

# Obesity Treatment for Socioeconomically Disadvantaged Patients in Primary Care Practice

Gary G. Bennett, PhD; Erica T. Warner, ScD, MPH; Russell E. Glasgow, PhD; Sandy Askew, MPH; Julie Goldman, MSW, MPH; Debra P. Ritzwoller, PhD; Karen M. Emmons, PhD; Bernard A. Rosner, PhD; Graham A. Colditz, MD, DrPH; for the Be Fit, Be Well Study Investigators

**Background:** Few evidence-based weight loss treatment options exist for medically vulnerable patients in the primary care setting.

**Methods:** We conducted a 2-arm, 24-month randomized effectiveness trial in 3 Boston community health centers (from February 1, 2008, through May 2, 2011). Participants were 365 obese patients receiving hypertension treatment (71.2% black, 13.1% Hispanic, 68.5% female, and 32.9% with less than a high school educational level). We randomized participants to usual care or a behavioral intervention that promoted weight loss and hypertension self-management using eHealth components. The intervention included tailored behavior change goals, self-monitoring, and skills training, available via a website or interactive voice response; 18 telephone counseling calls; primary care provider endorsement; 12 optional group support sessions; and links with community resources.

**Results:** At 24 months, weight change in the intervention group compared with that in the usual care group was  $-1.03$  kg (95% CI,  $-2.03$  to  $-0.03$  kg). Twenty-four-

month change in body mass index (calculated as weight in kilograms divided by height in meters squared) in the intervention group compared with that in the usual care group was  $-0.38$  (95% CI,  $-0.75$  to  $-0.004$ ). Intervention participants had larger mean weight losses during the 24 months compared with that in the usual care group (area under the receiver operating characteristic curve,  $-1.07$  kg; 95% CI,  $-1.94$  to  $-0.22$ ). Mean systolic blood pressure was not significantly lower in the intervention arm compared with the usual care arm.

**Conclusion:** The intervention produced modest weight losses, improved blood pressure control, and slowed systolic blood pressure increases in this high-risk, socioeconomically disadvantaged patient population.

**Trial Registration:** clinicaltrials.gov Identifier: NCT00661817

*Arch Intern Med.* 2012;172(7):565-574.  
Published online March 12, 2012.  
doi:10.1001/archinternmed.2012.1

**O**BESITY IS NOT SUFFICIENTLY addressed in the US primary care system.<sup>1-4</sup> Primary care providers infrequently diagnose obesity and offer weight loss counseling to only one-fifth of obese patients.<sup>4</sup> Evidence-based weight management strategies have not proven sustainable in real-world clinical practice, and few published primary care-based obesity treatment trials<sup>5</sup> have yielded clinically significant long-term outcomes.

The socioeconomically disadvantaged patients (disproportionately members of a racial/ethnic minority group) who seek care at community health centers are particularly affected by the limited availability of obesity treatments. These high-risk patients have disproportionately elevated rates of obesity<sup>6,7</sup> and obesity-associated health conditions<sup>8-11</sup> (particu-

larly hypertension and cardiovascular disease)<sup>12</sup> due, in part, to their high levels of adulthood weight gain<sup>13-15</sup> and prolonged exposure to obesogenic environments.<sup>16,17</sup> High-risk patient populations have been severely underrepresented in obesity trials, and evidence-based weight loss strategies are less effective in these groups,<sup>18-21</sup> including in the few published obesity trials<sup>5</sup> conducted in primary care settings. Furthermore, although behavioral and clinical hypertension management strategies have been widely tested<sup>22,23</sup> and disseminated,<sup>24</sup> hypertension control rates remain suboptimal,<sup>25</sup> particularly for socioeconomically disadvantaged patients with high cardiovascular disease risk.

We conducted a pragmatic randomized controlled trial<sup>26-28</sup> to evaluate the effectiveness of a behavioral intervention that emphasized weight loss and hyperten-

Author Affiliations are listed at the end of this article.

Group Information: The Be Fit, Be Well Study Investigators are listed at the end of this article.

sion medication adherence among primary care patients in the community health center setting.

## METHODS

Be Fit, Be Well was a 2-arm, 24-month patient-randomized effectiveness trial conducted among 365 obese adult primary care patients with hypertension, as described previously.<sup>29</sup> Supported under a cooperative agreement from the National Heart, Lung, and Blood Institute, the trial was part of the Practice-based Opportunities for Weight Reduction (POWER) trials.<sup>30</sup> Participants were recruited from 3 community health centers in Boston from February 1, 2008, through April 30, 2009. All study protocols were fully approved by the Harvard School of Public Health Institutional Review Board and the POWER Data Safety Monitoring Board.

### STUDY SETTING

We sought urban community health centers that served a predominately racial/ethnic minority patient population, used an electronic medical record or automated scheduling system, and had interest in research participation. Study investigators approached 7 community health centers (**Figure 1**). All sites indicated interest; 4 were excluded because they did not have an electronic medical record or automated scheduling system.

### PARTICIPANTS

Inclusion criteria included body mass index (calculated as weight in kilograms divided by height in meters squared) from 30 to 50, weight less than 180 kg, use of 1 or more antihypertensive medication, age at least 21 years, and 1 or more medical visits in the 12 months before study entry. In addition, we required English or Spanish fluency, written informed consent, and willingness to change diet, physical activity, and weight. Exclusion criteria included history of a vascular event 6 months or less before study entry or of a medical condition that might affect measurement or trajectory of weight loss, previous or planned bariatric surgery, use of weight loss medications or medications known to increase weight, recent pregnancy or breastfeeding or plans to become pregnant within 2 years, and/or plans to relocate within the 2-year study period. We sought primary care provider approval before enrolling those with diabetes mellitus, a cardiovascular event 6 months or more before study entry, or known stable cardiovascular or peripheral vascular disease.

### PARTICIPANT RECRUITMENT AND ALLOCATION

Research staff conducted medical chart reviews at each health center to identify potentially eligible participants ( $n=2631$ ; **Figure 1**). Primary care providers excluded those deemed unsuitable for participation. Study staff contacted 507 of the potentially eligible participants by telephone and screened them for eligibility. Only 4.9% of potentially eligible patients were uninterested in participation. Eligible individuals were invited to attend a baseline study visit at their health center, at which they provided informed consent and completed a computer-based questionnaire battery. Research staff collected anthropometric and blood pressure measures. Participants ( $n=365$ ; 72.0% of those contacted by telephone) were randomized to treatment arm using computer-generated allocations, blocked by clinic and sex. The trial design precluded blinding either patients or interventionists to treatment assignment.

## TREATMENT ARMS

We provided the National Heart, Lung, and Blood Institute's "Aim for a Healthy Weight" self-help booklet<sup>31</sup> to the usual care participants at baseline. The research team made no other attempts to influence care delivered to usual care participants.

### INTERVENTION

The intervention used theory-based<sup>32</sup> and evidence-based<sup>33,34</sup> principles to promote weight loss and hypertension self-management for 24 months. The intervention is described in greater detail elsewhere.<sup>29</sup> Briefly, we used a behavioral weight loss approach designed for use in resource-constrained settings.<sup>29</sup> The intervention approach was designed for delivery in populations with limited literacy and numeracy and impaired access to health-promoting resources. Patients are prescribed 3 tailored goals to modify routine obesogenic lifestyle behaviors.<sup>29,33</sup> Behavior change goals were modeled on evidence-based recommendations<sup>31,34</sup> that were tailored to the patient population and phrased so that they could be easily self-monitored. New goals were selected at subsequent 13-week intervals. For the duration of the study, participants maintained a hypertension medication adherence goal (to take their medication as prescribed daily).

Participants chose to self-monitor their progress using either the study website or an interactive voice response system, available in English and Spanish. Both tracking systems provided real-time tailored feedback. Participants could switch their intervention platform at any time.

Trained community health educators delivered counseling calls monthly during the first 12 months of intervention and bimonthly during the second year (18 total scheduled calls). The community health educators were trained by study investigators in principles of motivational interviewing<sup>35,36</sup> and conducted 15- to 20-minute calls (in English or Spanish) that covered self-monitoring data, problem solving, and behavioral skills training. The community health educators also led 12 optional monthly group sessions that were held at a community location. The community health educators were trained and certified at baseline, were recertified annually, and received weekly supervision throughout the study.

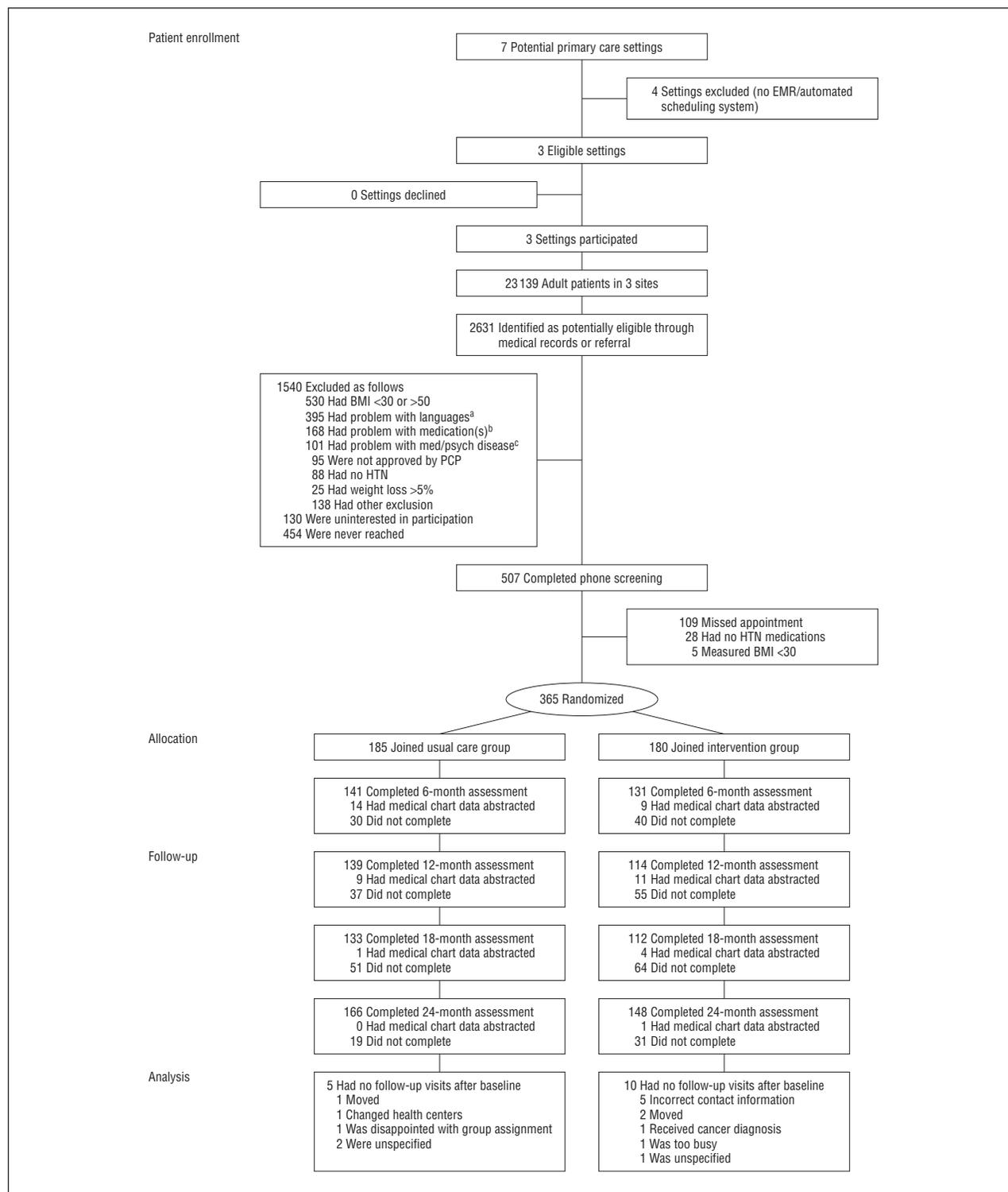
Primary care providers delivered at least 1 brief, standardized message about the importance of intervention participation. We also provided a personalized behavior change "prescription" that included the primary care provider's electronic signature.<sup>37</sup>

Finally, we provided tailored behavioral skills training materials, adapted from previous studies.<sup>34</sup> We also provided tailored information on community resources (eg, public parks, walking groups, and farmers' markets) and distributed a walking kit that included a pedometer and maps (with step counts) of destinations in the local community.

### MEASUREMENTS

Change in body weight (in kilograms) was the primary outcome. Change in systolic blood pressure (SBP; in millimeters mercury) was a secondary endpoint. Trained research staff administered a computer-based questionnaire battery and collected anthropometric and blood pressure measurements at baseline and 6, 12, 18, and 24 months after baseline. We offered a \$50 reimbursement at the first 3 follow-up visits and \$75 at 24 months.

Trained staff collected weight measurements using a digital scale (Seca 770; Seca), with participants dressed in lightweight indoor clothing. Weight was measured twice to the nearest 0.1 kg; the mean of the 2 measures was used in analysis.



**Figure 1.** CONSORT flow diagram. BMI indicates body mass index (calculated as weight in kilograms divided by height in meters squared); EMR, electronic medical record; HTN, hypertension; PCP, primary care provider. <sup>a</sup>Non-English or non-Spanish speakers. <sup>b</sup>Chronic use of medications likely to cause weight gain or prevent weight loss. <sup>c</sup>Participants excluded due to a serious medical condition or psychiatric condition.

Height to the nearest 0.1 cm was measured once at baseline using a calibrated, wall-mounted stadiometer (Seca 240; Seca). Blood pressure was assessed using an automated device (Omron 907; Omron). Three measurements were taken at 30-second intervals after 5 minutes of rest; the mean of the 3 measurements was used in analysis. We used the Hill-Bone Compliance to Hypertension Therapy Scale<sup>38</sup> to assess hypertension self-

management behaviors, including medication adherence, sodium intake, and appointment keeping.

#### FOLLOW-UP AND ALERTS

As noted in Figure 1, we collected 24-month follow-up data on 314 participants (86.0%), and 350 (95.9%) completed at least 1 follow-

up assessment. During the study, 71 participants (19.5%) were hospitalized (35 from the usual care group and 36 from the intervention group). Blood pressure alerts followed American Heart Association guidelines and were equally distributed (12 from the usual care group and 12 from the intervention group). Depression alerts followed the Patient Health Questionnaire<sup>39</sup> (scores  $\geq 20$ ) (8 from the usual care group and 11 from the intervention group).

## STATISTICAL ANALYSIS

The primary intent-to-treat analysis was based on the mean difference in weight between treatment arms at 24 months, after adjusting for sex and health center. We estimated mixed-effects regression models with Proc Mixed (SAS Institute, Inc) (see eMethods for full analytic models; <http://www.archinternmed.com>) using a random intercept and an unstructured covariance matrix. All 365 participants are included in the primary outcomes analysis, including 15 participants (4.1%) who had only a baseline assessment. Participants with missing visits are treated as missing at random. In addition, 1 participant (0.3%) was censored for reported bariatric surgery. We also compared the difference in weight during the 24-month study period between arms, estimated by the area under the receiver operating characteristic curve (AUC), calculated as follows:

$AUC = \text{mean (all available weights at 6, 12, 18, and 24 months)} - \text{baseline weight.}$

This measure was available for 350 participants (95.9%). The mixed-effects and AUC analyses were also performed for percent weight change, body mass index, and blood pressure. We used mixed-effects models with additional adjustment for baseline blood pressure to examine change in hypertension medication adherence.

Because the treatment effect for blood pressure appeared to increase over time, we also fit mixed models examining the different rates of SBP and diastolic blood pressure (DBP) change between intervention and usual care arms. Finally, we compared blood pressure control (SBP  $< 140$  and DBP  $< 90$  mm Hg) between intervention and usual care groups using generalized estimating equation models with Proc Genmod (SAS Institute, Inc) using a logistic link, a binomial distribution, and an unstructured covariance matrix.

The trial was designed to provide 80% power to detect a mean weight change in 24 months of 2.75 kg in the intervention arm, assuming no weight change in usual care.

## RESULTS

Participants were mostly women (68.5%), of racial/ethnic minority populations (96.8% [71.2% black]), and with a mean age of 54.5 years (Table 1). Most (86.3%) had an educational level lower than a college degree, annual household income less than \$25 000 (54.5%), and public health insurance coverage (54.2%).

Three hundred fourteen participants completed the 24-month follow-up (86.0%). Women were more likely than men to complete the 24-month assessment (88.8% vs 80.0%;  $P = .02$ ); there were no other observed differences in 24-month visit completion by race, income, educational level, age, sex, work status, health center, smoking status, or primary language.

### INTERVENTION ENGAGEMENT

At 24 months, intervention participants completed 70.6% of telephone counseling calls; this included 80.4% comple-

tion of calls 1 to 6, then 65.0% completion of calls 7 to 12, and then 66.7% completion of calls 13 to 18. Across both self-monitoring platforms, 40.0% of intervention participants tracked their behavior change goals weekly for at least 50% of trial weeks; 25.0% tracked weekly for at least 75% of trial weeks.

### CHANGE IN WEIGHT

Intervention participants had greater 24-month weight losses compared with those receiving usual care (difference,  $-1.03$  kg; 95% CI,  $-2.03$  to  $-0.03$  kg; Table 2). In addition, the intervention promoted larger mean weight losses in 24 months relative to usual care (AUC difference,  $-1.07$  kg; 95% CI,  $-1.94$  to  $-0.22$  kg). The proportion of those who lost at least 5% of their initial body weight during the 24 months was 19.5% for usual care and 20.0% for intervention participants. Similar patterns were observed for percent weight loss and change in body mass index (Table 2). Sex and health center did not significantly modify the weight change outcomes, nor did the mode of self-monitoring chosen by participants within the intervention arm.

### CHANGE IN BLOOD PRESSURE

Intervention participants had a lower mean change in SBP and DBP than usual care participants at each follow-up visit (Figure 2). During 24 months (Table 3), mean SBP was lower in the intervention group compared with the usual care group but not significantly different (AUC difference,  $-2.50$  mm Hg; 95% CI,  $-5.40$  to  $0.40$  mm Hg). The slope of increasing SBP per year was significantly higher in usual care ( $1.23$  mm Hg/y) compared with the intervention arm ( $0.07$  mm Hg/y) ( $P = .02$ ). Blood pressure changes became most apparent at 12 months of intervention. In AUC analyses including data from months 12 through 24, intervention participants had larger mean changes in SBP than usual care participants (AUC difference,  $-3.8$  mm Hg; 95% CI,  $-6.9$  to  $-0.7$  mm Hg) but not in DBP ( $-0.1$  mm Hg;  $-2.9$  to  $1.1$  mm Hg). We observed no significant differences between groups for DBP.

We next assessed blood pressure control (Table 3). The proportion of participants with controlled blood pressure decreased steadily in the usual care arm and was stable in the intervention arm (Figure 2D). At 24 months, intervention participants had greater odds of blood pressure control than usual care participants (odds ratio, 1.52; 95% CI, 1.01-2.30), and the difference in trend was significant ( $P = .05$ ).

### CHANGE IN HYPERTENSION SELF-MANAGEMENT BEHAVIORS

To contextualize the blood pressure findings, we examined change in hypertension self-management behaviors (Table 4). Intervention participants had significantly greater improvement in overall hypertension self-management at months 6, 12, and 18. Specifically, intervention participants showed significantly greater change in medication adherence at months 6 and 12. Similarly, the intervention produced positive change in self-reported sodium intake at all follow-up assessments, rela-

**Table 1. Baseline Characteristics of Participants**

Characteristic	Usual Care (n = 185)	Intervention (n = 180)	OR (95% CI) or Mean (SD) Difference	P Value
Sex, No. (%)				
Male	63 (34.1)	52 (28.9)	1 [Reference]	.29
Female	122 (65.9)	128 (71.1)	1.27 (0.82-1.98)	
Race/ethnicity, No. (%)				
Non-Hispanic white	4 (2.2)	9 (5.0)	1 [Reference]	.46
Non-Hispanic black	131 (70.8)	129 (71.7)	0.44 (0.10-1.62)	
Hispanic	23 (12.4)	25 (13.9)	0.49 (0.10-2.05)	
American Indian	3 (1.6)	3 (1.7)	0.47 (0.04-5.09)	
Asian	1 (0.5)	1 (0.6)	0.47 (0.01-43.53)	
Hawaiian/Pacific Islander	1 (0.5)	1 (0.6)	0.47 (0.01-43.53)	
>1 Race	19 (10.3)	12 (6.7)	0.29 (0.05-1.33)	
Unknown	3 (1.6)	0	0.15 (0.00-1.64)	
Educational level, No. (%)				
<12th Grade	73 (39.5)	47 (26.1)	1 [Reference]	.04
High school/GED	50 (27.0)	59 (32.8)	2.33 (1.19-4.57)	
Some college/associate's degree	42 (22.7)	44 (24.4)	1.63 (0.93-2.85)	
≥Bachelor's degree	20 (10.8)	30 (16.7)	1.83 (1.08-3.10)	
Income, \$, No. (%)				
<10 000	54 (29.2)	41 (22.8)	1 [Reference]	.30
10 000 to <25 000	51 (27.6)	53 (29.4)	1.37 (0.78-2.39)	
25 000 to <50 000	57 (30.8)	53 (29.4)	1.23 (0.71-2.13)	
≥50 000	23 (12.4)	33 (18.3)	1.89 (0.97-3.69)	
Employment, No. (%)				
Employed	98 (53.0)	94 (52.2)	1 [Reference]	.85
Unemployed	23 (12.4)	27 (15.0)	1.22 (0.66-2.28)	
Retired	21 (11.4)	22 (12.2)	1.09 (0.56-2.12)	
Disabled	43 (23.2)	37 (20.6)	0.90 (0.53-1.51)	
Health insurance, No. (%)				
Medicaid	58 (31.4)	65 (36.1)	1 [Reference]	.54
Medicare	41 (22.2)	34 (18.9)	0.74 (0.41-1.32)	
Private insurance	68 (36.8)	69 (38.3)	0.91 (0.56-1.47)	
Other	18 (9.7)	12 (6.7)	0.60 (0.26-1.34)	
Age, mean (SD) difference, y	54.67 (11.03)	54.58 (10.77)	0.08 (10.90)	.94
Weight, mean (SD) difference, kg	100.60 (18.67)	99.70 (16.29)	0.91 (17.53)	.62
BMI, mean (SD) difference	36.99 (5.24)	37.03 (4.96)	-0.04 (5.11)	.94
SBP, mean (SD) difference, mm Hg	128.50 (19.73)	130.20 (18.89)	-1.67 (19.32)	.41
DBP, mean (SD) difference, mm Hg	77.45 (13.77)	79.34 (12.73)	-1.89 (13.27)	.17
Taking diabetes medication, No. (%)				
No	121 (65.4)	136 (75.6)	1 [Reference]	.03
Yes	64 (34.6)	44 (24.4)	0.61 (0.38-0.96)	
Taking cholesterol medication, No. (%)				
No	119 (64.3)	114 (63.3)	1 [Reference]	.84
Yes	66 (35.7)	66 (36.7)	1.04 (0.68-1.60)	

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); DBP, diastolic blood pressure; GED, general equivalency diploma; OR, odds ratio; SBP, systolic blood pressure.

tive to usual care. We observed no change in hypertension treatment appointment keeping.

### ADVERSE EVENTS

During the study, 1 cardiovascular event and 2 cases of gallbladder disease were reported in the usual care group. Among intervention participants, 1 serious musculoskeletal injury was reported. We could not conclusively determine whether these events were related to study participation.

### COMMENT

The Be Fit, Be Well lifestyle intervention slowed weight and blood pressure increases in this high-risk patient

population. Although 6-month weight losses were modest, they were sustained for 24 months and were associated with clinically significant alterations in blood pressure trajectories. We did not observe the expected pattern of large initial (6-month) weight losses followed by weight regain. Rather, 6-month weight changes were modest but sustained through 24 months of follow-up. Weight gain prevention (although unintended in our trial) nonetheless may have clinical and public health significance.<sup>40</sup> This is particularly the case for black populations (especially black females) who experience, relative to whites, weaker associations of adiposity with cardiovascular risk factors,<sup>41-43</sup> as well as cardiovascular disease<sup>44-46</sup> and all-cause mortality.<sup>47,48</sup> For such groups, promoting weight stability (particularly at body mass index ≤40) may have

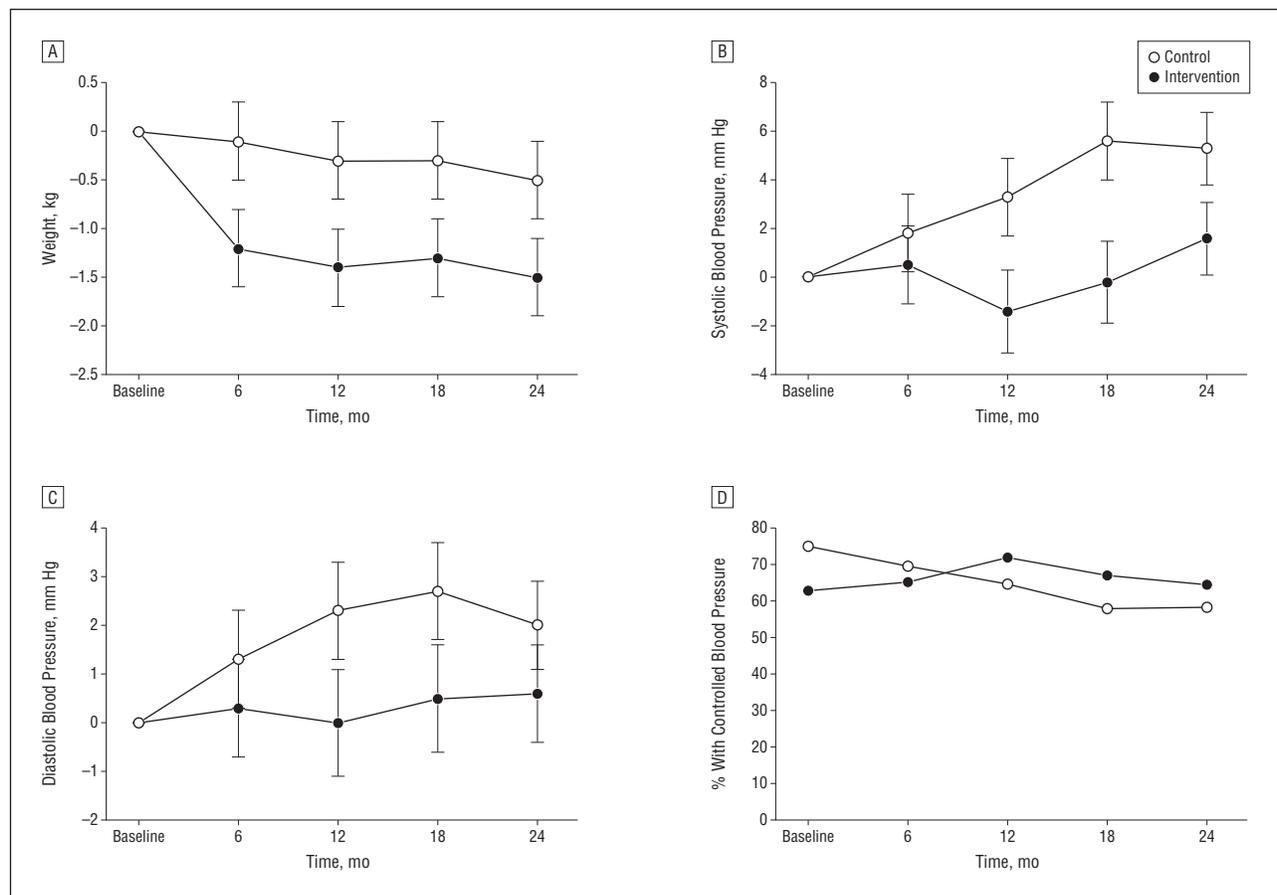
**Table 2. Baseline Levels and Changes From Baseline by Treatment Group<sup>a</sup>**

Variable	Mean (SD) at Baseline	Change From Baseline				AUC <sup>b</sup>
		Month 6	Month 12	Month 18	Month 24	
<b>Weight change, mean (SE)</b>						
Usual care	100.61 (18.67)	-0.13 (0.35)	-0.32 (0.36)	-0.33 (0.38)	-0.5 (0.35)	-0.33 (0.30)
Intervention	99.70 (16.29)	-1.25 (0.37)	-1.37 (0.38)	-1.28 (0.40)	-1.53 (0.37)	-1.41 (0.30)
Difference between arms, mean (95% CI)		-1.11 (-2.12 to -0.10)	-1.05 (-2.09 to -0.01)	-0.95 (-2.03 to 0.14)	-1.03 (-2.03 to -0.03)	-1.07 (-1.94 to -0.22)
<b>Weight change, mean % (SE)</b>						
Usual care	100.61 (18.67)	-0.24 (0.36)	-0.42 (0.37)	-0.51 (0.38)	-0.67 (0.36)	-0.47 (0.31)
Intervention	99.70 (16.29)	-1.32 (0.38)	-1.54 (0.39)	-1.4 (0.41)	-1.68 (0.38)	-1.54 (0.32)
Difference between arms, mean (95% CI)		-1.08 (-2.09 to -0.06)	-1.12 (-2.16 to -0.08)	-0.89 (-1.97 to 0.20)	-1.02 (-2.02 to -0.005)	-1.08 (-1.95 to -0.20)
<b>BMI change, mean (SE)</b>						
Usual care	36.99 (5.24)	-0.05 (0.13)	-0.12 (0.13)	-0.15 (0.14)	-0.20 (0.13)	-0.13 (0.11)
Intervention	37.04 (4.96)	-0.48 (0.14)	-0.54 (0.14)	-0.50 (0.15)	-0.58 (0.14)	-0.54 (0.12)
Difference between arms, mean (95% CI)		-0.43 (-0.80 to -0.05)	-0.42 (-0.80 to -0.03)	-0.35 (-0.75 to 0.06)	-0.38 (-0.75 to -0.004)	-0.41 (-0.73 to -0.09)

Abbreviations: AUC, area under the receiver operating characteristic curve; BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

<sup>a</sup>There were 185 participants in the usual care group and 180 in the intervention group.

<sup>b</sup>Calculated as AUC = mean (all available weights at 6, 12, 18, and 24 months) – baseline weight, adjusted for baseline weight, sex, and clinic.



**Figure 2.** Effects of Be Fit, Be Well lifestyle intervention on (A) weight, (B) systolic and (C) diastolic blood pressure, and (D) blood pressure control. Error bars indicate 95% CIs.

clinical utility. Be Fit, Be Well shows that weight gain prevention can be achieved at intensity levels that might be sustainable in resource-deprived practice settings.

The net SBP changes produced by Be Fit, Be Well compare favorably with those of behavioral hypertension control trials.<sup>49</sup> Given the magnitude of weight loss, we sus-

pect that the observed blood pressure outcomes were driven primarily by improved hypertension self-management. We found that the intervention—which included training to help participants improve self-management and provider communication—promoted positive change, particularly in medication adherence and

**Table 3. Baseline Levels and Blood Pressure Changes by Treatment Group<sup>a</sup>**

Variable	Mean (SD) at Baseline	Change From Baseline				AUC <sup>b</sup>	Slope per Year
		Month 6	Month 12	Month 18	Month 24		
<b>SBP change, mean (SE)</b>							
Usual care	128.55 (19.73)	1.78 (1.55)	3.35 (1.56)	5.61 (1.58)	5.30 (1.47)	4.34 (1.02)	1.23 (1.80)
Intervention	130.22 (18.89)	0.49 (1.60)	-1.38 (1.68)	-0.22 (1.69)	1.56 (1.54)	1.84 (1.06)	0.07 (1.61)
Difference between arms, mean (95% CI)		-1.30 (-5.67 to 3.08)	-4.73 (-9.23 to -0.22)	-5.83 (-10.38 to -1.28)	-3.73 (-7.91 to 0.45)	-2.50 (-5.40 to 0.40)	-1.16 (-2.12 to -0.20)
P value						.02	
<b>DBP change, mean (SE)</b>							
Usual care	77.45 (13.77)	1.28 (1.00)	2.30 (1.00)	2.73 (1.02)	2.00 (0.94)	1.99 (0.66)	1.33 (1.20)
Intervention	79.34 (12.73)	0.30 (1.03)	0.04 (1.08)	0.49 (1.09)	0.56 (0.99)	1.35 (0.69)	0.92 (1.09)
Difference between arms, mean (95% CI)		-0.98 (-3.80 to 1.83)	-2.26 (-5.15 to 0.64)	-2.24 (-5.16 to 0.69)	-1.44 (-4.13 to 1.24)	-0.63 (-2.52 to 1.26)	-0.41 (-1.03 to 0.21)
P value						.40	
<b>BP control, % of participants</b>							
Usual care	74.59	69.50	64.75	57.89	58.43		0.34 (0.10) <sup>c</sup>
Intervention	62.78	64.89	71.93	66.96	64.63		0.14 (0.12)
OR (95% CI) <sup>d</sup>	0.57 (0.37 to 0.90)	1.02 (0.58 to 1.79)	1.39 (0.98 to 1.98)	1.28 (0.90 to 1.82)	1.52 (1.01 to 2.30)		Difference: -0.21 (-0.41 to 0.00)
P value						.05	

Abbreviations: AUC, area under the receiver operating characteristic curve; BP, blood pressure; DBP, diastolic blood pressure; OR, odds ratio; SBP, systolic blood pressure.

<sup>a</sup>There were 185 participants in the usual care group and 180 in the intervention group.

<sup>b</sup>Calculated as AUC = mean (all available BPs at 6, 12, 18, and 24 months) - baseline BP, adjusting for baseline BP, sex, and clinic.

<sup>c</sup>Slope in log odds of % BP control per year adjusting for sex and clinic.

<sup>d</sup>Adjusted for baseline BP control, sex, and clinic.

**Table 4. Baseline Levels and Change in Hypertension-Related Self-management Behaviors**

Variable	Mean (SD) at Baseline	Change From Baseline			
		Month 6	Month 12	Month 18	Month 24
<b>Hill-Bone score change, mean (SE)</b>					
Usual care	19.97 (4.16)	-0.49 (0.26)	-0.42 (0.27)	-0.78 (0.27)	-1.02 (0.25)
Intervention	20.75 (4.65)	-1.74 (0.27)	-2.00 (0.29)	-1.72 (0.29)	-1.64 (0.27)
Difference between arms, mean (95% CI)		-1.25 (-1.99 to -0.5)	-1.59 (-2.36 to -0.82)	-0.94 (-1.72 to -0.16)	-0.62 (-1.34 to 0.10)
<b>Medication adherence subscale change, mean (SE)</b>					
Usual care	10.11 (2.78)	-0.37 (0.19)	-0.31 (0.19)	-0.76 (0.19)	-0.55 (0.18)
Intervention	10.59 (3.29)	-1.06 (0.20)	-1.16 (0.21)	-1.06 (0.21)	-0.91 (0.19)
Difference between arms, mean (95% CI)		-0.69 (-1.22 to -0.15)	-0.85 (-1.40 to -0.30)	-0.31 (-0.86 to 0.25)	-0.36 (-0.88 to 0.15)
P value		0.01	.002	.28	.17
<b>Sodium intake subscale change, mean (SE)</b>					
Usual care	5.23 (1.50)	-0.15 (0.08)	-0.13 (0.08)	-0.18 (0.09)	-0.27 (0.08)
Intervention	5.52 (1.58)	-0.60 (0.09)	-0.64 (0.09)	-0.57 (0.09)	-0.61 (0.09)
Difference between arms, mean (95% CI)		-0.45 (-0.68 to -0.21)	-0.51 (-0.76 to -0.27)	-0.39 (-0.63 to -0.14)	-0.33 (-0.56 to -0.11)
P value		<.001	<.001	.002	.004
<b>Appointment-keeping subscale change, mean (SE)</b>					
Usual care	4.63 (1.48)	0.02 (0.12)	0.02 (0.12)	0.14 (0.12)	-0.2 (0.11)
Intervention	4.64 (1.44)	-0.13 (0.12)	-0.24 (0.13)	-0.13 (0.13)	-0.15 (0.12)
Difference between arms, mean (95% CI)		-0.15 (-0.49 to 0.18)	-0.26 (-0.61 to 0.09)	-0.27 (-0.63 to 0.08)	0.05 (-0.27 to 0.38)
P value		.37	.14	.13	.74

sodium intake. Blood pressure control is a major clinical challenge in this population,<sup>50-52</sup> as demonstrated by the trend toward worsening blood pressure levels among usual care participants.

Despite their vastly increased risk, socioeconomically disadvantaged and racial/ethnic minority populations have been underrepresented in clinical trials. Existing evidence-based treatment approaches are less

effective in these groups. Across a wide variety of studies, blacks demonstrate poorer weight loss outcomes relative to whites,<sup>18-20</sup> even in well-powered, highly controlled trials.<sup>49,53</sup> Absolute weight losses among high-risk populations are usually small. With few exceptions,<sup>54</sup> most purely behavioral weight loss trials (ie, without use of meal replacements or pharmacotherapy) do not produce 12-month outcomes greater than 3.5 kg in these groups, independent of setting (clinical vs nonclinical).<sup>18</sup>

Several considerations affect interpretations drawn from our findings. In consultation with the participating health centers, we implemented several design options to decrease participant burden. We did not collect blood samples and we gathered limited medication data. The intervention only minimally involved providers because the participating health centers did not believe that they could sustain greater levels of provider involvement. Our sodium intake findings should be treated as preliminary given the limitations of the measure. To enhance the study's dissemination potential, we designed broadly accessible technologies and did not select participants on the basis of technology access or experience. Patient engagement with the intervention technologies was less than desired but was not inconsistent with other trials.<sup>55,56</sup> Sustaining participant engagement remains a major challenge for new-media behavioral intervention strategies.<sup>56</sup>

Finally, our participants were considerably more socioeconomically disadvantaged than in comparable trials.<sup>5,18</sup> Findings from trials demonstrating larger weight loss outcomes for racial/ethnic minorities<sup>53,54</sup> are not necessarily comparable with Be Fit, Be Well, given the much lower socioeconomic standing of our trial participants. Socioeconomic factors strongly pattern exposure to obesogenic environmental factors, adoption of obesogenic risk behaviors,<sup>9,57</sup> and the limited availability of weight management resources.<sup>4</sup> Socioeconomic challenges were exacerbated during the trial, given the national economic crisis. During this time, food stamp use in the target communities rose as high as 43%.<sup>58</sup> Rates of home foreclosure in these neighborhoods were among the highest in the city.<sup>58</sup> Because of the extreme macroeconomic changes, we surveyed 144 participants at the 24-month follow-up (eTable); 50.0% expressed having some difficulty paying bills, 41.0% reported that food sometimes ran out, 27.3% had their telephone disconnected for 2 months or longer, 11.9% had utilities deactivated, and at least 5 participants (3.5%) were homeless at some point during the trial. These challenges are ubiquitous for the medically underserved areas in which community health centers are located.

As a pragmatic<sup>26-28</sup> effectiveness trial, our findings are arguably more generalizable to real-world health center settings than are those of highly controlled efficacy trials with larger treatment effects. Although the field has made strides in obesity treatment, we should not assume that evidence-based approaches work in populations in which they were not tested. More work is necessary to best address the needs of socioeconomically disadvantaged patients who bear the greatest risk and disease burden of obesity.

**Published Online:** March 12, 2012. doi:10.1001/archinternmed.2012.1

**Author Affiliations:** Duke Obesity Prevention Program (Dr Bennett and Ms Askew), Department of Psychology and Neuroscience (Dr Bennett), and Duke Global Health Institute (Dr Bennett and Ms Askew), Duke University, Durham, North Carolina; Departments of Epidemiology (Drs Warner and Colditz), Society, Human Development, and Health (Drs Bennett and Emmons), and Biostatistics (Dr Rosner), Harvard School of Public Health, and Department of Medicine, Harvard Medical School (Dr Rosner), and Center for Community-Based Research, Division of Population Sciences, Dana Farber Cancer Institute (Drs Bennett, Warner, and Emmons and Mss Askew and Goldman), Boston, Massachusetts; Division of Cancer Control and Population Sciences, National Cancer Institute, Bethesda, Maryland (Dr Glasgow); Institute for Health Research, Kaiser Permanente, Denver, Colorado (Dr Ritzwoller); and Division of Public Health Sciences, Department of Surgery, Alvin J. Siteman Cancer Center, Washington University School of Medicine, St Louis, Missouri (Dr Colditz).

**Accepted for Publication:** December 26, 2011.

**Correspondence:** Gary G. Bennett, PhD, Duke Obesity Prevention Program, Duke University, PO Box 90086, Durham, NC 27708 (gary.bennett@duke.edu).

**Author Contributions:** Drs Bennett, Warner, Emmons, Rosner, and Colditz had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* Bennett, Warner, Glasgow, Ritzwoller, Emmons, and Colditz. *Acquisition of data:* Bennett, Warner, Goldman, and Colditz. *Analysis and interpretation of data:* Glasgow, Askew, Emmons, Rosner, and Colditz. *Drafting of the manuscript:* Bennett, Glasgow, Askew, and Colditz. *Critical revision of the manuscript for important intellectual content:* Bennett, Warner, Glasgow, Goldman, Ritzwoller, Emmons, Rosner, and Colditz. *Statistical analysis:* Askew, Rosner, and Colditz. *Obtained funding:* Bennett, Glasgow, Goldman, Emmons, and Colditz. *Administrative, technical, and material support:* Bennett, Warner, Askew, Goldman, Ritzwoller, Emmons, and Colditz. *Study supervision:* Bennett, Goldman, and Emmons.

**Financial Disclosure:** None reported.

**Funding/Support:** This work was supported in part by grant U01-HL087071 from the National Heart, Lung, and Blood Institute and grants K22CA126992 (Dr Bennett) and K05CA124415-04 (Dr Emmons) from the National Cancer Institute.

**Role of the Sponsor:** The funding organization was involved in the design of the study but not the collection, analysis, or interpretation of the data or preparation, review, or approval of the manuscript.

**Online-Only Material:** The eMethods and eTable are available at <http://www.archinternmed.com>.

**Be Fit, Be Well Study Investigators:** Ebela Anidi, Mike Atkinson,\* Sarah Connor,\* Jessica Dormeus, Erin Dubich,\* Lisa Farwell, Mary Greaney,\* Elizabeth Haselwandter, Erica Levine,\* Noemi Lopez,\* Jose Miranda,\* Katherine Morales,\* Loan Nyguen, Claudia Pischke, PhD,\* Lisa Quintiliani, PhD, RD,\* Erika Pena-Torero,

Danielle Rivas,\* Argelis Rivera,\* Wanda Scott,\* Charlette Steed,\* Cynthia Stein, MD, MPH,\* Evelyn Stein, LLM,\* Dori Steinberg, RN,\* Andrea Vasquez,\* Aubrey Wasser,\* Harvard University and Dana-Farber Cancer Institute, Boston, Massachusetts; Diane King, PhD,\* Barbara McCray,\* Anna Sukhanova, MA,\* Kaiser-Permanente; Carol Leighton,\* Washington University; Perry Foley, MSW, MPH, Duke University; Steve Christiansen\*, Tim Wooley,\* Intervision; Bela Bashir, MD, Harvey Bidwell, MD, Barbara Cousins, Mark Drews, MD, Henry Dryer, MD, Myechia Minter-Jordan, MD, Monica Morlote, MD, Rose O'Brien, Julie Tishler, MD, Whittier Street Community Health Center, Bowdoin Street Community Health Center, Dimock Community Health Center, all in Boston, Massachusetts. \*Individuals received compensation for participation. **POWER Data Safety Monitoring Board:** David C. Goff, MD, PhD (chair; Wake Forest University), Robert Kushner, MD (Northwestern University), Gbenga Ogedegbe, MD (New York University), Amelie G. Ramirez, DrPH, MPH (University of Texas at San Antonio), Nathan Stinson, MD, PhD, MPH (National Institute on Minority Health and Health Disparities, National Institutes of Health), and Barbara Tilley, PhD (University of Texas at Houston).

## REFERENCES

- Stafford RS, Farhat JH, Misra B, Schoenfeld DA. National patterns of physician activities related to obesity management. *Arch Fam Med*. 2000;9(7):631-638.
- Ma J, Xiao L, Stafford RS. Underdiagnosis of obesity in adults in US outpatient settings. *Arch Intern Med*. 2009;169(3):313-314.
- Galuska DA, Will JC, Serdula MK, Ford ES. Are health care professionals advising obese patients to lose weight? *JAMA*. 1999;282(16):1576-1578.
- Bleich SN, Pickett-Blakely O, Cooper LA. Physician practice patterns of obesity diagnosis and weight-related counseling. *Patient Educ Couns*. 2011;82(1):123-129.
- Tsai AG, Wadden TA. Treatment of obesity in primary care practice in the United States: a systematic review. *J Gen Intern Med*. 2009;24(9):1073-1079.
- Ogden CL, Lamb MM, Carroll MD, Flegal KM. Obesity and socioeconomic status in adults: United States, 2005-2008. *NCHS Data Brief*. 2010;50(51):1-8.
- Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999-2008. *JAMA*. 2010;303(3):235-241.
- Karlamangla AS, Merkin SS, Crimmins EM, Seeman TE. Socioeconomic and ethnic disparities in cardiovascular risk in the United States, 2001-2006. *Ann Epidemiol*. 2010;20(8):617-628.
- Winkleby MA, Kraemer HC, Ahn DK, Varady AN. Ethnic and socioeconomic differences in cardiovascular disease risk factors: findings for women from the Third National Health and Nutrition Examination Survey, 1988-1994. *JAMA*. 1998;280(4):356-362.
- McGruder HF, Malarcher AM, Antoine TL, Greenlund KJ, Croft JB. Racial and ethnic disparities in cardiovascular risk factors among stroke survivors: United States 1999 to 2001. *Stroke*. 2004;35(7):1557-1561.
- Roger VL, Go AS, Lloyd-Jones DM, et al; American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2011 update: a report from the American Heart Association [published corrections appear in *Circulation*. 2011;123(6):e240 and *Circulation*. 2011;124(16):e426]. *Circulation*. 2011;123(4):e18-e209.
- Redmond N, Baer HJ, Hicks LS. Health behaviors and racial disparity in blood pressure control in the National Health and Nutrition Examination Survey. *Hypertension*. 2011;57(3):383-389.
- Burke GL, Bild DE, Hilder JE, Folsom AR, Wagenknecht LE, Sidney S. Differences in weight gain in relation to race, gender, age and education in young adults: the CARDIA study: Coronary Artery Risk Development in Young Adults. *Ethn Health*. 1996;1(4):327-335.
- Lewis CE, Smith DE, Wallace DD, Williams OD, Bild DE, Jacobs DR Jr. Seven-year trends in body weight and associations with lifestyle and behavioral characteristics in black and white young adults: the CARDIA study. *Am J Public Health*. 1997;87(4):635-642.
- Lewis C, Jacobs D, McCreath H. Weight gain continues in the 1990s: 10-year trends in weight and overweight from the CARDIA study: Coronary Artery Risk Development in Young Adults. *Am J Epidemiol*. 2000;151(12):1172-1181.
- Morland K, Wing S, Diez Roux A. The contextual effect of the local food environment on residents' diets: the Atherosclerosis Risk in Communities study. *Am J Public Health*. 2002;92(11):1761-1767.
- Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. *Am J Prev Med*. 2002;22(1):23-29.
- Osei-Assibey G, Kyrou I, Adi Y, Kumar S, Matyka K. Dietary and lifestyle interventions for weight management in adults from minority ethnic/non-white groups: a systematic review. *Obes Rev*. 2010;11(11):769-776.
- Yancey AK, Kumanyika SK, Ponce NA, et al. Population-based interventions engaging communities of color in healthy eating and active living: a review. *Prev Chronic Dis*. 2004;1(1):A09.
- Kumanyika SK, Gary TL, Lancaster KJ, et al. Achieving healthy weight in African-American communities: research perspectives and priorities. *Obes Res*. 2005;13(12):2037-2047.
- Kumanyika SK, Obarzanek E, Stevens VJ, Hebert PR, Whelton PK. Weight-loss experience of black and white participants in NHLBI-sponsored clinical trials [published correction appears in *Am J Clin Nutr*. 2003;77(5):1342]. *Am J Clin Nutr*. 1991;53(6)(suppl):1631S-1638S.
- Appel LJ, Moore TJ, Obarzanek E, et al; DASH Collaborative Research Group. A clinical trial of the effects of dietary patterns on blood pressure. *N Engl J Med*. 1997;336(16):1117-1124.
- Svetkey LP, Sacks FM, Obarzanek E, et al; DASH-Sodium Collaborative Research Group. The DASH Diet, Sodium Intake and Blood Pressure Trial (DASH-sodium): rationale and design. *J Am Diet Assoc*. 1999;99(8)(suppl):S96-S104.
- Chobanian AV, Bakris GL, Black HR, et al; National Heart, Lung, and Blood Institute Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure; National High Blood Pressure Education Program Coordinating Committee. The seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. *JAMA*. 2003;289(19):2560-2572.
- Egan BM, Zhao Y, Axon RN. US trends in prevalence, awareness, treatment, and control of hypertension, 1988-2008. *JAMA*. 2010;303(20):2043-2050.
- Tunis SR, Stryer DB, Clancy CM. Practical clinical trials: increasing the value of clinical research for decision making in clinical and health policy. *JAMA*. 2003;290(12):1624-1632.
- Zwarenstein M, Treweek S, Gagnier JJ, et al. Improving the reporting of pragmatic trials: an extension of the CONSORT statement. *BMJ*. 2008;337:a2390.
- Ware JH, Hamel MB. Pragmatic trials—guides to better patient care? *N Engl J Med*. 2011;364(18):1685-1687.
- Greaney ML, Quintiliani LM, Warner ET, et al. Weight management among patients at community health centers: the "Be Fit, Be Well" study. *Obes Weight Manage*. 2009;5(5):222-228.
- Yeh H-C, Clark JM, Emmons KE, et al. Independent but coordinated trials: insights from the Practice-based Opportunities for Weight Reduction Trials Collaborative Research Group. *Clin Trials*. 2010;7(4):322-332.
- NHLBI, National Heart, Lung, Blood Institute. Aim for a healthy weight: 2005. [http://www.nhlbi.nih.gov/health/public/heart/obesity/lose\\_wt/index.htm](http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/index.htm). Accessed June 2, 2011.
- Sorensen G, Emmons K, Hunt MK, et al. Model for incorporating social context in health behavior interventions: applications for cancer prevention for working-class, multiethnic populations. *Prev Med*. 2003;37(3):188-197.
- Bennett GG, Herring SJ, Puleo E, Stein EK, Emmons KM, Gillman MW. Web-based weight loss in primary care: a randomized controlled trial. *Obesity (Silver Spring)*. 2010;18(2):308-313.
- Knowler WC, Barrett-Connor E, Fowler SE, et al; Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med*. 2002;346(6):393-403.
- Emmons KM, Rollnick S. Motivational interviewing in health care settings: opportunities and limitations. *Am J Prev Med*. 2001;20(1):68-74.
- Miller W, Rollnick S. *Motivational Interviewing: Preparing People to Change Addictive Behaviors*. New York, NY: Guilford Press; 1991.
- Emmons KM, Stoddard AM, Fletcher R, et al. Cancer prevention among working class, multiethnic adults: results of the Healthy Directions—Health Centers study. *Am J Public Health*. 2005;95(7):1200-1205.
- Kim MT, Hill MN, Bone LR, Levine DM. Development and testing of the Hill-Bone Compliance to High Blood Pressure Therapy Scale. *Prog Cardiovasc Nurs*. 2000;15(3):90-96.
- Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606-613.
- Hill JO, Wyatt HR, Reed GW, Peters JC. Obesity and the environment: where do we go from here? *Science*. 2003;299(5608):853-855.

41. Dustan HP. Obesity and hypertension in blacks. *Cardiovasc Drugs Ther.* 1990;4 (suppl 2):395-402.
42. Pan WH, Flegal KM, Chang HY, Yeh WT, Yeh CJ, Lee WC. Body mass index and obesity-related metabolic disorders in Taiwanese and US whites and blacks: implications for definitions of overweight and obesity for Asians. *Am J Clin Nutr.* 2004;79(1):31-39.
43. Stevens J, Juhaeri, Cai J, Jones DW. The effect of decision rules on the choice of a body mass index cutoff for obesity: examples from African American and white women. *Am J Clin Nutr.* 2002;75(6):986-992.
44. Stevens J. Obesity and mortality in Africans-Americans. *Nutr Rev.* 2000;58(11): 346-353.
45. Stevens J, Plankey MW, Williamson DF, et al. The body mass index-mortality relationship in white and African American women. *Obes Res.* 1998;6(4):268-277.
46. Calle EE, Thun MJ, Petrelli JM, Rodriguez C, Heath CWJ Jr. Body-mass index and mortality in a prospective cohort of US adults. *N Engl J Med.* 1999;341 (15):1097-1105.
47. Fontaine KR, Redden DT, Wang C, Westfall AO, Allison DB. Years of life lost due to obesity. *JAMA.* 2003;289(2):187-193.
48. Finkelstein EA, Brown DS, Wraga LA, Allaire BT, Hoerger TJ. Individual and aggregate years-of-life-lost associated with overweight and obesity. *Obesity (Silver Spring).* 2010;18(2):333-339.
49. Svetkey LP, Erlinger TP, Vollmer WM, et al. Effect of lifestyle modifications on blood pressure by race, sex, hypertension status, and age. *J Hum Hypertens.* 2005;19(1):21-31.
50. Bailey JE, Wan JY, Tang J, Ghani MA, Cushman WC. Antihypertensive medication adherence, ambulatory visits, and risk of stroke and death. *J Gen Intern Med.* 2010;25(6):495-503.
51. Shelley D, Tseng T-Y, Andrews H, et al. Predictors of blood pressure control among hypertensives in community health centers. *Am J Hypertens.* 2011;24(12): 1318-1323.
52. Rosner B, Langford HG. Judging the effectiveness of antihypertensive therapy in an individual patient. *J Clin Epidemiol.* 1991;44(8):831-838.
53. Wing RR, Hamman RF, Bray GA, et al; Diabetes Prevention Program Research Group. Achieving weight and activity goals among diabetes prevention program lifestyle participants. *Obes Res.* 2004;12(9):1426-1434.
54. Hollis JF, Gullion CM, Stevens VJ, et al; Weight Loss Maintenance Trial Research Group. Weight loss during the intensive intervention phase of the weight-loss maintenance trial. *Am J Prev Med.* 2008;35(2):118-126.
55. Neve M, Morgan PJ, Jones PR, Collins CE. Effectiveness of web-based interventions in achieving weight loss and weight loss maintenance in overweight and obese adults: a systematic review with meta-analysis. *Obes Rev.* 2010;11(4): 306-321.
56. Bennett GG, Glasgow RE. The delivery of public health interventions via the Internet: actualizing their potential. *Annu Rev Public Health.* 2009;30:273-292.
57. Wolin KY, Bennett GG. Interrelations of socioeconomic position and occupational and leisure-time physical activity in the National Health and Nutrition Examination Survey. *J Phys Act Health.* 2008;5(2):229-241.
58. Boston Public Health Commission. Health of Boston 2010. Boston, MA: Boston Public Health Commission; 2010. <http://www.bphc.org/ABOUT/RESEARCH/HOB2010/Pages/Home.aspx>. Accessed January 17, 2012.

#### Images From Our Readers



Stormy sea (watercolor on canvas).

Courtesy of: Pradeep Reddy Atla, MD, MPH, Internal Medicine, Community Regional Medical Center, Fresno, California.