ORIGINAL RESEARCH ARTICLE

Clinical Implications of the Association of Race With Body Satisfaction and Perceived Control Over Eating in Women Initiating a Behavioral Obesity Treatment

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ABSTRACT

Objective: An improved understanding of the implications of race on body satisfaction might optimize the weight loss process and quality of life in women with obesity.

Methods: Women with obesity (mean [standard deviation] age, 33.0 [13.8] years) of black (n = 32) and white (n = 38) racial groups volunteered for a cognitive-behavioral weight management program.

Results: Body satisfaction scores at baseline and month 3 were significantly higher in the black group; however, the significant within-group improvements in that variable and on weight, physical activity, fruit and vegetable consumption, sweets intake, perceived ability to control eating, and emotional eating did not significantly differ by racial group. Neither weight nor age significantly added to the strength of the association between race and body satisfaction. Perceived ability to control eating mediated the associations between race and body satisfaction as well as change in weight and change in body satisfaction. In post hoc analyses, inverse associations between body satisfaction and emotional eating were detected regardless of race.

Conclusion: The findings of this study increased understanding of body satisfaction in women with obesity and have implications for addressing psychosocial factors within weight loss treatments across racial and at-risk groups.

Introduction

In the US, 32% of white women and 55% of black women have obesity (body mass index ≥ 30 [calculated as weight in kilograms divided by square of height in meters]).[1] Of those with an unhealthy weight, approximately 60% are actively trying to lose weight.[1] A poor understanding of psychosocial factors associated with weight and weight loss has rendered almost all behavioral (nonsurgical and nonpharmacologic) treatments ineffective beyond their initial weeks.[2] Psychosocial factors, such as body satisfaction, emotional eating, and perceived ability to control eating, can have important implications in early months of treatment that could vary by ethnicity/race and age in women.[3] For example, black women tend to have a more favorable body image and less disordered eating than white women.[4,5] However, these findings are less clear for those participating in treatments for obesity and across age groups.[3,4] Notably, more women who have a healthy weight seek weight loss because of a poor body image than those with overweight or obesity.[6] Body satisfaction is an important quality-of-life variable that might be affected by cultural factors, including pressures for thinness in women.

On the basis of social cognitive and self-efficacy theories,[7,8] perceptions of one's ability to control eating might affect body satisfaction, disordered eating, and weight loss behaviors.[3] Thus, theory-based, behavioral weight management treatments have emphasized the use of self-regulatory skills (eg, relapse prevention) to overcome barriers to behavioral changes and foster feelings of perceived ability to sustain desired changes. Although analyses of possible psychosocial factors of typical treatment outcome measures (eg, weight and body composition) have long been advocated, minimal research attention has been focused on these factors to help inform treatment architectures.[2] An increased understanding of the aforementioned associations could also be useful for interactions between medical professionals and patients.

Thus, this study assessed white and black women with obesity participating in a theoretically driven, behavioral weight management program intended to induce both sustained physical activity and eating changes. It assessed 3-month changes in body satisfaction and other psychological and behavioral factors relevant to weight and the weight loss process, accounting for race, age, and initial weight.

Our hypotheses were as follows. First, significant 3-month improvements would be seen in weight, physical activity, fruit and vegetable consumption, sweets intake, body satisfaction, perceived ability to control eating, and emotional eating across racial groups. Second, black race would be associated with higher body satisfaction. (It was set as a research question, without hypotheses, whether the addition of weight and age would significantly affect that association.) Third, perceived ability to control eating would mediate the association between race and body satisfaction

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and the association between changes in weight and body satisfaction.

Methods

Participants

Women in the Southeast US volunteered for a weight management program that emphasized physical activity and healthy eating. Inclusion criteria were obesity, no known health issues that precluded safe participation, no regular exercise (≤ 1 exercise session per week during the previous year), and not currently participating in any weight loss program. The present data set was part of a larger and longer-term research project and included only black (n = 32) and white (n = 38) women. There were no significant group differences in age (mean [standard deviation], 33.0 [13.8] years) and weight (mean [standard deviation], 95.5 [12.7] kg). Almost all the women were in the middle socioeconomic stratum. Approval of the study protocol and of the written informed consent form required for participation was obtained from Kennesaw State University institutional review board.

Measures

Body satisfaction was measured using the body areas satisfaction scale of the Multidimensional Body-Self Relations Questionnaire.[9] Happiness or unhappiness with 9 areas of a respondent's body (eg, lower torso [buttocks, hips, thighs, legs]) was self-reported, with possible responses ranging from 1 (very dissatisfied) to 5 (very satisfied). Item scores were summed and then divided by 9. The internal consistency was Cronbach α = 0.73, and test-retest reliability during 4 weeks was 0.74. Strong correspondences with other well-validated body image scales were found.[9] For the present sample, Cronbach α = 0.75.

Perceived ability to control eating was measured using the Weight Efficacy Lifestyle Questionnaire.[10] Items included feelings of control over eating under conditions of negative emotions, social pressures, physical discomforts, high food availabilities, and positive activities (eg, television watching). Possible responses to the 20 items, such as "I can resist eating when I am anxious (nervous)" and "I can resist eating even when others are pressuring me to eat," ranged from 0 (not confident) to 9 (very confident) and were summed. Internal consistencies ranged from Cronbach α = 0.70 to 0.90,[10] and for the present sample was Cronbach α = 0.74 to 0.82.

Emotional eating was measured using the Emotional Eating Scale.[11] Fifteen items addressed how feelings related to anxiety (eg, on edge), depression (eg, sad), and anger (eg, irritated) led a respondent to a desire or urge to eat. Possible responses ranged from 0 (no desire to eat) to 4 (an overwhelming urge to eat) and were summed. Internal consistency was Cronbach α = 0.76, and test-retest reliability during 2 weeks was 0.79. Strong correspondences with binge eating disorder scales were found.[11] In the present sample, Cronbach α = 0.73.

Physical activity outputs of 15 minutes or longer during the previous week were measured by the Leisure-Time Physical Activity Questionnaire.[12] Frequencies of bouts of mild exercise or minimal exertion (eg, easy walking) through strenuous exercise or heart beats rapidly (eg, running) were coded as 3-9 metabolic equivalents (a physiologic measure of exertion) and summed. Previous research indicated significant associations between accelerometer and physiologically based energy expenditure results, and the test-retest reliability during 2 weeks was 0.74.[12,13]

On the basis of portion sizes indicated by the US Department of Agriculture,[14] portions of fruits (eg, 118 mL of canned pears), vegetables (eg, 118 mL of peas), and sweets (eg, 118 mL [small piece of] cake) consumed in a typical day were recalled. Strong correspondences were found with comprehensive food frequency recalls and energy consumption. Test-retest reliabilities during 2 weeks averaged 0.81.[15] Consumption of fruits and vegetables was summed.

Body weight was measured in kilograms using a recently calibrated digital scale after removing heavy outerwear and shoes. The mean of 2 consecutive measurements was recorded.

Procedure

Health educators with national certifications were trained in the administration of the physical activity and eating behavior-change components that were based on tenets of social cognitive theory,[7] self-efficacy theory,[8] and self-regulation theory.[16] Their instruction to participants was further supported by retained manuals and videos. The physical activity support component consisted of 4 educator-to-participant sessions of 45 minutes each during the 3-month study, starting at baseline. The protocol was intended to counter common barriers to regular exercise, such as slow progress, discomfort, and boredom, through the use of self-regulatory skills, such as relapse prevention, cognitive restructuring, and stimulus control, which were addressed during each session. Individualized proximal goals were also discussed, revised, and documented during each session. Physical activity types were based on participant preference, and their durations and intensities were adjusted so that they were associated with reinforcing feelings of revitalization.[17]

Six weeks after treatment start, participants were required to log their foods and kilocalorie intake. Soon after, a daily limit of 1500 kcal was established, and group nutrition sessions of 10 to 15 participants were held every 2 weeks. During each of these 60-minute sessions, the self-regulatory

Table 1. Within-group changes in study variables during 3 months[a]

Variable	Baseline		Month 3		Score change[b]		*t*	p	d[c]	95% CI
	Mean	SD	Mean	SD	Mean	SD				
Weight, kg										
White	96.32	13.72	93.61	13.79	−2.71	3.39	4.92	< .001	0.20	−3.82 to −1.59
Black	94.43	11.56	91.46	10.81	−2.96	4.04	4.42	< .001	0.26	−4.42 to −1.51
Aggregated	95.45	12.72	92.63	12.48	−2.82	3.68	6.43	< .001	0.22	−3.70 to −1.95
Physical activity, METs per week										
White	10.70	8.76	29.65	13.24	18.95	15.05	7.76	< .001	2.16	14.00-23.90
Black	13.16	9.28	34.86	17.06	21.70	16.56	7.41	< .001	2.34	15.73-27.67
Aggregated	11.82	9.02	32.03	15.22	20.21	15.70	10.77	< .001	2.24	16.46-23.95
Fruits and vegetables, portions per day										
White	3.49	2.12	5.21	2.73	1.72	2.23	4.76	< .001	0.81	0.99-2.46
Black	3.30	1.96	4.97	2.14	1.67	1.77	5.34	< .001	0.85	1.03-2.31
Aggregated	3.40	2.04	5.10	2.46	1.70	2.02	7.04	< .001	0.83	1.22-2.18
Sweets, portions per day										
White	2.05	1.45	1.28	0.91	−0.78	1.24	3.86	< .001	0.54	−1.18 to −0.37
Black	2.70	2.15	1.25	1.09	−1.45	1.96	4.20	< .001	0.67	−2.16 to −0.75
Aggregated	2.35	1.82	1.26	0.98	−1.09	1.63	5.57	< .001	0.60	−1.47 to −0.70
Body satisfaction										
White	1.04	0.42	1.34	0.58	0.30	0.53	3.47	.001	0.71	0.12-0.47
Black	1.33	0.53	1.70	0.70	0.37	0.65	3.22	.003	0.70	0.13-0.60
Aggregated	1.18	0.49	1.51	0.66	0.33	0.58	4.73	< .001	0.67	0.19-0.47
Perceived ability to control eating										
White	88.61	27.41	113.21	28.27	24.61	29.03	5.22	< .001	0.90	15.06-34.15
Black	101.28	30.17	125.88	28.51	24.59	24.20	5.75	< .001	0.82	15.87-33.32
Aggregated	94.40	29.20	119.00	28.88	24.60	26.74	7.70	< .001	0.84	18.22-30.98
Emotional eating										
White	26.36	10.19	20.33	9.82	−6.03	10.21	3.64	.001	0.59	−9.38 to −2.67
Black	24.88	11.45	18.00	10.03	−6.91	9.67	4.04	< .001	0.60	−10.39 to −3.42
Aggregated	25.68	10.73	19.25	9.92	−6.43	9.90	5.43	< .001	0.60	−8.79 to −4.07

[a] n = 38 white women (*df* = 37) and n = 32 black women (*df* = 31). N = 70 (*df* = 69) for aggregated data.
[b] Score change was calculated as the month 3 score minus the baseline score.
[c] Cohen's measure of within-group change (mean at month 3 minus mean at baseline divided by SD at baseline).
CI = confidence interval; METs = metabolic equivalents; SD = standard deviation.

skills learned for adhering to regular physical activity were adapted and applied to healthy eating, with emphases on increasing fruit and vegetable consumption and reducing sweets intake. Thus, feelings of the ability to control eating were targeted. Instructions in observing satiety levels in the context of when to eat were also included.

Identical measures were administered to participants in a private area at treatment start and month 3. Fidelity checks on approximately 15% of treatment sessions were structured to identify protocol delivery compromises. Study staff were able to easily correct the few minor protocol violations.

Statistical Analysis

Because there was no systematic bias in the 11% of missing cases, the expectation maximization algorithm was used for imputation and to facilitate an intention-to-treat format. For the planned regression analyses, 67 participants or more were required to detect a moderate effect ($f^2 = 0.15$) at the statistical power of 0.80 ($\alpha \leq 0.05$).[18] SPSS statistical software, version 22 (IBM Corporation, Armonk, NY), was used for the statistical analyses, incorporating the Process macroinstruction application Model 4 (mediation analysis, with 20,000 bias-corrected and accelerated bootstrap resamples).[19] Tolerance values > 0.90 indicated acceptable collinearity. Statistical significance was set at $\alpha \leq 0.05$ (2-tailed for group differences and 1-tailed in regression analyses where directionality of relationships was previously established[3]).

Independent *t*-tests were performed to assess the significance of group differences at baseline and month 3.

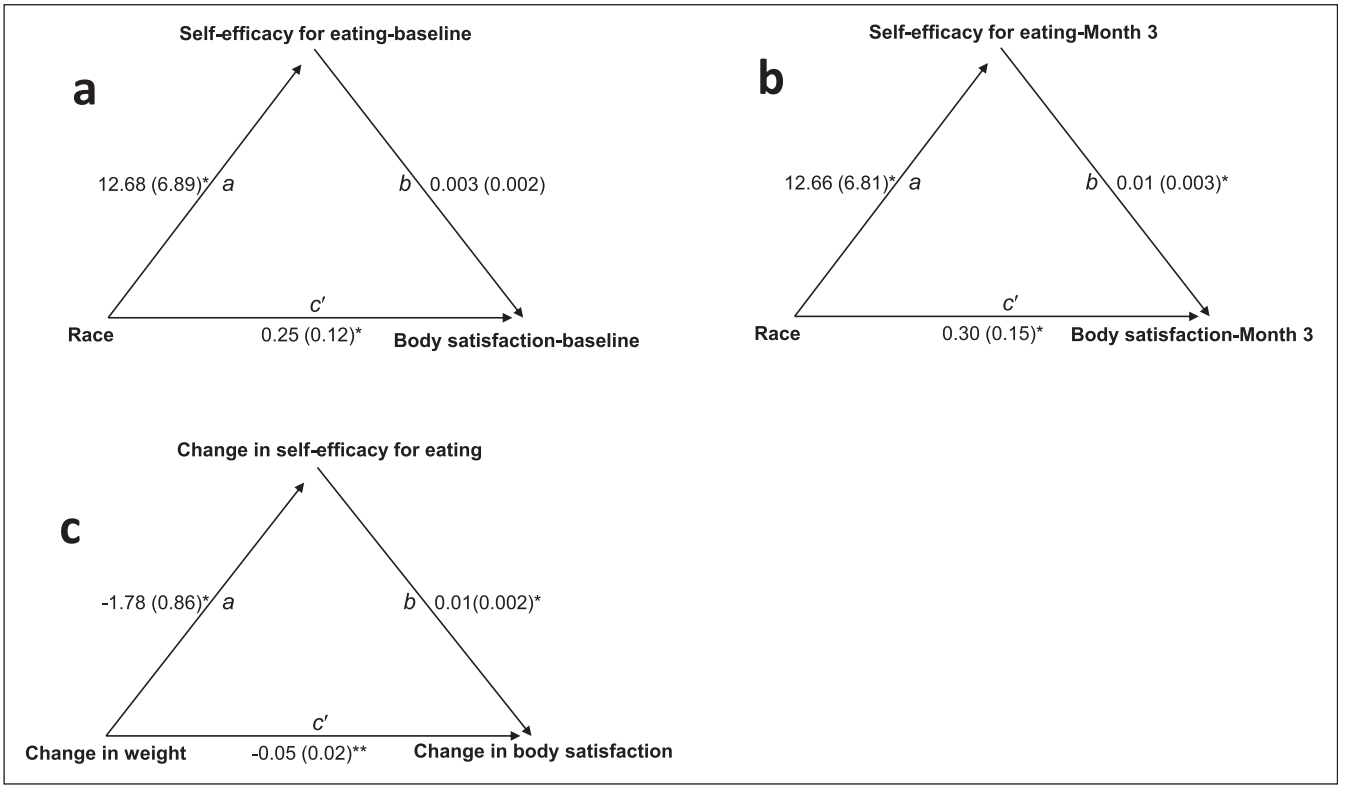

Figure 1. Mediation of the association of race and body satisfaction by perceived ability to control eating at baseline (A) and month 3 (B) and mediation of the association of changes in weight and body satisfaction by change in perceived ability to control eating (C). Paths a, b, and c′ are labeled in italics. *p ≤ 0.05 and **p ≤ 0.01 (1-tailed tests).

Dependent *t*-tests and mixed-model repeated measures analyses of variance were then performed to evaluate within-group score changes from baseline to month 3 and between-group differences in those changes. Small, moderate, and large effect sizes were defined, respectively, as a Cohen's d of 0.20, 0.50, and 0.80 for the *t*-tests and $\eta^2_{partial}$ of 0.06, 0.14, and 0.20 for the analyses of variance.

Multiple regression analyses assessed the associations of race (coded as 1 for white and 2 for black) with body satisfaction. Weight and age were next entered as additional indicators in step 2 of those equations. Scores were appraised at baseline, month 3, and change from baseline to month 3. Mediation effects of perceived ability to control eating on associations between race and body satisfaction as well as changes in weight and body satisfaction were evaluated.

Results

Baseline and month 3 scores on body satisfaction were significantly greater in the black group (t_{68} = 2.53, p = 0.014, d = 0.60, 95% confidence interval [CI] = 0.06-0.51, and t_{68} = 2.35, p = 0.022, d = 0.56, 95% CI = 0.05-0.66, respectively). No other significant group difference was found (Table 1). For both racial groups, weight, emotional eating, and sweets intake significantly decreased, whereas and physical activity, fruit and vegetable consumption, body satisfaction, and perceived ability to control eating significantly increased during 3 months (Table 1). No significant between-group difference was found in those improvements.

At baseline and month 3, neither weight (β = −0.003 and −0.19, respectively; p > 0.100) nor age (β = −0.18 and −0.01, respectively; p > 0.130) significantly added to the strength of a significant association of race with body satisfaction at both baseline (R^2 = 0.09, $F_{1,68}$ = 6.40, p = 0.014) and month 3 (R^2 = 0.08, $F_{1,68}$ = 5.53, p = 0.022). The nonsignificant changes in the R^2 values were 0.03 and 0.04.

Perceived ability to control eating significantly mediated the association between race and body satisfaction at baseline (B = 0.04, standard error [SE] = 0.03, 95% CI = 0.003-0.104) and month 3 (B = 0.06, SE] = 0.05, 95% CI = 0.006-0.181) (Figure 1A and B). Change in perceived ability to control eating significantly mediated the association between changes in weight and body satisfaction (B = −0.01, SE = 0.01, 95% CI = −0.031 to −0.001) (Figure 1C).

In exploratory post hoc regression analyses that assessed the associations between body satisfaction and emotional eating, no significant association was found between those

variables when baseline scores were entered (R^2 = 0.03, B = −3.88; SE = 2.61, 95% CI = −8.234 to 0.485), but significant associations were found when scores at month 3 (R^2 = 0.05, B = −3.49, SE_B = 1.78, 95% CI = −6.456 to −0.515) and score changes from baseline to month 3 (R^2 = 0.04, B = −3.47, SE = 2.05, 95% CI = −6.893 to −0.052) were entered. Entering racial group in step 2 of those equations did not significantly add to the strength of the associations (95% CIs = −4.892 to 4.082, −5.267 to 2.870, and −4.452 to 3.562, respectively). The nonsignificant changes in *R2* values were < 0.004.

Discussion

As expected, the self-regulation-based weight loss treatment was associated with 3-month improvements in all tested behavioral and psychosocial variables, regardless of racial group. In addition, as hypothesized, the black group had a significantly greater initial body satisfaction score than the white group. That moderate effect size was somewhat larger than the mean of 93 such contrasts of US women (d = 0.29),[4] which included 13 contrasts that incorporated the currently used body areas satisfaction scale. Because the treatment-targeted construct of perceived ability to control eating mediated the race-body satisfaction and weight change-body satisfaction change associations, its estimated utility supported theory[7,8] and related research.[3]

Although body satisfaction is an important quality-of-life factor, its identified negative association with weight change further justifies intervention-based attention. The detected association between body satisfaction and emotional eating warrants further research and might have implications for treating the problem of disordered eating that have not yet been identified.[5,6] This could enhance relationships between medical professionals and patients in areas that are rarely considered.

Because the various subgroups of the participants who self-classified as black (eg, African immigrant, Caribbean origin) were not accounted for, extensions of this research should evaluate other racial groups to determine cultural implications.

Conclusion

Although limitations inherent in field studies, such as effects of social support, experimenters, and expectations, were likely present, extensions and replications of this research across sample types have potentials for addressing psychosocial indicators of weight loss and thus improving the success of behavioral treatments across at-risk groups. ❖

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

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Laura King, ELS, performed a primary copyedit.

Author Contributions

JJA conceptualized the study, supervised the data collection, conducted the data analyses, and wrote the report. PHJ contributed to the data collection and the writing of the report. Both authors approved the final version of the report.

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