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Racial Differences in Weight Loss among Adults in a Behavioral Weight Loss Intervention: Role of Diet and Physical Activity

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Abstract

Background—African-Americans lose less weight during a behavioral intervention compared with Whites, which may be from differences in dietary intake or physical activity.

Methods—Subjects (30% African-American, 70% White; n=346; 42.4±9.0 yrs.; BMI=33.0±3.7 kg/m^2) in an 18-month weight loss intervention were randomized to a standard behavioral (SBWI) or a stepped-care (STEP) intervention. Weight, dietary intake, self-report and objective physical activity, and fitness were assessed at 0, 6, 12, and 18 months.

Results—Weight loss at 18 months was greater in Whites (−8.74 kg with 95% CI [−10.10, −7.35]) compared with African-Americans (−5.62 kg with 95% CI[−7.86, −3.37]) (p=0.03) in the SBWI group and the STEP group(White:−7.48 kg with 95% CI[−8.80, −6.17] vs. African-American:−4.41kg with 95% CI[−6.41,−2.42]) (p=0.01). Patterns of change in dietary intake were not different between groups. Objective physical activity changed over time (p<.0001) and was higher in Whites when compared to African-Americans (p=0.01).

Conclusions—Whites lost more weight (3.10 kg) than African-American adults. Although there were no differences in dietary intake, Whites had higher levels of objective PA and fitness. Thus, the discrepancy in weight loss may be due to differences in PA rather than dietary intake. However, the precise role of these factors warrants further investigation.

Keywords

race/ethnicity; obesity; weight loss; physical activity; diet

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This study is registered at Clinical Trials Registration, clinicaltrials.gov (NCT00714168).

INTRODUCTION

The epidemic of overweight and obesity continues to be a serious public health concern with considerable consequences.[1–4] The current prevalence of overweight (body mass index (BMI) > 25 kg/m^2) and obesity (BMI > 30 kg/m^2) in American adults is estimated to be 68.5% and 34.9%, respectively.[5] Although these estimates represent an overall slowing in the rise of obesity since 2003–2008, data suggests that this is not necessarily the case in all racial/ethnic groups. African-American adults in particular have been shown to have disproportionately higher rates of overweight (76.2% vs. 67.2%) and obesity (47.8% vs. 32.6%) when compared to their white counterparts that do not appear to be decreasing.[5] Consequently, African-Americans also have higher rates of obesity-related co-morbidities, such as hypertension, type II diabetes, and some forms of cancer.[1,2,6,7]

Behavioral weight loss interventions have been shown to effectively treat overweight and obesity, producing a clinically meaningful average weight loss of about 10.7 kg, or 10–11% of initial body weight in approximately 32 weeks.[8] However, these interventions may be less effective for weight loss in African-Americans compared to Whites, as African-American adults typically lose 2.1 – 5.1 kg less than White adults.[9–13] The Diabetes Prevention Program revealed that about half as many African-Americans achieved the 7% weight loss goal at 6 months when compared to the Whites. [10,11]

We have recently reported the promising weight loss benefits of a stepped-care intervention approach (STEP), defined as a low-intensity intervention that only increases in intensity and contact when pre-determined weight loss goals are not met, compared to a standard behavioral intervention (SBWI).[14] However, the response to these interventions by race has not been examined and so this investigation provides an opportunity to evaluate differences in response between African-Americans and Whites.

This study also examined components of energy balance, physical activity and energy intake. Resting metabolic rate, cardiorespiratory fitness, and energy expenditure from physical activity may be lower in African-Americans compared to Whites,[15–22] which may impact body weight changes. While much of the data to support these ideas have stemmed from self-reported physical activity, conclusions from limited available objective data have varied. Accelerometry data from NHANES have suggested that physical activity levels in African-Americans were equivalent to or higher than their White counterparts,[17] while armband data from the Energy Balance Study showed African-American women spent significantly more time in sedentary and light activity, and less time in moderate-to-vigorous activity compared to White women.[16] This study also showed that African American women had a lower resting metabolic rate (approximately 100kcal/day) than White women, with low cardiorespiratory fitness explaining 25% this difference.[16] It has been theorized that cardiorespiratory fitness may influence metabolic rate through differences in physical activity, sympathetic nervous system activation, in muscle structure and fiber type, or in substrate cycling.[15,16] However there is limited research directly comparing and examining objectively measured physical activity and cardiorespiratory fitness over time in African-Americans and Whites during a weight loss intervention.

Alternatively, racial differences in weight loss may be attributed to differences in energy intake or diet composition.[18,19,23,24] However, few studies have compared energy intake and diet composition in response to a weight loss intervention between African-Americans and Whites.

Thus, the current investigation aims to examine the potential differences in weight loss, self-reported and objectively measured physical activity, and dietary intake between African-American and White adults in response to SBWI and STEP interventions. In addition, measures of body composition, fitness, resting heart rate, and resting blood pressure will also be compared.

METHODS and PROCEDURES

This was a randomized clinical trial conducted at two clinical sites (University of Pittsburgh and University of North Carolina at Chapel Hill) from May 2008 through September 2011. Subjects were recruited using strategies that included television and newspaper advertisements. Primary eligibility criteria included a body mass index (BMI) between 25.0 to <40.0 kg/m^2 and age between 18–55 years. Exclusionary criteria included history of cardiovascular disease, the presence of a medical condition that would affect body weight, contraindicate reducing energy intake or increasing physical activity. Additional exclusionary criteria were taking medication that would affect body weight or heart rate response to exercise, sustaining a weight loss of >4.5 kg within the past 6 months, or regular participation in physical activity (>20 min/d on >3 days/wk) over the prior 6 months. Women pregnant within the past 6 months, currently pregnant, or planning on becoming pregnant within the subsequent 18 months were excluded. Subjects completed a medical history and a physical activity readiness questionnaire,[20] provided written clearance from their physician, and provided written informed consent prior to participation. Study procedures were approved by the Institutional Review Boards at the University of Pittsburgh and University of North Carolina at Chapel Hill.

Eligible participants were randomized to one of two intervention groups, a standard behavioral weight loss intervention (SBWI) or a stepped-care intervention (STEP). Randomization was stratified within each clinical site based on gender and ethnicity (white or non-white). Full details describing the study protocol and methods have been described elsewhere [14] and will be reviewed briefly here.

Outcome Assessments

Weight and self-reported physical activity were assessed at baseline, 3, 6, 9, 12, 15, and 18 months. Resting heart rate and blood pressure, waist girth, body composition, fitness, objective physical activity, and dietary intake were measured at baseline, 6, 12, and 18 months. Weight was assessed to the nearest 0.1 kg using a digital scale with the subject clothed in a cloth hospital gown or light-weight clothing with shoes removed. Height was measured at baseline using a calibrated stadiometer to the nearest 0.1 cm. BMI was computed as kg/m^2.

Lean body mass (LBM) was assessed using bioelectrical impedance and computed using a prediction equation[21] and then used to compute percent body fat. Waist circumference was measured horizontally at the level of the umbilicus, with data represented as the average of two measures that differed by ≤1.0 cm.

Self-reported physical activity was measured using a questionnaire.[25,26] Objective physical activity was measured using an armband (SenseWear Pro Armband, BodyMedia, Inc.) device worn for a period of one week during all waking hours. Moderate-to-vigorous physical activity (MVPA) was defined as the sum of minutes from bouts of activity that were >10 minutes in duration performed at >3 metabolic equivalents (METS) per minute.

The Block Food Frequency questionnaire was used to provide an estimate of self-reported energy intake (kcal/d) and percent of macronutrient composition (fat, carbohydrates, protein) of the diet.[27,28]

Following a 5 minute seated rest period, resting heart rate was measured by palpation. Resting blood pressure was then manually measured in duplicate and was represented as the average of two measures in which systolic pressure (SBP) differed by ≤10 mmHg and diastolic pressure (DBP) differed by ≤6 mmHg.

Fitness was assessed using a submaximal graded exercise treadmill test terminated at ≥85% of age-predicted maximal heart rate (220 minus the age of the subject). Termination heart rate was measured by electrocardiography (ECG) and any subject determined to have abnormalities on the ECG or possessed other contraindications to exercise were referred to their primary care physician for evaluation prior to proceeding with this study. Fitness was defined as the time (minutes) to achieve 85% of age-predicted maximal heart rate.

Interventions

As previously described,[14] participants were randomized to one of two intervention groups (SBWI or STEP) that both included group behavioral sessions, and identical diet and physical activity recommendations. Both groups decreased energy intake to 1200–1800 kcal/d (20%−30% fat) depending on starting body weight. Physical activity was prescribed to be of moderate-to-vigorous intensity (11–15 on the 15-point rating of perceived exertion (RPE) scale[20]) starting at 100 min/wk and progressing to 300 min/wk by week 24. All subjects were instructed to self-monitor food intake and physical activity in a weekly diary, and interventionists reviewed these upon completion with feedback provided to the subject in an attempt to maximize adherence to the recommendations of the study.

Participants randomized to the SBWI group attended weekly group sessions for the first 6 months, biweekly sessions in months 7–12, and monthly sessions in months 13–18. The participants in the STEP group attended monthly group sessions throughout the 18 months, combined with additional contact and strategies only if pre-determined weight loss goals were not achieved at 3 month intervals. The weight loss goals were 5% at 3 months, 7% at 6 months, 10% at 9 months, and remained at 10% at 12, 15, and 18 months for all subjects. Intervention details have been published previously.[14]

Statistical Analysis

Statistical analyses were performed using SAS (version 9.2), with the type I error rate fixed at 0.05 (two-tailed). Analysis dataset included 346 randomized participants who were either non-Hispanic White or African American based on self-reported race/ethnicity. Normality of outcome variables was checked using the Kolmogorov-Smirnov test. Differences between White and African American participants in baseline characteristics were examined using the Chi-square test for categorical variables and the Student's T-test or Wilcoxon rank sum test for continuous variables.

Weight, weight change, BMI, waist circumference, % body fat, resting heart rate, resting SBP and DBP, fitness, self-reported physical activity, physical activity measured using the armband, dietary intake, % fat intake, % carbohydrate intake, and % protein intake were analyzed using separate mixed effects models using the first-order autoregressive dependence structure or AR(1). Each mixed effects model included covariate adjustment for clinical site and gender because both were randomization stratification factors. Inferences were focused on the effects of race, time, and race by time interaction. The three-way interaction between race, time, and treatment and all two-way interactions of those three variables were also included in the models. For the primary outcome, weight change from baseline was calculated and modeled using a mixed effects model with 6 time points adjusting for baseline weight in the model as a covariate.

Missing data were handled through multiple imputation implemented using SAS procedures PROC MI and PROC MIANALYZE. For each outcome, ten datasets were imputed and results were then combined. Least square means along with the 95% confidence intervals are presented in the tables.

RESULTS

Participants in the current investigation were sedentary, overweight and obese adults, with a mean age of 42.4±9.0 years and a mean BMI of 33.0±3.7 kg/m^2. Baseline demographic characteristics of the participants, separated by racial groups, were similar and shown in Table 1. There were no significant baseline differences between racial groups for gender, weight, body mass index, or education level. There was a significant difference ($p<0.01$) in age between races, with African-Americans being slightly younger (40.4±8.7 vs. 43.2±9.0 years) in the intent-to-treat sample (Table 1). Baseline characteristics separated by treatment group have previously been published.[14]

Retention and Adherence

A total of 363 participants were randomized to one of two groups, 165 to SBWI and 198 to STEP. Results are presented based on analyses of the 346 participants randomized that were self-classified as either White (n=243) or African-American (n=103). Two sensitivity analyses, which only included a select subgroup of participants, were performed to investigate the robustness of the results found in the full sample of all randomized participants. The first sensitivity analysis used only the subset of randomized subjects who provided assessment data at 18 months (n=250). The second sensitivity analysis was

performed excluding participants deemed ineligible by investigators due to pregnancy, relocation, or a non-study-related medical condition. The pattern of findings from both of these analyses was similar to what is reported for the analyses based on the 346 randomized subjects, thus, we only report the results of those analyses.

Process measures of attendance at intervention sessions and return of intervention diaries were also analyzed to compare Whites and African-Americans across the 18 month study period. Because of differences in intervention, data for the Standard intervention and Stepped-Care intervention were analyzed separately. Data were not normally distributed and therefore were analyzed using Wilcoxon Ranked Sum test, with results presented as median and interquartile range (IQR). Whites completed significantly more intervention contacts than African-Americans in both the Standard Intervention (51.4% [IQR: 41.7%, 60.0%] vs. 37.7% [IQR: 14.8%, 53.4%]; p=0.0004) and Stepped-Care Intervention (36.2 [IQR: 23.3, 51.6] vs. 26.8 [IQR: 18.2, 33.4]; p=0.0026). Whites also returned more intervention diaries than African-Americans in both the Standard Intervention (32.0 [IQR: 16.0, 58.0] vs. 14.0 [IQR: 6.0, 35.0]; p=0.0003) and Stepped-Care intervention (27.0 [IQR: 10.0, 48.0] vs. 18.5 [6.0, 35.0]; p=0.0096).

Weight and Body Composition

Both Whites and African-Americans had significant weight loss across the 18-month intervention, with a significant race*time interaction observed (p=0.0001) (Figure 1). Weight loss at 18 months was significantly greater in Whites when compared with African Americans in SBWI (−8.74 kg; 95% CI[−10.10, −7.35] vs. −5.62 kg; 95% CI[−7.86,−3.37]) (p=0.03) and in STEP (−7.48 kg; 95% CI[−8.80,−6.17] vs. −4.41 kg; 95% CI[−6.41,−2.42]) (p=0.01). The non-significant race*treatment*time interaction effect (p=0.71) indicates that the pattern of weight loss between Whites and African-Americans over time was not influenced by the intervention condition (SBWI vs. STEP). See Figure 1. Similar results were revealed when examining percent weight change, BMI, percent body fat, and waist circumference. Data are provided in Supplementary Table 1 online.

Physical Activity

There were significant differences in the pattern of self-reported physical activity by race over time (Race*time interaction, p=0.03), and self-reported physical activity did increase relative to baseline in both races (p<0.0001). See Table 2. In contrast, the pattern of change in objectively measured physical activity did not differ between Whites and African-Americans (Race*time interaction, p=0.24) (Figure 2). MVPA increased relative to baseline levels (p<0.0001) and there was a significant main effect for race (p=0.01), with higher amounts of MVPA observed in Whites compared to African-Americans. There was no significant influence of intervention (SBWI vs. STEP) on the pattern of these findings. See Table 2 and Figure 2.

Dietary Intake

There were no significant differences in the patterns of dietary intake, reported as overall energy intake in kcal/day, measured over time between the races (Race*time interaction, p=0.3954). Dietary intake decreased significantly over time by approximately 400–600

kcal/d (p<.0001 for time main effect). See Table 2. There was no significant difference between African-Americans and Whites for the pattern of change in percent fat intake (Race*time interaction, p=0.12), percent carbohydrate intake (Race*time interaction, p=0.60), or percent protein intake (Race*time interaction, p=0.65). There was no significant influence of intervention (SBWI vs. STEP) on the pattern of these findings. See Supplementary Table 2 online.

Fitness, Resting Heart Rate, Resting Blood Pressure

Fitness increased significantly relative to baseline in response to the interventions (p<0.0001). The significant Race*Time interaction (p=0.02) indicates that change in fitness was greater in Whites (SBWI=13.4 min, 95% CI[12.7,14.1]; STEP=13.2 min, 95% CI[12.5, 13.9]) compared with African Americans (SBWI=11.6 min, 95% CI[10.4,12.9]; STEP= 11.9 min, 95% CI[10.9,13.0]). See Supplementary Table 3 online.

There was a significant reduction in resting heart rate, systolic blood pressure, and diastolic blood pressure over the intervention period compared to baseline (p<0.0001). However, the pattern of change in these outcomes did not differ by racial group (African-Americans vs. Whites) or by intervention condition (SBWI vs. STEP). See Supplementary Table 3 online.

DISCUSSION

Behavioral weight loss interventions typically produce a mean weight loss of about 10.7 kg between 6 to 12 months.[8] Unfortunately not all subjects achieve this magnitude of weight loss, and African-Americans regularly achieve weight losses 2.1–5.1 kg less than their white counterparts.[9–13] Results from this study reveal a remarkably consistent finding, with African-Americans losing approximately 3.1 kg less than Whites at 18 months (5.0 kg vs. 8.1 kg; 5.5% vs. 8.6%) (See Figure 1 and supplementary Table 1 online). However, it should be noted that although African Americans lost less weight, the intervention resulted in significant and clinically meaningful weight loss for both racial groups that is comparable to previous studies. In a secondary analysis of racial and gender differences in the Diabetes Prevention Program (DPP), weight losses at 18 months in the lifestyle arm were approximately 5.7 kg (5.5%) in the African-Americans and 7.0 kg (7.3%) in the Whites,[11] which is nearly identical to the weight losses at 18 months observed in the present study.

Attempts have been made to improve weight loss in African-Americans by developing culturally relevant intervention materials[12,29], tailoring interventions to individual needs, [11,30] and conducting interventions within religious/social communities.[31–33] The ORBIT Study was a randomized controlled weight loss and weight maintenance trial designed specifically for African-American women,[34] and resulted in an unadjusted mean weight loss of 2.3 kg at 18 months.[12] A recent review of studies that were culturally tailored for African-Americans reported the average mean difference in weight loss was −2.66 kg between intervention and control groups.[35,36] In contrast, the interventions examined in the current study were not culturally tailored, and while less effective for weight loss in African-Americans compared to Whites, resulted in weight loss of approximately 5.0 kg (5.5% of initial weight) at 18 months, which has been shown to result in clinically meaningful improvements in many health-related outcomes.

One consideration is that the less weight loss observed in African-Americans may not negatively impact the health benefits of weight loss in this population. For example, despite achieving less weight loss in this study, the reduction in blood pressure and resting heart rate was similar between African-Americans and Whites. Moreover, it should be noted that a number of studies have shown inconsistent associations between BMI and total mortality in African-Americans, in that they may reap similar health benefits as their White counterparts while at a higher BMI, especially in the women.[37–39] Other studies, however, have shown positive associations between BMI and mortality similar to that of whites.[40,41] Research should continue to examine this relationship in order to determine the magnitude of weight loss necessary to optimize health benefits in African-Americans and if weight recommendations should be different between races.

Exploration of racial differences should take into account variations in the intervention approach as well as adherence to the intervention. We have reported that a STEP intervention approach can result in clinically meaningful weight loss at a lower cost when compared to SBWI.[14] However, whether the effectiveness of STEP versus SBWI varies by racial group (African-Americans vs. Whites), has not been examined. The results from this study showed that while African-Americans lost less weight than Whites overall, differences within racial groups were not seen when comparing the effectiveness of SBWI to STEP (See Figure 1 and supplementary Table 1 online). These results suggest that a STEP intervention can be an effective alternative for African-Americans as well as White participants. In addition, adherence to either intervention, as evidenced by more intervention contacts and returned diaries, was found to be greater in Whites when compared African-Americans. Systematic reviews have shown consistent significant associations between increased dietary self-monitoring and weight loss across all racial groups,[42] while a study by Hollis et al. revealed that the number of food records completed had a stronger association with weight loss in African Americans when compared to Whites, regardless of sex.[43] Additional research has also highlighted the importance of intervention attendance and weight loss, [43–45] indicating these are important components of success. Although other key measures of adherence such as frequency of self-weighing and use of e-monitoring tools were not measured, it should be noted that greater adherence by Whites to two important aspects of the intervention may have contributed to the racial differences in weight loss seen in this study, especially as it relates to participation in prescribed eating and exercise behaviors.

The discrepancy in weight loss between African-Americans and Whites may be a result of differences in the effectiveness of interventions to improve key components of energy balance, primarily physical activity and energy intake. With regard to objectively measured physical activity, there were no differences in the pattern of change over time between the races, but there was a main effect of race, with Whites having higher levels of MVPA compared to the African-Americans across the intervention period (See Figure 2). Other studies have also shown that in response to a weight loss intervention Whites have a higher level of physical activity energy expenditure when compared to African-Americans.[46,47] This suggests that researchers need to develop intervention strategies that are equally effective at increasing and maintaining physical activity behaviors in both races, as it is known that physical activity is a key behavior for improving long-term weight loss.[48]

A unique aspect of this study is that it also included measures of self-reported physical activity. Data revealed that although the patterns of change in self-reported physical activity were different over time between the races, there were no differences between the groups at 18 months (See Table 2). This is in contrast to the objectively measured physical activity, which showed more minutes of MVPA for Whites compared to African-Americans. This discrepancy in findings between self-report and objectively measured physical activity may be partially explained by the results reported by Walsh et al.,[47] which showed that in response to a weight loss intervention, African-Americans are less accurate at estimating their energy expenditure from physical activity when compared to Whites. This may suggest the need to include objective measures of physical activity and incorporate strategies that allow African-Americans to more accurately estimate the amount of physical activity completed, when examining racial differences in overweight and obese adults. The change in cardiorespiratory fitness was greater in Whites when compared to African-Americans (See supplementary Table 3 online), which also substantiates the objectively measured physical activity findings. These results confirm the findings of other studies that have reported both physical activity and cardiorespiratory fitness are greater in Whites compared to African-Americans in response to a weight loss intervention.[46,47] One such study that used doubly labeled water to objectively measure physical activity found higher physical activity energy expenditure (~122kcal/day) in Whites when compared with African-Americans.[23] Another study revealed a significant race effect on cardiorespiratory fitness (expressed as maximal oxygen consumption ($VO2_{max}$)) indicating lower fitness in African-Americans compared to Whites even after adjusting for changes in weight or fat-free mass.[49]

This study also examined if differences in energy intake between African-Americans and Whites would partially explain the differences in weight loss. The results, however, showed no significant differences in energy intake per day between the two racial groups (see Table 2). Moreover, there were no differences by racial group for macronutrient composition expressed as percentage of total calories from dietary fat, carbohydrate, or protein. Similar results were seen in a previous weight loss intervention study that reported no differences between blacks and whites for calories consumed or percentage of calories from fat.[50] An obvious consideration is that self-reported dietary data are often inaccurate and underreported, especially in the obese. [51] However given the data available in this study and others, differences in dietary intake do not appear to be entirely responsible for the racial differences in weight loss observed between African-Americans and Whites.

Several strengths and limitations of this study need to be considered. This study was part of a larger randomized clinical trial that examined weight loss in response to two types of interventions (SBWI vs. STEP) over a period of 18 months. While approximately 30% of the sample who were recruited self-identified as African-American, this study was not designed or powered to specifically examine differences in the effectiveness of these interventions by race. Thus, future studies need to be designed to specifically examine differences in effectiveness of weight loss interventions by racial group to understand how to make these interventions better for all races/ethnicities, including how to improve adherence. Additional strengths of this study were the inclusion of objectively measured physical activity and cardiorespiratory fitness. As noted in the results, self-reported physical activity was inaccurate when compared to the objective measures. Therefore studies that have only

used self-reported physical activity may not be getting a clear picture of the differences in activity between races. In addition, energy intake and diet composition were assessed using a food frequency questionnaire, which may be prone to inaccuracy and underreporting. Thus, future studies should consider using more objective measures of energy intake, such as doubly-labeled water, to elucidate racial differences in components of energy balance that may contribute to these weight loss disparities.

In summary, the present study confirms previous findings that African-Americans lose less weight compared to Whites in response to a behavioral weight loss intervention, regardless of whether a SBWI or STEP intervention was implemented. Similar to other studies, no differences were found in dietary intake between races. However, Whites had higher levels of objectively measured physical activity, which may have contributed to the observed higher levels of cardiorespiratory fitness when compared to African-Americans. Based on these findings, the source of the discrepancy in weight loss between African-Americans and Whites may be due to differences in physical activity levels rather than differences in energy intake or diet composition. However, the precise role of these factors in weight loss differences among African-American and White adults warrants further investigation with larger samples and alternative intervention methods.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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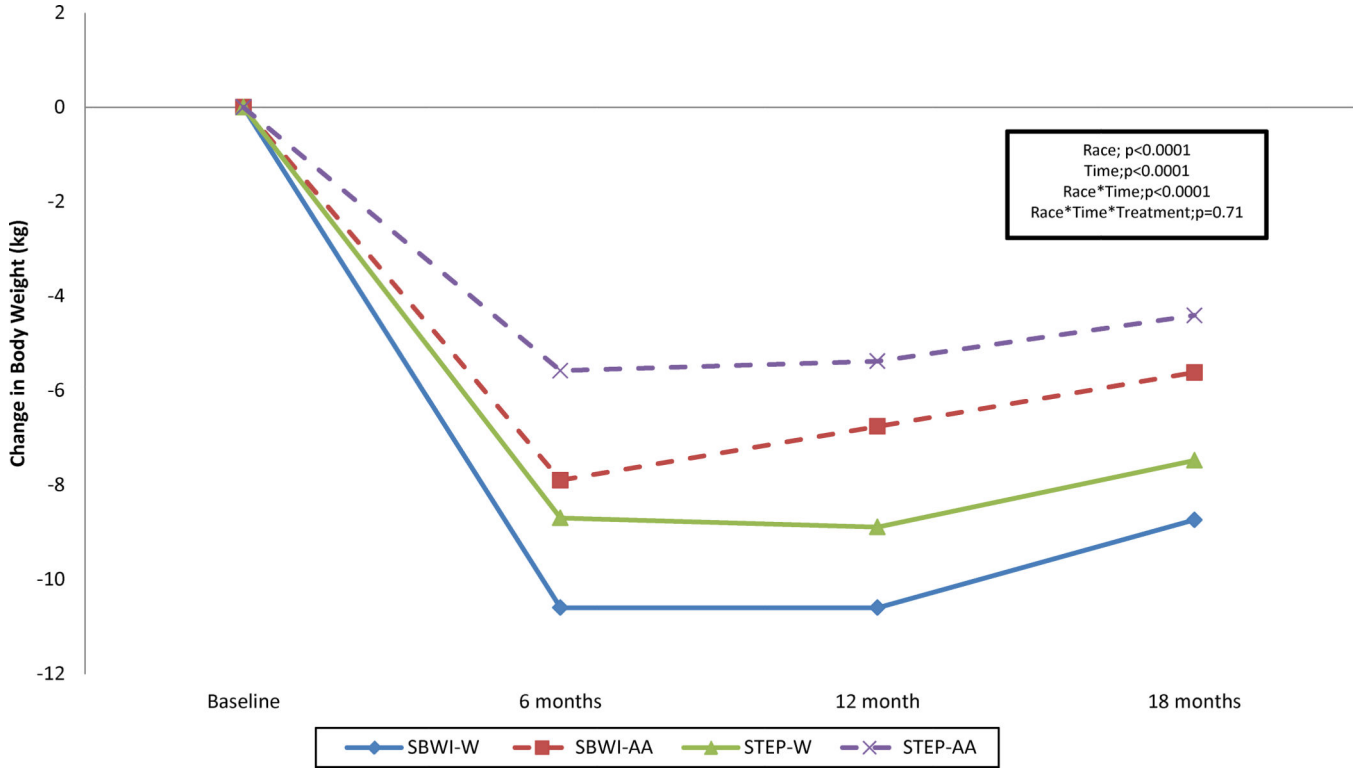

Figure I.

Change in body weight (kg) over time for White (W) and African-American (AA) adults who were randomly assigned to one of two intervention conditions: a standard behavioral weight loss intervention (SBWI) or a stepped-care intervention (STEP).

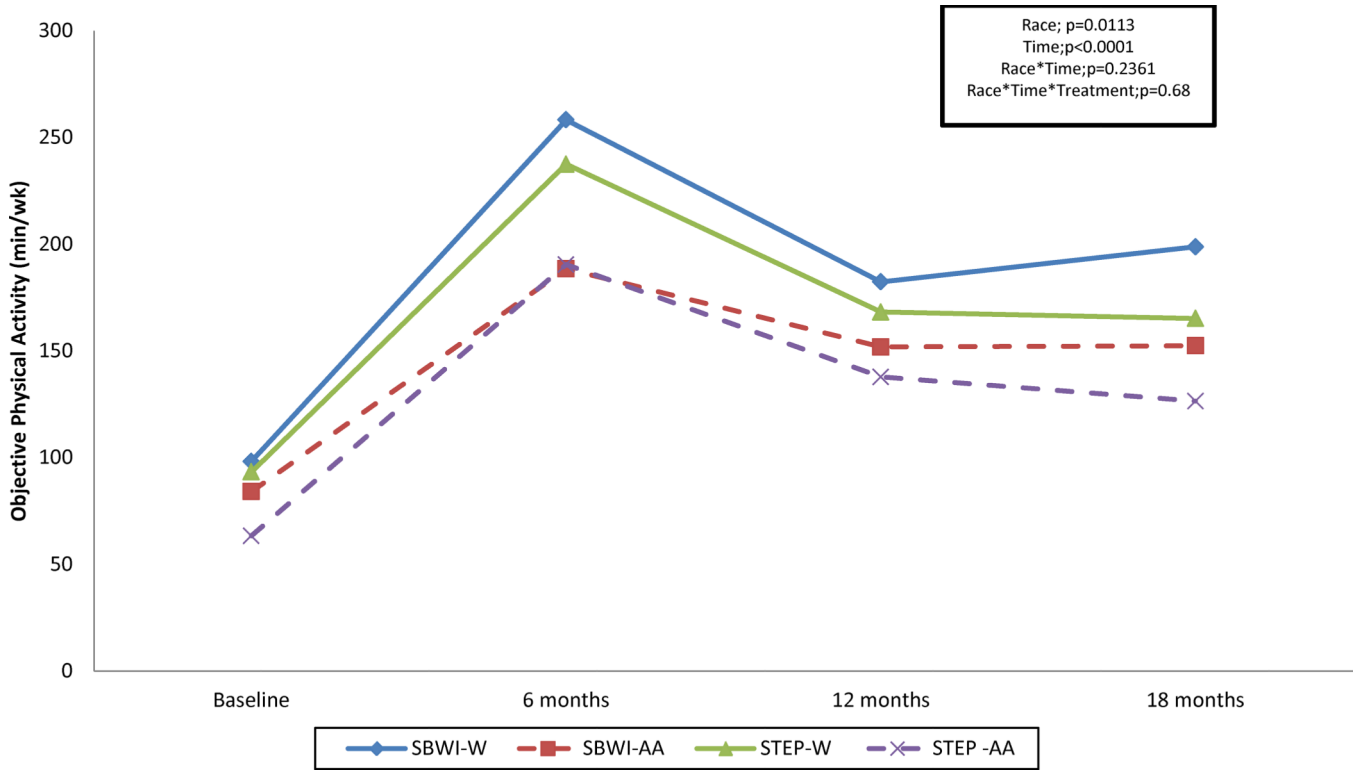

Figure II.

Objective Physical Activity (min/wk) over time for White (W) and African-American (AA) adults who were randomly assigned to one of two intervention conditions: a standard behavioral weight loss intervention (SBWI) or a stepped-care intervention (STEP).

Table 1.

Summary of Demographic Characteristics of Subjects for All Randomized Participants (N=346).

	Total	Whites	African-Americans	P-value# for Race
Number of Subjects				
Intention-to-Treat Analysis	N=346	N=243	N=103	
Completers	N=250	N=181	N=69	
Lost to Follow-Up	N=96	N=62	N=34	
Gender(Females)				
Intention-to-Treat Analysis	N=285	N=194	N=91	0.0574
Completers	N=197	N=138	N=59	0.1092
Lost to Follow-Up	N=88	N=56	N=32	0.5199
Age(years)				
Intention-to-Treat Analysis	42.38+/−8.98	43.21+/−9.00	40.40+/−8.66	0.0075
Completers	43.01+/−8.90	43.68+/−9.04	41.25+/−8.32	0.0532
Lost to Follow-Up	40.73+/−9.02	41.85+/−8.80	38.68+/−9.18	0.0989
Body Mass Index(kg/m^2)				
Intention-to-Treat Analysis	32.96+/−3.65	32.83+/−3.68	33.25+/−3.58	0.3277
Completers	32.72+/−3.56	32.51+/−3.61	33.26+/−3.41	0.1338
Lost to Follow-Up	33.59+/−3.82	33.78+/−3.76	33.23+/−3.97	0.5044
Education Level +				
Grade School(6 years or less)	-	-	-	0.8198
High School(10–12 years)	N=24(N=15)	N=19(N=12)	N=5(N=3)	
Vocational Training(beyond High School)	N=17(N=11)	N=13(N=10)	N=4(N=1)	
Some College(less than 4 years)	N=97(N=70)	N=64(N=47)	N=33(N=23)	
College/University Degree	N=119(N=89)	N=83(N=64)	N=36(N=25)	
Graduate or Professional Education	N=87(N=64)	N=64(N=48)	N=23(N=16)	

+Indicates that numbers not in parenthesis are based on the intent-to-treat analysis and numbers in parenthesis are based on subjects completing 18 months.

#Categorical variables are tested with chi-square, continuous variables are tested with Students T-test

Table 2.

Change in Self-Reported Physical Activity and Dietary Intake (mean(95%CI)) by Race and Intervention Condition (N=346)

Variable Treatment Group Race	Assessment Period							P-values						
	Baseline	3 Months	6 Months	9 Months	12 Months	15 Months	18 Months	Race	Time	Trt	Race*Time	Race*Trt	Trt*Time	Race*Trt*Time
Self-reported Physical Activity (kcal/wk)								0.4344	<.0001	0.6489	0.0322	0.5208	0.7204	0.4540
SBWI														
White	690.7 (450.6, 930.9)		2023 (1752, 2294)		1573 (1323, 1824)		1505 (1257, 1754)							
African-American	770.0 (401.1, 1139)		1988 (1567, 2409)		1607 (1123, 2090)		1298 (868.1, 1728)							
Difference	79.25 (−362, 520.7) (p= 0.7249)		−35.4 (−539, 468.1) (p= 0.8905)		33.44 (−490, 556.4) (p= 0.9005)		−207 (−710, 295.8) (p= 0.4205)							
STEP														
White	649.8 (432.1, 867.6)		2064 (1839, 2290)		1536 (1284, 1787)		1665 (1429, 1901)							
African-American	713.6 (376.6, 1051)		1781 (1419, 2143)		1783 (1383, 2184)		1282 (896.3, 1667)							
Difference	63.82 (−339, 466.4) (p= 0.7560)		−284 (−709, 141.6) (p= 0.1915)		247.7 (−242, 737.5) (p= 0.3244)		−383 (−837, 70.61) (p= 0.0995)							
Dietary Intake(kcal/d)								0.6002	<.0001	0.1830	0.3954	0.7009	0.0178	0.3376
SBWI														
White	2156 (2022, 2291)		1504 (1367, 1641)		1491 (1351, 1630)		1559 (1418, 1701)							
African-American	2157 (1945, 2369)		1469 (1253, 1685)		1644 (1405, 1882)		1588 (1346, 1830)							
Difference	0.72 (−252, 253.0) (p= 0.9955)		−35.5 (−294, 222.5) (p= 0.7873)		152.9 (−130, 436.2) (p= 0.2916)		28.67 (−264, 321.8) (p= 0.8483)							
STEP														
White	1957 (1835, 2080)		1472 (1345, 1599)		1485 (1359, 1611)		1440 (1306, 1574)							
African-American	1948 (1758, 2138)		1505 (1303, 1708)		1533 (1309, 1756)		1504 (1301, 1707)							
Difference	−8.81 (−236, 218.2) (p= 0.9394)		33.71 (−200, 267.3) (p= 0.7773)		47.17 (−204, 298.2) (p= 0.7130)		64.34 (−178, 306.7) (p= 0.6031)							