

# WEIGHT LOSS AND WEIGHT LOSS MAINTENANCE IN AFRICAN-AMERICAN WOMEN

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The purpose of this study was to identify factors associated with weight loss and weight loss maintenance in 23 African American women participating in a 32-week lifestyle enhancement awareness program (LEAP), 16 weekly sessions on weight loss and 16 weekly sessions on weight loss maintenance. A pre-test, post-test one group design was used. Measures included dietary readiness to lose weight, bioelectrical impedance analysis, lipid levels, blood pressure, waist/hip ratio, weight, height, and activity level. Women who completed the weight loss phase of the program showed a reduction in weight; body mass index; percentage body fat; and waist/hip ratio; and an increase in physical activity and dietary readiness to control over-eating.

Weight loss was significantly correlated with attendance and dietary readiness to decrease emotional eating. Women who continued on to complete the weight loss maintenance classes maintained a significant loss in body mass index, and increased their high-density lipoproteins and dietary readiness to monitor hunger and eating cues. African-American women who sustain weight loss and weight loss maintenance regimens reduce their risks for developing chronic diseases. (*J Natl Med Assoc.* 2002;94:686-694.)

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The 6% increase in obesity (body mass index  $\geq 30$  kg/m<sup>2</sup>) between 1991 and 1998 has raised the levels of obesity in the United States to epidemic proportions.<sup>1</sup> Cross sectional, epidemiological, and prospective studies have shown that race is a predictor of obesity, with African American women gaining more weight

than Caucasian women across most age and socioeconomic groups.<sup>2</sup> Approximately 66% of African American women over the age of 20 are overweight or obese.<sup>3</sup> African American women are at increased risk of death from obesity-related diseases such as heart disease, diabetes and cancer.<sup>4</sup> However, overweight African American women are less likely than Caucasian women to consider themselves overweight<sup>5,6</sup> and less likely to participate in weight loss (WL) programs.<sup>7</sup> When they do participate in self-imposed or formal programs, they are less likely than Caucasian women to achieve WL<sup>8,9</sup> or weight-loss maintenance (WLM).<sup>9,10</sup> The purpose of this study was to examine factors associated with weight loss and weight loss

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maintenance in African American women participating in a lifestyle enhancement awareness program (LEAP).

Weight loss among African-American women has led to decreases in blood pressure,<sup>11</sup> resting heart rate,<sup>12</sup> lipid levels,<sup>13</sup> and risk of diabetes.<sup>14</sup> However, the research in WL and African-American women reveals that programs have been of short duration, from seven weeks to 24 weeks,<sup>15</sup> and have not focused on factors associated with WLM.

This study was designed to assess factors associated with both WL and WLM within the context of a lifestyle enhancement awareness program (LEAP). To develop the LEAP program qualitative and quantitative data were first gathered from 68 African American middle-income women using triangulation methods, interviews and questionnaires.<sup>16</sup> The interviews and questions were designed to identify factors in WL and WLM, that are both environmental (access to facilities and programs) and personal (perceptions, attitudes, stress, self-concept, and diet and exercise self-efficacy—that is, the cognitive processes in which an individual judges her ability to perform a specific behavior (i.e., a change in diet or exercise).

Results revealed that the perceived barriers to both WL and WLM for African American women were occupational and personal stress, lack of social support, lack of programs addressing the women's concerns, and traditional cooking and eating patterns. The data from the study were integrated into the development of the LEAP for African American women.

Kumanyika, Morssink, and Agars<sup>17</sup> recommend developing culturally sensitive WL programs in which participants have frequent contact with group leaders over longer periods of time. Therefore, LEAP incorporated African American attitudes and beliefs into the design and implementation of the program. The following research questions were examined: a) What factors are associated with WL in African American women? and b) What factors are as-

sociated with WLM in African American women?

Theoretical underpinnings guiding the research study were based on social cognitive theory (SCT), which was developed to predict and explain both the personal and environmental dynamics influencing both health behavior and the methods that promote behavioral change.<sup>18</sup> An organizing theme within the SCT is reciprocal determinism that embraces an interactional model of causation in which environmental events, personal factors and behavior all operate as interacting determinants of each other. Personal factors encompass three subcategories: biological, psychosocial, and cognitive.

The biological factor measured in this study was physiological status. The psychosocial aspect measured was dietary readiness to lose weight. The cognitive process of the model includes knowledge acquisition from the education process, which occurred during the administration of the program. Environmental factors are physically external aspects that can affect an individual's behavior (e.g., weather, social support, access to facilities, and programs). Behavior is dynamic, and uniquely determined by the interaction of personal and environmental influences. For instance, a person could have high motivation to exercise and change eating behavior, however the availability and accessibility of exercise facilities and weight loss programs will determine whether exercise and eating behavior change will occur.

Studies examining the relationship between health behavior and environmental factors have shown that African American women are less likely than Caucasian women to participate in healthy lifestyle behavior due to neighborhood safety issues and lack of affordable, conveniently located health and weight loss programs and facilities.<sup>14,16,19</sup> The need to lose weight and maintain weight loss is complex. Examining the relationships among personal, environmental, and behavioral factors comprehensively addresses the complexity of the problem.<sup>20</sup>

## METHOD

### Design and Sample

A one-group pre-test/post-test design was used to examine factors associated with WL and WLM in African American women. The women completed self-administered questionnaires at three data collection sessions: baseline (Time 1), post WL phase (Time 2) and post WLM phase (Time 3). At the same sessions, measures of bioelectrical impedance, blood pressure, cholesterol, waist/hip circumference, and weight were obtained. Height was measured at baseline.

Overweight African American women were recruited from a large university medical center. To be eligible for the study, women had to be (a) a minimum of 20% above ideal weight for height as measured by the Metropolitan Life Insurance height weight tables,<sup>21</sup> (b) nondiabetic, (c) employed outside the home, (d) American-born, (e) willing to obtain physician approval prior to joining the program, and (f) agreeable to participating in an exercise activity three times a week for at least 20 minutes each session. The human subjects review committee of the sponsoring university approved the protocol for the study.

### VARIABLES AND MEASURES

For Bioelectrical impedance analysis (BIA), we used a tetrapolar bioelectrical impedance plethysmograph (model 101, RJL Systems, Mt. Clemens, MI). This procedure involves an applied electrical current conducted through body fluids and electrolytes; conduction measures total body fat, lean body mass, total body water and their compartments. Additional information needed to conduct the analysis included heart rate, weight, age, and self-reported exercise activity. A known resistor verified the calibration of the impedance analyzer before each analysis. Test retest reliability<sup>22</sup> and validity<sup>23,24</sup> of the BIA has been established.

### Lipid Analyses

The Cholestech LDX was used for the quantitative determination of total cholesterol (TC),

high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein (LDL-C). The Cholestech analyzer calculates a ratio of TC to HDL-C. It has demonstrated reliability in determination of TC<sup>25</sup> and accuracy and precision in the measurement of TC, HDL, triglycerides and glucose.

### Blood Pressure

Women sat with their arms supported and at heart level. After the women spent five minutes at rest, two measures were taken two minutes apart and averaged.<sup>26</sup>

### Waist-Hip Ratio (WHR)

Women stood erect with the abdomen relaxed, arms at their sides, and feet together with weight equally divided over both legs. The measuring tape was applied horizontally midway between the lowest rib margin and the iliac crest. The hip measurement was taken at the point yielding the maximum circumference ratio over the buttocks.<sup>27</sup>

### Height and Weight

Measures were obtained on a physician's balance scale with the women wearing street clothes but no shoes. Height was measured to the nearest centimeter and weight to the nearest 250 grams. The Metropolitan Life Tables<sup>21</sup> was used to guide obesity status. Body mass index (BMI) was calculated from standard formulas ( $[\text{weight}/\text{height}]^2$ ).

### Dieting Readiness Test (DRT)

The DRT is a 23-item instrument designed to measure three categories of readiness to lose weight: motivation, commitment, and life circumstances.<sup>28</sup> This instrument consists of six subscales: goals and attitudes, hunger and eating cues, control over eating, binge eating and purging, emotional eating, and exercise patterns and attitudes. Fontaine, Cheskin, and Allison,<sup>29</sup> reported alpha coefficients ranging from .61 to .78 for five of the subscales, in the current study range was .50 to .79. Acceptable alpha coefficients were .73 hunger and eating

(three items), .75 for emotional eating (three items) and .79 for exercise and attitudes (five items).

### Exercise/Activity Scale

The five-item self-report activity scale supplied by RJL Systems to conduct the BIA provided information for this exercise scale. The following activity levels were used: **Inactive**—no regular physical activity with sit-down job; **Light**—no organized physical activity during leisure time with three to four hours of walking or standing per day; **Moderate**—sporadically involved in recreational activities such as weekend tennis, occasional jogging, swimming, or cycling; **Heavy**—consistent job activities of lifting or stair climbing or recreational/fitness activities such as jogging, swimming or cycling at least three times a week for 30 to 60 minutes per session; and **Vigorous Activity**—participation in extensive physical activity for 60 or more minutes at least four days per week. The levels were scored from 0 (inactive) to 4 (vigorous activity).

### Procedures

To participate, women signed a consent form and obtained a physician's written consent. Upon receipt of the physician's consent, women were scheduled to see a dietitian and receive pre-program assessments, which included completion of the dietary readiness questionnaire and demographics, bioelectrical impedance analysis, lipid analysis, blood pressure, and measures of the waist and hip, height and weight. An African American registered dietitian provided one hour of individualized nutrition counseling based on an evaluation of each woman's eating and activity habits. The dietitian prescribed tailored calorie-reduction diets ranging from 1400 to 1800 kilocalories a day.

The women met as a group with an African-American nurse certified as a lifestyle counselor in weight management and stress for 32 one-hour sessions. Strategies for WL (i.e. setting goals and monitoring eating behavior)

and factors influencing WL (i.e., attitudes, stress) were addressed during the first 16 sessions. During the next 16 sessions, strategies for WLM (i.e. addressing relapse) were discussed. The women were weighed weekly prior to each session.

The LEARN Education Center Materials were provided free of charge to each participant. The materials consisted of the LEARN manual, a weight maintenance survival guide, and a personal maintenance survival kit. The LEARN Program for Weight Control<sup>28</sup> contains 16 weekly lessons that address five components: lifestyle, exercise, attitude, relationships, and nutrition (LEARN). Weekly monitoring forms were given to the women to record daily dietary intake, calories, behaviors they were using to maintain their diet, emotional status, and types of exercise behavior. The forms were collected weekly and discussed with the women.

The Weight Maintenance Survival Guide<sup>30</sup> contains 13 weekly lessons on weight loss maintenance. The Personal Maintenance Kit<sup>31</sup> was given to the women after completion of the maintenance phase. The kit includes information to assist individuals in monitoring their weight over a period of two years. LEARN program materials were selected because of their culturally sensitive illustrations and the descriptions of a range of lifestyle experiences relevant to various ethnic/racial groups.

Culturally sensitive and relevant materials pertaining to African American women and the African American culture were provided for the women throughout the program. The women were introduced to literature on women and body weight through interactive discussions and reading materials. These reading materials included recent articles in scientific journals and popular magazines, especially those in African American publications such as *Essence*, *Ebony*, *Heart, Body and Soul* and *Jet*. The articles were usually personal descriptions of African-American women's successful attempts at weight loss. The women were given the names and references of low-fat cookbooks, including those written for African Americans,

such as *The Black Family Dinner Quilt Cookbook*.<sup>32</sup> The women also shared low-fat tasty recipes and videotapes of popular talk shows on relevant weight issues. The group viewed exercise videos and discussed them, analyzing their appropriateness for overweight and African American women.

### Data Analysis

The SPSS Guide to Data Analysis for release 10.1<sup>33</sup> was used to analyze the data. Descriptive statistics including means and standard deviations are used to present the data. Differences in physiological and psychosocial data from baseline were analyzed by paired student's *t*-test. Pearson's product moment correlations were used to determine the relationship between weight loss and attendance.

## RESULTS

### Attrition

Of the 50 women volunteers, 23 were eligible to participate. Of these 23, 16 women completed the WL phase of the program, and 10 of the 16 also completed the WLM phase. Preprogram attrition was 8.6% (*n*=2). One subject was diagnosed with diabetes, and one could not participate because of job-scheduling conflicts. Within the WL phase of the LEAP program, attrition was 23.8% (*n*=5). Between the weight loss and the weight loss maintenance phase attrition was 6.25% (*n*=1). This subject completed the weight loss program and the physiological measures, but did not complete the questionnaires. For the LEAP WLM phase, attrition was 33.3% (*n*=5). The reasons for attrition from the WL and WLM maintenance phases were similar: job-scheduling conflicts, transportation problems, lack of "motivation and commitment," and "stress."

### Characteristics of the Participants

Participants (*n*=23) ranged in age from 22 to 51 years of age (mean = 38, *sd* = 9.7). Almost half (45%) were never married, 18% were married, 27% divorced, and 9% separated. All women were high school graduates;

41% had some college, and 32% had a baccalaureate degree or higher. Average income was \$29,000, with 95% of the women employed full time. Mean number of children was one (range 0 to 4).

At baseline, the mean body mass index (BMI) of the 21 women entering the weight loss phase of the program was 36.4 (range 28 to 50). Their average waist/hip ratio (WHR) was .8 (range .72 to .91). Of the 21 women, 36% had a total cholesterol (TC) level above 200 mg/dl (range 100 to 270), while 18% had LDL levels above 130 mg/dl (range 50-173). HDL levels were within normal ranges (40mg/dl - 78mg/dl), as were diastolic and systolic blood pressures. At baseline, activity levels were inactive 27%, light activity 36%, moderate activity 27%, and heavy activity 9%. Subsequent data are reported on the 15 subjects who completed the WL phase and the 10 subjects who completed the WLM phase of LEAP.

### Factors Associated with Weight Loss

The women lost an average of 13.5 pounds,  $\pm 7.75$ , ( $p \leq .01$ ). Table 1 shows the changes in the biological and behavioral (activity) parameters of the 15 women who completed the 16-week WL phase. The changes included reductions in BMI, 34.50 ( $\pm 6.41$ ), percentage body fat 87.13 ( $\pm 28.39$ ), and waist/hip ratio .78 ( $\pm .08$ ), and an increase in exercise activity level 3.31 ( $\pm .87$ ). The activity levels at the end of this phase of the program were inactive, 4.5%; moderate activity, 40.9%; heavy activity, 22.7%, and vigorous activity, 4.5%. The types of exercise in which the women participated during the program included, walking, exercise machines at home and at health clubs, exercise videos, step aerobics, and floor exercises. Lipid profile and blood pressure measures were not significant.

Results of the analysis of the psychosocial factors after the WL phase showed a significant increase in control over emotional eating ( $t=2.48$ ,  $p \leq .05$ ) from baseline. Additional analysis indicates that higher rates of attendance ( $r=.794$ ,  $p < .01$ ) and dieting readiness to de-

**Table 1. Status of Biologic and Behavioral Variables Between Baseline (Time 1) and Weight Loss Program Completion (Time 2) (n = 15)**

Variable	Mean and Standard Deviation of the variable			t	p
	Time 1	Time 2	Difference		
Body Mass Index	36.53 ± 6.08	34.50 ± 6.30	2.02 ± 1.22	6.41	.000
Percentage Body Fat	96.00 ± 28.89	87.13 ± 28.39	8.87 ± 7.36	4.67	.000
Percentage Body Lean	122.53 ± 13.95	118.93 ± 13.31	3.60 ± 5.08	2.74	.016
Lean/Fat Ratio	1.35 ± .29	1.46 ± .34	-.11 ± .15	-2.86	.013
Total Cholesterol	181.87 ± 38.51	198.27 ± 38.34	-16.40 ± 33.09	-1.92	NS
High D/Lipoproteins	53.93 ± 10.96	53.87 ± 12.79	.07 ± 14.02	.02	NS
Low D/Lipoproteins	98.17 ± 31.75	115.50 ± 42.09	-17.33 ± 47.20	-1.27	NS
Systolic Blood Pressure	126.14 ± 9.69	123.29 ± 6.30	2.86 ± 12.72	.84	NS
Diastolic Blood Pressure	82.92 ± 8.39	83.85 ± 8.54	-.92 ± 8.19	-.41	NS
Waist/Hip Ratio	.81 ± .06	.78 ± .08	.03 ± .05	2.52	.024
Activity level	2.19 ± .91	3.31 ± .87	-1.13 ± .96	-4.70	.000

crease emotional eating ( $r=.53$ ,  $p\leq.05$ ) were significantly correlated with weight loss.

Women who completed the 16-week WL phase of the program had, at baseline, lower body-mass index ( $t=2.02$ ,  $p=.007$ ) and lower total cholesterol ( $t=2.65$ ,  $p=.025$ ) than did dropouts. The completers had more years of education ( $t=2.50$ ,  $p=.023$ ) and higher income ( $t=2.73$ ,  $p=.018$ ). In addition, they were also more likely than the dropouts to have lower scores on the responsiveness to environmental hunger and eating cues ( $t=2.40$ ,  $p=.031$ ) and emotional eating ( $t=2.33$ ,  $p=.036$ ) scales.

### Factors Associated with Weight Loss Maintenance

The women maintained a weight loss of 10.7 pounds ( $\pm 10.1$ ),  $p\leq.01$ . Significant findings of the biologic variables at the post WLM phase are shown in Table 2. The women were able to maintain a decrease in BMI, 32.9 ( $\pm 6.23$ ) and percentage body fat 75.18 ( $\pm 25.4$ ). As listed in table 2, there were statistically significant increases in the total cholesterol and HDLs. Activity levels while not significant, did increase. Of the psychosocial variables, only decreased responsiveness to environmental hunger and eating cues approached significance ( $p=.057$ ).

As for the baseline characteristics that might

predict WLM, women who completed the entire 32 weeks had, at baseline, less body fat ( $t=2.26$ ,  $p=0.36$ ) and higher income ( $t=3.32$ ,  $p=.004$ ) than dropouts.

### Discussion

The participants in this LEAP program had a rate of attrition greater than 50%. Although the investigators incorporated culturally sensitive information into the delivery of the program, several environmental and personal factors influenced the women's ability to remain in both phases of the program. The results of this study are consistent with the results of an earlier study of weight loss among African American women in which Kanders, et al.<sup>34</sup> used attendance and WL as measures of effectiveness for their WL program for African American women.

As in the Kanders, et al. study, women in this study who attended more weight loss sessions lost more weight. Participation in this study also resulted in a decrease in risk factors for heart disease, such as weight loss and reduction in percentage body fat and WHR.<sup>35</sup> Although the 16-week intervention had minimal effect on the lipid profile, completers of the 32-week program increased HDL levels. These findings indicate the need for longitudinal studies to assess the relationship between WL, WLM and

**Table 2. Status of Biological and Behavioral Variables Between Baseline (Time 1) and Maintenance Program Completion (Time 3) (n = 10)**

Variable	Mean and Standard Deviation of the variable			t	p
	Time 1	Time 3	Difference		
Body Mass Index	34.62 ± 5.91	32.91 ± 6.23	1.71 ± 1.70	3.33	.008
Percentage Body Fat	88.00 ± 27.12	75.18 ± 25.46	12.81 ± 12.36	3.44	.006
Percentage Body Lean	117.18 ± 9.66	119.36 ± 14.29	-2.18 ± 7.64	-.95	NS
Lean/Fat Ratio	1.41 ± .31	1.75 ± .72	-.34 ± .62	-1.81	NS
Total Cholesterol	170.33 ± 39.66	194.67 ± 34.19	-24.33 ± 24.35	-3.00	.017
High D/Lipoproteins	52.00 ± 8.70	62.44 ± 6.29	-10.44 ± 9.67	-3.24	.012
Low D/Lipoproteins	96.13 ± 30.24	95.38 ± 14.56	.75 ± 32.20	.07	NS
Systolic Blood Pressure	124.00 ± 8.49	122.80 ± 10.29	1.20 ± 10.34	.37	NS
Diastolic Blood Pressure	82.00 ± 7.30	82.00 ± 4.32	.00 ± 5.25	.00	NS
Waist/Hip Ratio	.79 ± .04	1.05 ± .91	-.27 ± .93	-.95	NS
Activity Level	2.30 ± .95	3.40 ± 1.17	-1.10 ± 1.73	-2.01	NS

physiological outcomes in African-American women. The findings of this study, as well as this recommendation, support Brunner and Boyington's literature review results that revealed "follow-up reinforcement classes" are effective in maintaining long-term weight loss outcomes.<sup>36</sup>

As designed, the women in the study increased their physical activity. The activity findings reflect an increase in the moderate, heavy, and vigorous activity levels. Women who were exercising at baseline increased their levels of exercise over the course of the study and sedentary women initiated exercise regimens. None of the women were participating in vigorous activity at baseline, while 4.5% were at the end of the 32 weeks.

The women self-selected exercise activities that fit into their daily routines. Previous studies revealed that individuals are more likely to adhere to exercise activities when they self-select the activity.<sup>37</sup> and that participation in physical activity is common among successful weight maintainers.<sup>38</sup>

Earlier research also suggests that psychosocial variables associated with WL and WLM may differ.<sup>39</sup> In this study, dieting readiness to control over eating and to decrease emotional eating were important to WL, while responsiveness to hunger and eating cues was somewhat important to WLM. Blair et al.<sup>40</sup> found that

individuals who reduced emotional eating were more likely to lose weight and approach goal weight. However, in a study of 410 Caucasian men and women<sup>29</sup> and a study of 132 Caucasian women,<sup>41</sup> no correlations were found between the DRT subscales and weight loss. In spite of conflicting research findings, for the African American women in this study, the psychosocial aspects of eating behavior were associated with weight loss.

Limitations of this study are the use of convenience sampling, small sample size, and the lack of a control group. These threats to the internal validity of the research design prevent generalization of the findings to other groups of African American women. However, the findings are consistent with the desired changes in both lifestyle and reduction in disease risks, weight control experts recommend.<sup>15</sup> Additionally, the SCT explanatory model enabled a multifactorial examination of variables that were associated with WL and WLM in this group of women.<sup>42</sup>

Future studies in weight loss and weight loss maintenance with African American women need to be more rigorous, by including power analyses to determine adequate sample size to increase the probability of significant results and control groups to determine the effectiveness of the LEAP program. A major concern for this study, as in other WL studies, is the rate

of attrition. Identifying reasons for attrition and assessing participants' satisfaction with programs could provide guidance to reduce attrition in future programs. Assessment of satisfaction with the program revealed that women thought the LEAP program materials included information that was relevant and helpful for African American women. The women found the structure and format of the LEARN<sup>28</sup> program and the Weight Maintenance Survival Guide<sup>30</sup> appealing and easy to use. However, they suggested that the dietary and exercise monitoring forms were burdensome. The women also recommended separate groups for younger women, providing more group interaction time, and assistance with transportation needs. Although many of the women did not achieve their weight loss goals, the changes in the biologic factors and the increases in activity may reflect a decreased risk for chronic disease, and thus represent a successful outcome.<sup>43-47</sup>

Community-based programs developed for African American women should result in desired outcomes<sup>17,35</sup> such as the personal and behavioral benefits experienced by the women who completed this 32-week program. As Kanders and colleagues<sup>33</sup> found, African American women are motivated to lose weight; and as shown in this study, will perform the necessary actions to do so, especially if they perceive that the environment (program) is accessible and relevant.

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