Effects of Women’s Body Satisfaction, Emotional Eating, and Race on Short-, Mid-, and Long-term Weight Loss
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ABSTRACT
Objective: To improve understanding of psychosocial factors, their changes, and racial differences with implications for behavioral obesity treatments.
Methods: Women with obesity of White (n = 64) and Black (n = 33) racial groups participated in cognitive-behavioral community-based obesity treatment and were assessed on body satisfaction, emotional eating, and weight changes over 3, 6, 12, and 24 months via mixed-model repeated-measures analysis of variance and stepwise multiple regression analyses.
Results: Baseline body satisfaction scores were significantly higher (P < 0.001) in Black participants. White participants had significantly higher (P = 0.04) emotional eating scores. Significant overall improvements (P < 0.001) in body satisfaction, emotional eating, and weight were found, with weight reduction significantly greater (P = 0.05) among the White women. Weight reductions were significantly predicted by changes in body satisfaction and emotional eating (R² = 0.12–0.20, P < 0.01). When racial group was entered into the analyses, the explained variance in weight change over 6 and 12 months significantly increased (P < 0.05).
Conclusions and Implications: Findings suggest addressing body satisfaction, emotional eating, and racial differences by adjusting obesity treatment targets could improve outcomes. Research-to-practice needs include a control group and further identification/elucidation of other psychosocial and economic factors that might affect outcomes.
Key Words: body satisfaction, body image, race, obesity, treatment (J Nutr Educ Behav. 2023;000:1–5.)
Accepted July 13, 2023.

INTRODUCTION
Successfully addressing psychosocial predictors of short- and long-term weight loss in women has been elusive within behavioral obesity treatments. Although interventions largely maintain the atheoretical emphasis of simply educating participants on nutritional and physical activity changes,2 cognitive-behavioral approaches have focused on self-regulatory skill development to counter the problem of emotional eating and fostering improved body image—an assumed requirement for adherence to the requisite behavioral changes,3 especially in women.4 Research suggests interactions between body satisfaction, emotional eating, and weight5,6; however, accounting for possibly relevant individual characteristics such as race/ethnicity is also an important consideration for treatment development. For example, although causal factors are unclear, studies suggest that White women have more emotional eating and a poorer body image than Black women,5,6 who are the group highest in obesity in the US at 49.6%.7 It remains unclear if treatment-associated improvements in women’s body satisfaction and emotional eating will predict their short-, mid, and long-term weight loss and, if so, could the weight loss be further explained by racial group (White/Black). If racial differences are found, adjustments to treatment targets/foci (eg, improvements in health risks/quality-of-life vs body satisfaction/emotional eating) might be indicated.

Therefore, within a field-based behavioral obesity treatment setting, we contrasted and evaluated relationships among body satisfaction, emotional eating, and weight, accounting for racial groups. Hypotheses were as follows: (1) baseline scores on body satisfaction will be higher in the Black women than in the White women participants, and emotional eating scores will be lower within the Black racial group; (2) there will be significant improvements in body

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Conflict of Interest Disclosure: The authors have not stated any conflicts of interest.
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https://doi.org/10.1016/j.jneb.2023.07.003
satisfaction, emotional eating, and weight across racial groups associated with participation in the cognitive-behavioral treatment; (3) there will be a significant inverse relationship between body satisfaction and emotional eating at baseline, and with their overtime changes; and (4) changes in body satisfaction or emotional eating (or both) will predict subsequent reductions in weight. Whether racial group further explains the subsequent weight loss was left as a research question.

METHODS

Participants

Participant data were from enrollees of a continuing program of field-based inquiry on behavioral obesity treatments. Although aspects of the dataset were previously analyzed, the present research foci are unique to this study. Participants were recruited via electronic media to a no-cost/no-compensation program incorporating exercise and healthy eating for weight loss in a community-based setting. Treatment processes for all participants occurred between 2018 and 2020 from the same southeastern region of the US, with the same instructors. Inclusion requirements were female with a body mass index (BMI) ≥ 30 kg/m², no known contraindication for participation, no current/soon-planned pregnancy, and self-reporting as White (n = 64) or Black (n = 33).

At baseline, there was no racial group difference in mean age (47.9 ± 8.1 years) or BMI (34.71 ± 3.1 kg/m²). Nearly all participants were within a middle yearly household income range (ie, median = $66,000). The Institutional Review Board at Kennesaw State University approved the study protocol using an expedited review process. It also approved the written informed consent required of each participant before participation. Ethical requirements of the World Medical Association Declaration of Helsinki and the American Psychological Association were followed throughout.

Measures

Five noninstructional study staff were trained to administer the study measures in a private area at baseline and 3, 6, 12, and 24 months. Each of those staff members had either a master’s or doctoral degree related to health science.

Body satisfaction was measured by 5 items of the Body Areas Satisfaction Scale (eg, lower torso, weight). Response options for each item were from 0 (very dissatisfied) to 4 (very satisfied), then summed. Internal consistency for women was reported to be α = 0.73, with 4-week test-retest reliability at 0.74. Internal consistency for the present sample was α = 0.75.

The Emotional Eating Scale measured how feelings (eg, sad, on edge) lead to an urge to eat via 15 items. Response options for each item were from 0 (no desire to eat) to 4 (an overwhelming urge to eat), then summed. Internal consistency for women with obesity was reported to be α = 0.78, with 2-week test-retest reliability at 0.79. Internal consistency for the present sample was α = 0.74.

Weight was measured to the nearest 0.1 kg by a recently calibrated, self-zeroing digital floor scale (Health o Meter Professional 800 KL, Newell Brands). Participants first removed their shoes and heavy outer clothing. The mean of 2 consecutive measurements was recorded. To confirm the inclusion criterion, height was measured at baseline by a stadiometer (Health o Meter Portrod, Newell Brands) which facilitated the calculation of BMI.

Procedure

The cognitive-behavioral treatment administered within this study is explained more fully elsewhere. Briefly, its exercise- and eating behavior-support components were based on social cognitive theory and the strength model of self-regulation. After training by study staff, it was administered by existing staff members of the participating community health-promotion facilities. The exercise support component consisted of 6 1-on-1 sessions (through 6 months) in which self-regulatory skills, such as proximal goal setting/incremental progress tracking, relapse prevention, cognitive restructuring, and stimulus control, were developed/rehearsed. Exercise modalities and amounts were largely based on participant preference; however, a minimum of 3 moderate sessions/wk were required (the minimum amount associated with positive changes in psychosocial variables associated with lost weight). The group eating behavior-change sessions were held every 2 weeks from 3 to 12 months, in which self-regulatory skills learned during the exercise support component were adapted for controlling eating (which emphasized fruit/vegetable increases and reducing sweets). Monthly brief phone conversations were held from 13 to 23 months to reinforce participants’ self-regulatory skills. Noninstructional study staff conducted periodic structured protocol fidelity checks and enabled minor adjustments as indicated.

Data Analyses

Required criteria for no systematic bias in the 11% of missing cases were met; thus, imputation using the expectation-maximization algorithm was acceptable. This facilitated an intention-to-treat format. Based on the planned regression models, a total sample size of 76 was required to detect a moderate effect (Cohen’s f² = 0.15) at the statistical power of 0.80. Inspection of the data indicated no ceiling or floor effects and variance inflation factor scores of < 2.0 indicated acceptable multicollinearity. As proposed for the present research context, gain (change) scores were unadjusted for their baseline value throughout the analyses. The established change intervals followed tenets of lagged variable analyses (eg, change over a longer duration predicted by change during a previous interval) and reinforced directionality in the planned regression models. Statistical significance was set at α < 0.05 (2-tailed tests) throughout. Based on suggestions for theory-driven testing with a priori hypotheses, no adjustment of α for multiple tests was needed. SPSS software (version 28.0,
IBM, 2021) was used for the statistical analyses.

Mixed-model repeated-measures analysis of variance first assessed the overall significance of changes in the study variables, then evaluated whether those changes significantly differed by racial group. Planned follow-up contrasts were then incorporated. Effect sizes are given as partial eta-squared ($\eta^2_{\text{partial}}$), in which 0.01, 0.09, and 0.25 were small, moderate, and large effects, respectively. One-way analysis of variance also assessed group differences at baseline.

The interrelations of body satisfaction and emotional eating scores were calculated using data aggregated across groups. In addition, using aggregated data, stepwise multiple regression analyses assessed associations of weight change over 6, 12, and 24 months (short-, mid-, and long-term, respectively) from baseline scores and earlier changes in body satisfaction and emotional eating (simultaneously entered). Racial group (1, White; 2, Black) was next entered into step 2 of each equation.

RESULTS
Score Changes and Contrasts by Racial Group

Score changes in body satisfaction and emotional eating from baseline to 3, 6, and 12 months; and weight from baseline to 6, 12, and 24 months; are given by racial group in Table 1. There were significant overall improvements ($P < 0.001$) in body satisfaction ($F[1, 95] = 91.45$, $\eta^2_{\text{partial}} = 0.49$), emotional eating ($F[1, 95] = 40.33$, $\eta^2_{\text{partial}} = 0.30$), and weight ($F[1, 95] = 38.15$, $\eta^2_{\text{partial}} = 0.29$). Follow-up contrasts indicated that improvements from baseline were significant at all tested temporal intervals. There was a significant time × racial group interaction for weight ($F[1, 95] = 4.05$, $P = 0.05$, $\eta^2_{\text{partial}} = 0.04$). Weight loss was greater at all intervals in White participants. At baseline, Black participants had a significantly higher score on body satisfaction ($F[1, 95] = 15.07$, $P < 0.001$, $\eta^2_{\text{partial}} = 0.14$) and a significantly lower emotional eating score ($F[1, 95] = 4.52$, $P = 0.04$, $\eta^2_{\text{partial}} = 0.05$).

Interrelations of Body Satisfaction and Emotional Eating Scores

Incorporating aggregated data, there were significant bivariate relations between emotional eating and body satisfaction at baseline ($B$ [unstandardized beta value $\pm SE$] $= -1.14 \pm 0.53$; $\beta$ [standardized beta] $= -0.22$; $P = 0.04$; 95% confidence interval [CI], $-2.20$ to $-0.83$), 3 months ($B = -1.15 \pm 0.37$; $\beta = -0.30$; $P = 0.003$; 95% CI, $-1.88$ to $-0.41$), 6 months ($B = -0.84 \pm 0.25$; $\beta = -0.33$; $P = 0.001$; 95% CI, $-1.33$ to $-0.35$), and 12 months ($B = -1.27 \pm 0.27$; $\beta = -0.44$; $P < 0.001$; 95% CI, $-1.80$ to $-0.73$).

Prediction of Weight Change Using Body Satisfaction and Emotional Eating Scores

Changes in weight from baseline to months 6, 12, and 24 were not significantly predicted by body satisfaction and emotional eating scores at baseline, $R^2 = 0.01, 0.02,$ and 0.03, respectively. Table 2 provides data on the stepwise multiple regression analyses incorporating changes in body satisfaction in the independent variable in the independent variables. In addition, using data aggregated across groups, changes in weight from baseline to 6, 12, and 24 months were significantly predicted by changes in body satisfaction from baseline to 3, 6, and 12 months, respectively (given the changes in body satisfaction, prediction by emotional eating changes did not reach statistical significance). Within each equation, only change in body satisfaction made a significant unique contribution to the explained variance in weight change. Entry of racial group into step 2 of those equations significantly increased the explained variance in weight change from baseline to 6 months and baseline to 12 months. Based on the coding of the racial groups, the directionality.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline</th>
<th>3 mo</th>
<th>6 mo</th>
<th>12 mo</th>
<th>$\Delta B$ to 3 mo</th>
<th>$\Delta B$ to 6 mo</th>
<th>$\Delta B$ to 12 mo</th>
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<tbody>
<tr>
<td>Body satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>White</td>
<td>5.0 ± 2.1</td>
<td>7.2 ± 2.6</td>
<td>9.4 ± 3.6</td>
<td>9.1 ± 3.6</td>
<td>2.2 ± 2.6</td>
<td>4.5 ± 3.7</td>
<td>4.1 ± 3.8</td>
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<tr>
<td>Black</td>
<td>6.7 ± 2.1</td>
<td>9.3 ± 3.2</td>
<td>10.5 ± 3.9</td>
<td>9.5 ± 2.8</td>
<td>2.6 ± 2.5</td>
<td>3.7 ± 3.4</td>
<td>2.8 ± 2.6</td>
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<td>Aggregated data</td>
<td>5.6 ± 2.3</td>
<td>7.9 ± 2.9</td>
<td>9.8 ± 3.7</td>
<td>9.2 ± 3.4</td>
<td>2.3 ± 2.6</td>
<td>4.2 ± 3.6</td>
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<tr>
<td>Emotional eating</td>
<td></td>
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<td></td>
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<tr>
<td>White</td>
<td>26.4 ± 11.7</td>
<td>19.4 ± 11.5</td>
<td>16.7 ± 9.9</td>
<td>19.0 ± 11.9</td>
<td>-7.0 ± 9.9</td>
<td>-9.7 ± 9.3</td>
<td>-7.4 ± 10.4</td>
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<tr>
<td>Black</td>
<td>21.0 ± 12.2</td>
<td>17.8 ± 10.0</td>
<td>14.6 ± 10.7</td>
<td>16.1 ± 10.8</td>
<td>-3.2 ± 8.7</td>
<td>-6.4 ± 8.7</td>
<td>-4.9 ± 9.7</td>
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<td>24.6 ± 12.1</td>
<td>18.9 ± 11.0</td>
<td>16.0 ± 10.1</td>
<td>18.0 ± 11.6</td>
<td>-5.7 ± 9.7</td>
<td>-8.6 ± 9.2</td>
<td>-6.5 ± 10.2</td>
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<tr>
<td>Body weight (kg)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>White</td>
<td>95.42 ± 12.57</td>
<td>88.39 ± 12.34</td>
<td>88.58 ± 12.92</td>
<td>89.21 ± 13.06</td>
<td>-7.03 ± 4.87</td>
<td>-6.83 ± 6.33</td>
<td>-6.21 ± 7.25</td>
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<tr>
<td>Black</td>
<td>92.54 ± 9.89</td>
<td>88.21 ± 10.52</td>
<td>88.84 ± 11.06</td>
<td>89.21 ± 10.79</td>
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<td>94.44 ± 11.75</td>
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<td>88.67 ± 12.26</td>
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<td>-6.11 ± 4.75</td>
<td>-5.77 ± 5.87</td>
<td>-5.23 ± 6.56</td>
</tr>
</tbody>
</table>

$\Delta B$ to 3 mo indicates the change from baseline to 3 mo; $\Delta B$ to 6 mo, change from baseline to 6 mo; $\Delta B$ to 12 mo, change from baseline to 12 mo.

aData were from White ($n = 64$) and Black ($n = 33$) women participating in community-based obesity treatment in the southeast US. Note: Data are presented as mean ± SD.
of the beta values, and the associated 95% CIs, findings indicated greater weight loss among White women during those temporal intervals (when controlled for changes in body satisfaction and emotional eating).

**DISCUSSION**

Our findings related to body satisfaction and emotional eating regarding racial groups and their interrelations are generally consistent with previous research.\(^5\)\(^6\) For example, White women scored significantly higher on emotional eating and lower in body satisfaction than Black women at baseline.\(^5\)\(^6\) The observation that treatment-associated changes in those psychological factors were significant predictors of weight change was an important extension of those relationships. In addition, the finding that racial difference was a significant contributor to the psychological change—weight loss relationships suggests a need to address racial differences within behavioral obesity treatments—especially when an improved body image is represented as the primary incentive for weight loss, as is typical.\(^19\) The predictive power found with the association between body satisfaction and racial difference in cognitive-behavioral treatment-associated changes in weight over short- and longer-term periods further supports tailoring intervention foci/content accordingly.

Important limitations such as reliance on repeated measurement from the same self-report instruments and possible confounds associated with volunteerism were present, and thus findings should be interpreted accordingly. Additional limitations included a lack of incorporation for the following: (1) BMI changes and standardized protocols for height/weight measurements, (2) adjustments for alterations in weight from physiological changes such as edema and the menstrual cycle, and (3) a control group to help account for changes associated with social support and/or expectation effects. Including a control group would also help account for other psychosocial and economic factors. It should also be noted that this research was field based and, as such, other activities of the women during the intervention were not monitored. In addition, although specific times were not indicated, women were aware that they would be weighed at varying intervals throughout the study.

**IMPLICATIONS FOR RESEARCH AND PRACTICE**

Because our findings suggest that body satisfaction is experienced differently in White than in Black women, future obesity treatments...
might consider addressing alternate reinforcements for weight loss in Black females over more typical emphases on increased feelings of self-esteem, self-worth, and social status (which were not studied here). A sensitivity to racial difference is especially important in Black women because of their high prevalence of obesity.

In addition, implications of this research suggest a need for replications with larger sample sizes that are powered to better address additional individual differences that might also affect findings. We further suggest that future investigations explore effects when emotional eating is directly addressed by targeting the learned self-regulatory skills and leveraging the possible mood improvements associated with exercise. Until additional testing is completed, findings from this field-based research must be carefully interpreted.

ACKNOWLEDGMENTS

The authors would like to thank the study participants and Dr Steven B. Kim for providing statistical consultation.

REFERENCES


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