the earlier published analysis of this data,(8) indicate that to achieve weight loss through the work place, and in particular morbidity reductions strong enough to impact employer health costs, more extensive and intensive interventions are required, with more attention to motivation and compliance.

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Appendix 1

Covariates Included in the Propensity Score Logistic Model

Covariate	Data Type	Description
Age	Continuous	Age at baseline start
Gender	Dichotomous	Male, Female
Race/Ethnicity	Categorical	White, Black, Other
Body Mass Index (BMI)	Continuous	BMI at cohort entry
Cohort Entry Year	Categorical	Year of cohort entry
Cigarette Smoking Status	Categorical	Never, past, current smoker
Health Plan Type	Categorical	Employer health plan
Occupational Group	Categorical	Employee job group
Comorbidity Risk Score	Continuous	CDPS-Rx Summary Score

Covariate	Data Type	Description
Elixhauser Comorbidity Index	Continuous	Count of Elixhauser Risks
CDPS-Rx Category Anti_coagulants Cancer_high Cancer_low Cardiac Cardiovascular_ex_low Cardiovascular_low Cardiovascular_medium Cerebrovascular_low CNS_low Diabetes Diabetes_type2_low Diabetes_type1_medium Diabetes_type2_medium Eye_low Eye_very_low Gastro_low Gastro_medium Genital_extra_low Hematological_medium Infectious_low Inflammatory_Autoimmune Malignancies Metabolic_high Metabolic_medium Metabolic_very_low Parkinsons_Tremor Psychiatric_low Psychiatric_medium Psychiatric_medium_low Psychosis_Depression Pulmonary_low Pulmonary_medium Renal_low Renal_very_high Seizure_disorders Skeletal_low Skeletal_medium Skeletal_very_low Skin_low Skin_very_low	Dichotomous for each CDPS-Rx category	CDPS-Rx condition or disease category using combined ICD-9 diagnoses and pharmacy data using CDPS-Rx Version 5.3. Only CDPS-Rx categories that had five or more prevalent cases in the combined cohort of obesity study participants and controls were included.

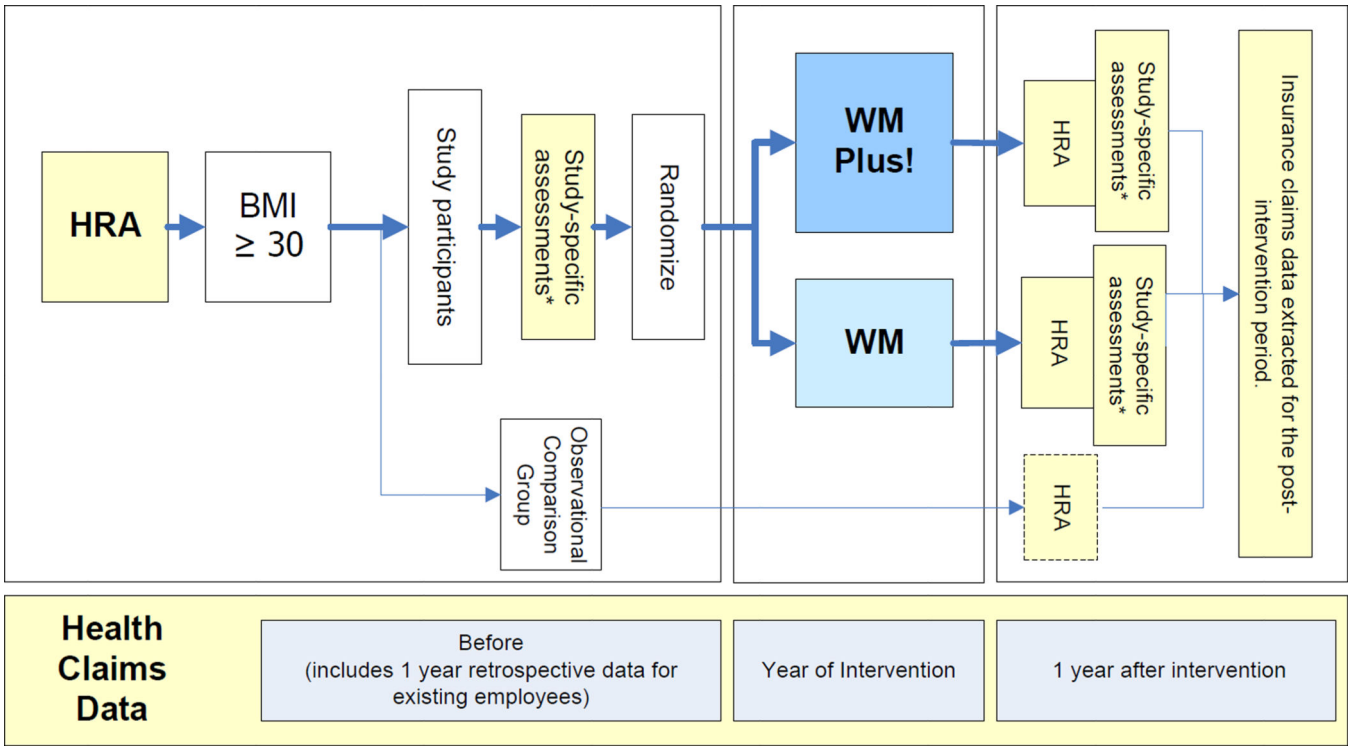

Figure 1.
Study design

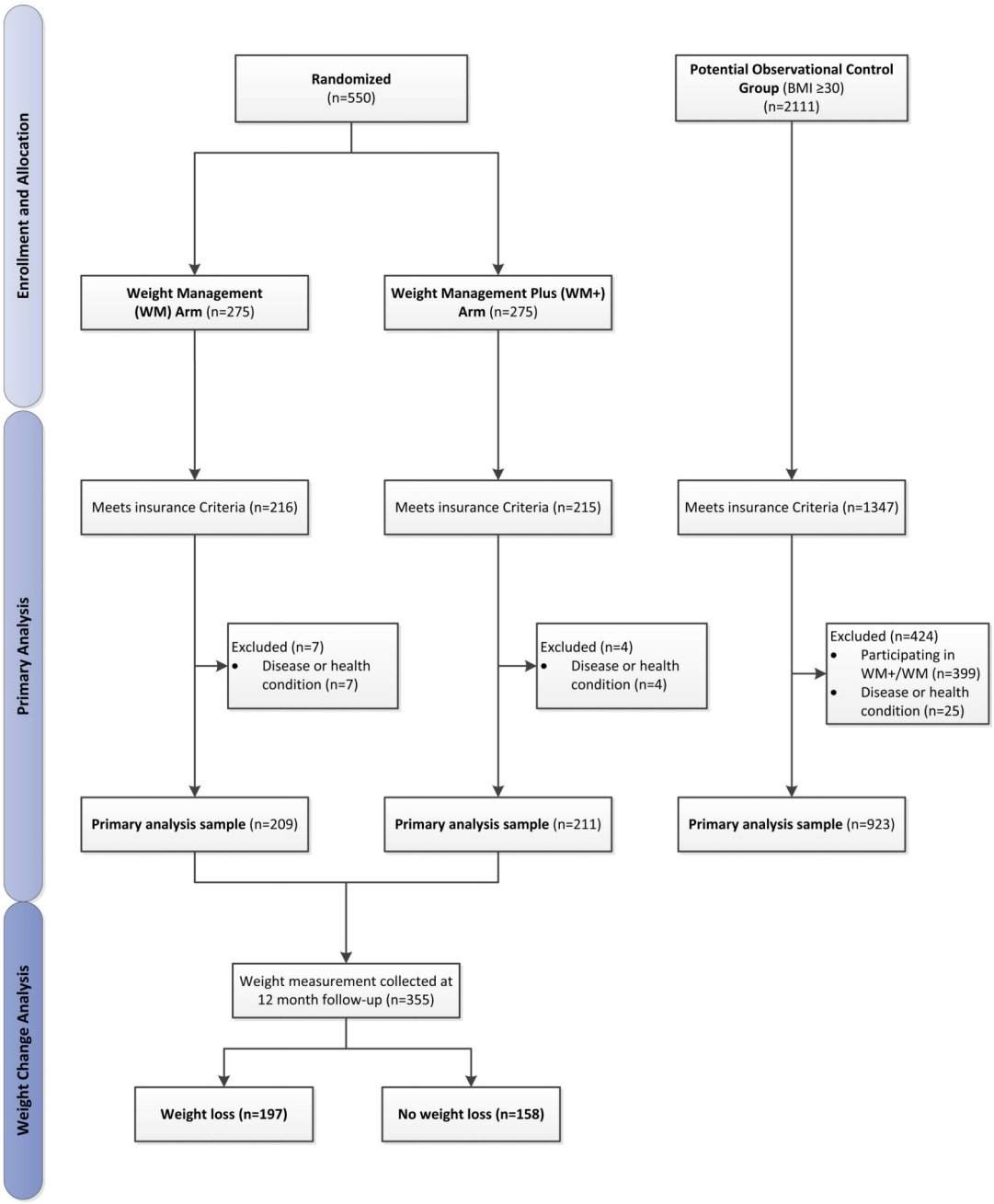

Figure 2.
CONSORT diagram

Table 1

Characteristics of the Steps to Health Study participants and controls at baseline[1]

Covariate	Obesity Study		Obs Controls (N=923)	P-Value[2]
	WM+ (N=209)	WM (N=211)		
Mean Age in years (SE)	43.5 (0.66)	43.7 (0.66)	45.1 (0.34)	0.005
% Male	15.3	17.1	20.6	0.058
Race/Ethnicity (%)				0.012
White	38.3	46.9	51.4	
Black	59.3	51.7	46.8	
Other	2.4	1.4	1.8	
Obesity-Related Disease Prevalence (%)				
Diabetes	12.9	6.2	28.5	<0.001
Hypertension	20.1	27.0	30.0	0.015
Coronary Artery Disease	1.4	2.8	2.0	0.816
Congestive Heart Failure	1.0	0.0	0.7	0.701
Peripheral Vascular Disease	1.0	1.4	0.5	0.200
Depression	8.1	10.0	9.0	0.974
Mean CDPS_Rx Risk Score (SE)	2.40 (0.05)	2.40 (0.05)	2.50 (0.03)	0.052
Mean Elixhauser Comorbidities (SE)	0.97 (0.08)	0.96 (0.07)	1.19 (0.04)	0.001
Mean BMI [kg/m2**] (SE)**	37.1 (0.43)	37.0 (0.41)	36.9 (0.21)	0.707
Occupational Group (%)				0.873
Administrative and Managerial	10.6	16.6	16.4	
Clinical Technical/Professional	1.4	1.0	0.8	
Faculty/Clinical/Professional	8.2	8.1	6.5	
Nurse Aides/Medical Assistant	4.8	3.8	4.6	
Nursing/Nurse Managers	12.0	11.4	12.6	
Office Support	34.6	28.9	28.7	
Scientific/Electronic/Research Technology	9.1	16.1	12.7	
Service	13.5	9.5	11.6	
Skilled Crafts	1.9	1.9	2.2	
Technical/Clinical Labs	2.4	1.9	2.2	
All Other	1.4	1.0	2.0	
Smoking Status (%)				0.011
Never	68.9	66.4	65.6	
Past	26.3	29.9	25.8	
Current	4.8	3.8	8.9	

Covariate	Obesity Study		Obs Controls (N=923)	P-Value[2]
	WM+ (N=209)	WM (N=211)		
Health Plan (%)				<0.001
A	16.2	15.2	7.6	
B	6.2	5.7	3.5	
C	8.6	7.1	5.4	
D	65.1	65.1	82.3	
Missing	3.8	3.8	1.2	
Mean Months of Baseline Health Insurance (SE)	11.92 (0.03)	11.90 (0.03)	11.96 (0.01)	0.034
Disease Management Program Participation (%)	18.7	21.8	29.0	0.001
High Cost Individuals (%)[3]	1.91	0.95	0.87	0.388

[1] The baseline period for these analyses includes the 12 months prior to study entry.

[2] P-value comparing obesity study participants (WM and WM+) as described in methods

[3] Individuals with >$100,000 costs per year in any follow-up period.

Table 2

Comparison of WM+ and WM Participants Using a Difference-in-Difference Regression Model (intent to treat analysis)[1]

Outcome Measure	Model Mean Costs or Utilization				P-value
	WM+ (N=209)		WM (N=211)		
	Pre Intervention	Post Intervention	Pre Intervention	Post Intervention	
Mean Monthly Costs					
Total Cost	447	541	565	503	0.103
Outpatient	236	315	327	350	0.209
Inpatient	98	107	118	51	0.282
Pharmacy	101	104	106	90	0.081
Emergency Room	12	15	14	12	0.243
Monthly Costs by MDC and Rx Category					
MDC 1, Nervous system	23	27	24	13	0.297
MDC 3, Ear, nose, mouth, and throat	18	21	28	23	0.451
MDC 5, Circulatory system	32	48	48	58	0.778
MDC 8, Musculoskeletal	71	79	82	59	0.417
MDC 10, Endocrine, nutritional & metabolic	13	14	13	17	0.415
Rx, Cardiovascular agents	14	10	17	11	0.692
Rx, Central nervous system agents	12	12	21	18	0.773
Rx, Hormones and synthetic substances	19	29	16	21	0.393
Utilization per 1000 Ins. Mo.					
Emergency Room Visits	19.3	21.7	20.5	18.5	0.393
Hospital Admissions	4.2	4.7	6.3	1.9	0.040
Hospital Stay Days	15.1	15.6	25.8	8.2	0.152

[1] Difference- in-difference negative binomial, GEE regression model results, without propensity score adjustment. P-value represents the interaction of study arm and time period in a difference-in-difference context. Results rounded to nearest whole US dollar

Table 3

Relationship between study participation and changes in health care utilization and costs [1]

Outcome Measure	Propensity Score Adjusted Mean Costs or Utilization				P-value[2]
	WM + WM+ (N=420)		Controls (N=923)		
	Pre Intervention	Post Intervention	Pre Intervention	Post Intervention	
Mean Monthly Costs					
Total Cost	529	548	483	498	0.971
Outpatient	276	326	251	259	0.231
Inpatient	128	102	76	76	0.641
Pharmacy	115	106	140	144	0.153
Emergency Room	14	13	11	12	0.826
Monthly Costs by MDC and Rx Category					
MDC 1, Nervous system	29	23	13	17	0.354
MDC 3, Ear, nose, mouth, and throat	23	22	21	17	0.516
MDC 5, Circulatory system	44	60	38	31	0.256
MDC 8, Musculoskeletal	77	70	52	60	0.453
MDC 10, Endocrine, nutritional & metabolic	14	17	16	17	0.781
Rx, Cardiovascular agents	18	14	21	14	0.299
Rx, Central nervous system agents	18	16	23	16	0.115
Rx, Hormones and synthetic substances	23	29	24	30	0.896
Utilization per 1000 Ins. Mo.					
Emergency Room Visits	20.7	20.9	19.3	18.6	0.773
Hospital Admissions	6.2	4.3	4.3	3.5	0.641
Hospital Stay Days	24.9	15.8	13.0	10.0	0.689

[1] WM and WM+ were combined for these analyses and compared to the observational controls.

[2] Difference- in-difference negative binomial, GEE regression model results with propensity score adjustment. P-value represents the interaction of study arm and time period in a difference-in-difference context. Results rounded to nearest whole US dollar

Table 4

Relationship between weight loss and changes in health care utilization and costs[1]

Outcome Measure	Model Adjusted Mean Costs or Utilization[2]				Estimated Impact of *Weight* Loss	P-value[3]
	Weight Loss (N=197)		No Weight Loss (N=158)			
	Pre Intervention	Post Intervention	Pre Intervention	Post Intervention		
Mean Monthly Costs						
Total Cost	554	434	441	512	−191.0	0.049
Outpatient, Inpatient, and ER	477	342	348	417	−203.3	0.023
Pharmacy	83	74	81	83	−10.7	0.322
Monthly Costs by MDC and Rx Category						
Obesity-related MDC Combined	203.5	131.3	135	171	−107.6	0.017
Obesity-related Rx Combined	41.2	42.5	43	41	3.6	0.632
Utilization per 1000 Ins. Mo.						
Emergency Room Visits	15.9	14.8	18.1	18.9	−1.9	0.713
Hospital Admissions[3]	6.8	1.5	2.7	1.0	−3.6	0.660
Hospital Stay Days[3]	21.9	3.2	7.0	3.3	−15.1	0.385

[1] Individuals in the WM or WM+ classified as those losing weight and those not losing or gaining weight during the study.

[2] Difference- in-difference negative binomial GEE regression models adjusted for age, gender, race/ethnicity, smoking status at baseline, BMI at baseline, and baseline comorbidities. P-value represents the interaction of study arm and time period in a difference-in-difference context. Results rounded to nearest whole US dollar

[3] GEE models failed to converge. Non-GEE model results with variance adjusted by the scaled deviance are shown