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The weight of racial discrimination: Examining the association between racial discrimination and change in adiposity among emerging adult women enrolled in a behavioral weight loss program

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Abstract

Background: Non-Hispanic Black (NHB) emerging adult (EA) women are at disproportionate risk for obesity but experience limited benefit from behavioral weight loss (BWL) programs. Race-related stress could play a role; the goal of this study was to examine the association between racial discrimination (RD) and early (3-month) changes in adiposity, and to explore potential protective factors, among EA in an adapted BWL program.

Methods: This is an ancillary study of non-Hispanic White (NHW) and NHB EA women enrolled in an adapted BWL trial (N=49; 55.1% NHB; Age 21.2 (2.1); BMI=33.0+4.3 kg/m^2). At baseline, group- and personal-level RD (RD-group and RD-personal), racial identity (NHB women only), vigilant coping, and social support were assessed via validated questionnaires. Weight and waist circumference were measured objectively at 0 and 3 months.

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Results: NHW women manifested greater reductions in waist circumference relative to NHB women (p=.004). RD-personal did not predict change in waist circumference at 3-months (p=.402); however, the association between RD-group and change in waist circumference was statistically significant (p=.015), such that reporting greater group-level discrimination predicted a smaller decrease in waist circumference; the model explained 22% of the variance. Social support and vigilant coping were not statistically significant in the model. Among NHB women only, higher racial identity-centrality predicted greater reduction in waist circumference (p=.019).

Conclusion: Findings suggest racial discrimination could contribute to greater cardiometabolic risk during this developmental period. Future research should examine how experiences of racial discrimination unfold in the daily lives of NHB women to inform mechanistic interventions to enhance health and well-being.

Keywords

racial discrimination; racism; health disparities; emerging adults; women; obesity

Introduction

Non-Hispanic Black women bare a disproportionate burden of obesity—data place the prevalence of overweight / obesity at 82% among non-Hispanic Black women relative to 63.5% among non-Hispanic White women. These stark disparities place Black women at increased risk of cardiovascular disease, type 2 diabetes, hypertension, psychological distress, and a decrease in overall life expectancy.[1, 2] Of note, emerging adulthood[3]—typically defined as 18–25 years of age—represents a particularly critical time for intervention to reduce obesity and cardiometabolic risk among Black women. These years are associated with increased risk for additional weight gain[4] and metabolic dysregulation,[5] coupled with potential for intergenerational transmission of risk among women of childbearing age.[6, 7] Moreover, staggering racial disparities in the prevalence of overweight and obesity are already evident during emerging adulthood, with rates reaching 52% among non-Hispanic Black emerging adults compared to 39% among their non-Hispanic White counterparts.[8]

Although evidence-based behavioral treatments exist, non-Hispanic Black women are underrepresented in these trials,[9] and it is well documented that they experience a lower magnitude of weight loss relative to other race and sex groups.[10, 9, 11–13] Compounding this problem is that emerging adults as a whole are also markedly underrepresented in BWL programs and fare worse than their adult counterparts.[14] Recognizing the critical need for weight control efforts during the transition into young adulthood, NIH funded the Early Adult Reduction of weight through LifestYle (EARLY)[15] Trials consortium. Each of the EARLY trials focused on using technology to promote weight management in young adults (18–35 years) and several of those interventions recruited large numbers of emerging adults. Unfortunately, most of the trials yielded very modest benefits overall, even among predominantly White samples[16, 17]—and the two trials that demonstrated clinically meaningful outcomes[18, 19] had low racial / ethnic minority enrollment and used a dichotomous variable to report race, making it difficult to generalize to non-Hispanic Black emerging adult women.

With this in mind, we recently examined racial differences in treatment outcomes in our behavioral weight loss trial targeting emerging adults, which had a remarkably diverse sample with respect to race. Consistent with previous reports in adults, disparities in treatment outcomes were observed between non-Hispanic Black and non-Hispanic White emerging adult women following 3 months of intervention.[20, 21] Importantly, we examined early treatment response (3-months) due to its robust association with long-term outcomes in adults, and the association with longer-term weight loss in emerging adults specifically.[22] While the difference between groups was much smaller than previously documented in adults[11, 13], mean weight change among non-Hispanic Black emerging adult women only met the minimum level for clinical significance, and reductions in waist circumference for non-Hispanic White emerging adult women were double those observed in non-Hispanic Black emerging adult women. Thus, a critical next step is to determine potential drivers of these disparities during early treatment, in order to inform future intervention efforts with this vulnerable population.

The relationship between stress and health outcomes is well documented[23] and emerging adults have the highest rates of perceived stress.[24] Of note, evidence suggests that Black women have increased levels of chronic stress relative to non-Hispanic White women, [25–27] which contributes to higher production of cortisol,[28] a hormone that increases the desire for high fat foods, and can result in maladaptive eating behaviors, intensified visceral adiposity, and weight gain.[29, 30, 28, 31–33] Additionally, increased cortisol production is also linked to insomnia, depression, and metabolic syndrome,[34–36] all of which could lead to challenges adhering to behavioral weight loss goals (e.g., dietary, physical activity) and ultimately hamper treatment response. Some previous studies have attempted to target general stress management within the context of behavioral weight loss for Black women, but these studies have yielded mixed results.[37, 38] One type of stress that has not been addressed within the context of behavioral weight management is racial discrimination—a unique stressor that non-Hispanic Black women have faced individually, institutionally, and culturally for over 400 years.[39]

Evidence suggests racial discrimination is associated with a multitude of adverse health outcomes.[40–46] A large secondary data analysis of the Black Women's Health Study found that racial discrimination was associated with eight-year weight gain.[47] Further, a study conducted by Wagner and colleagues found a significant positive association between racial discrimination, insulin resistance, and waist circumference.[48] These findings suggest that racial discrimination could have toxic effects on adiposity and overall metabolic function. Further, some evidence suggests non-Hispanic Black women cope with negative emotions and stress through emotional eating,[49, 31] which could interfere with adherence to dietary goals and contribute to disparate weight loss outcomes. Despite these findings linking racial discrimination to weight gain, to our knowledge, no previous studies have examined how racial discrimination might affect weight loss outcomes among young Black women. Moreover, there is some evidence that experiencing personal racial discrimination is worse for both mental and physical health outcomes compared to group-level racial discrimination.[50–52] However, evidence is limited and primarily cross-sectional, therefore it is of interest to examine whether different levels of racial discrimination will operate differentially when examined with respect to behavioral weight loss treatment response.

Importantly, there is evidence to suggest the effects of racial discrimination could be exacerbated by other individual level factors, which is an important consideration in light of the within group variability observed in previous reports.[20, 11] One such factor is vigilance, which is a passive coping strategy that involves mentally preparing, anticipating, and ruminating about a situation that may or may not occur.[53] In addition, many individuals deem interracial interactions to be stressful, which leads to negative reactions and coping based on feelings of inadequacy or lacking necessary resources to handle the encounter.[54] In general, Blacks tend to participate in passive coping strategies that encourage emotional suppression and poor health outcomes.[55, 56] In addition, Blacks who practice vigilant coping do so based on both personal and vicarious (i.e., situation watched on the news or social media, family, friends) experiences,[53] which greatly increases their risk of engaging in the behavior. Limited research suggests vigilance is associated with racial disparities between non-Hispanic Blacks and non-Hispanic Whites, including blood pressure, and the biological stress response system.[57–59] Thus, non-Hispanic Black emerging adult women engaging in passive coping strategies, such as chronic vigilant coping, in daily preparation for entering a society dominated by cultural racism could be at a greater risk for poorer treatment response and health outcomes relative to those not practicing vigilant coping. To our knowledge, this has never been explored within behavioral obesity treatment programs.

Of note, there are also a number of factors such as racial identity and social support that could serve as buffers against the adverse effects of racial discrimination. Racial identity has several domains, however for the nature of this study, we focused on centrality and regard (private and public). Centrality is the way in which a person defines themselves within their respective group and whether race is at the center of their being,[60, 61] whereas regard pertains to the beliefs and affect (negative and positive) a person has with respect to their race.[60, 61] Private regard focuses on how the individual feels about their race, while public regard is how the individual feels other people feel about their race.[60, 61] Unlike racial identity, the benefits of social support as they relate to health outcomes has been well documented.[62–67] Evidence suggests strong social support could enhance coping by providing a positive way for individuals to receive assistance and strength from their social network.[64] Thus, perceived social support could alter the racial discrimination stress response (e.g., lessening depressive symptoms or negative affect) by providing practical or emotional support to assist with adherence to goals. Further, limited research suggests tailoring social support based on exposure to racial discrimination could serve as a buffer for depression symptoms.[68] Although previous research has demonstrated the various roles of racial identity and social support, no study has examined these constructs as potential moderators of the association between racial discrimination and weight loss outcomes among non-Hispanic Black women during emerging adulthood.

The overarching goal of this research was to examine the association between racial discrimination and treatment response among emerging adult women enrolled in a behavioral weight loss program, and to explore potential risk and protective factors associated with experiences of racial discrimination. Based on extant evidence, we evaluated the following hypotheses: (1) Racial discrimination experiences at baseline will be greater among non-Hispanic Black women compared with non-Hispanic White women, (2) Greater

experiences of racial discrimination at baseline will be associated with smaller reductions in measures of adiposity at 3 months (i.e., percent weight change, percent change in weight circumference). In addition, we evaluated the following exploratory hypotheses: (3) Within non-Hispanic Black women, higher vigilant coping at baseline will predict small reductions in adiposity at 3-months, (4) Within non-Hispanic Black women, higher racial identity and social support at baseline will predict greater reductions in adiposity at 3-months.

Methods

Procedures

This was an ancillary study wherein additional measures were added to an ongoing behavioral weight loss trial. (R01DK103668; NCT02736981).[69] Participants were from one cohort (recruited and enrolled in treatment between April 2019-September 2019) of the parent trial (N=62), and for the purposes of this study, only non-Hispanic Black and non-Hispanic White women (N=49) were selected for analyses. Trial inclusion criteria included 18–25 years of age with a measured body mass index (BMI) between 25 and 45 kg/m^2. Exclusion criteria primarily centered on participant safety and included: medications / medical conditions that could interfere with weight loss or would pose safety concerns in light of the diet and physical activity recommendations in this trial; history of anorexia nervosa / bulimia nervosa or recent compensatory behaviors; psychiatric hospitalization within the previous 12 months; bipolar disorder or psychotic disorder; pregnancy; or current symptoms of alcohol dependence. A multi-method, community-based recruitment plan was used, with messages and strategies that drew from our previous work with emerging and young adults.[19, 70–72] Individuals who appeared eligible after completing an initial online screening questionnaire were invited to attend an in-person orientation session, which provided detailed information about the study, including details of the interventions, the research question of interest and requirements of the data collection visits. Those who remained interested then engaged in the informed consent process. Consented participants completed a baseline assessment visit to determine final eligibility for the trial.

Participants who remained eligible after baseline were randomized to 1 of 3 intervention groups. All participants received a 6-month behavioral weight loss program which included 1 in-person group session and 1 individual session followed by a 6-month mHealth program that included weekly evidence-based lesson content, self-monitoring via digital tools (wireless scales and self-monitoring app), and tailored feedback from their coach on goal progress. Additionally, participants received automated text messages (reminders and motivational), and access to a closed Facebook group for social support. Intervention conditions differed in terms of enhancements to promote motivation and engagement, but the lesson content and contact schedule and type were identical across conditions. All assessments were completed by trained assessors masked to treatment assignment at baseline and 3 months. Participants were asked to fast for at least 12-hours and refrain from vigorous activity and sauna for 8-hours prior to all measurements. Questionnaires were completed online via a secure platform (REDCap). All procedures were approved by the Institutional Review Board at Virginia Commonwealth University.

Measures

Demographics.—At baseline, participants self-reported demographic information including age, sex, gender, race, ethnicity, student and work status.

Weight and Height.—A wall-mounted stadiometer was used to measure height. Weight was assessed at each lab visit using a calibrated scale according to a standardized protocol. Participants wore lightweight shorts and a t-shirt, without shoes. Participants were measured twice; however, if the difference of the two measures was greater than 0.2 kg, a third measure was taken. The mean of the measures was used for analyses. BMI was calculated using the formula: weight (kg) / [height (m)]^2.

Waist Circumference.—A Gulick tape measure was used to measure waist circumference. Participants were measured twice; however, if the difference of the two measures was larger than 0.5 cm, a third measure was taken. For analyses purposes, the mean of the measurements was used.

Racial Discrimination.—Racial discrimination experiences were assessed at baseline using the Perception of Racial Discrimination Questionnaire, which consists of items from two different scales.[73, 74] Participants responded on a 5-point Likert scale ranging from 1= strongly disagree to 5=strongly agree. This assessment method was selected to acknowledge the vast variability in experiences of racism among Blacks that has not been fully captured in other measures.[51] The Perception of Racial Discrimination Questionnaire includes 8-items that ask respondents about acts of racial discrimination experienced personally (e.g., I feel like I am personally a victim of society because of my race) and within the context of their group (e.g., My racial group is discriminated against). This measure was administered to both non-Hispanic Black and non-Hispanic White women. The questionnaire has excellent internal consistency (α = .84) and validity (r = .49).[51]

Racism-related Vigilance.—Racism-related vigilance was assessed at baseline using the Heightened Vigilance Scale Abbreviated (HVS)[53], a shortened version of the original heightened vigilance scale.[53] The abbreviated scale is a 4-item questionnaire that asks respondents to assess the degree to which they prepare to be discriminated against because of their race. Participants responded on a 6-point Likert scale ranging from never to almost every day for each of the items. The HVS has good reliability (α=.72) and validity (r=.63).[53]

Racial Identity.—Racial identity was assessed among non-Hispanic Black women only at baseline using two subscales (centrality and regard) from the Multidimensional Inventory of Black Identity (MIBI).[75] Centrality is an 8-item subscale that asks respondents to assess the extent to which they believe being Black is central to their self-definition (e.g., “Being Black is unimportant to my sense of what kind of person I am”). Regard consists of 6-item public regard (e.g., “Blacks are not respected by the broader society”) and 6-item private regard (e.g., “I often regret that I am Black”) subscales. Participants responded on a 7-point Likert scale ranging from strongly disagree to strongly agree. The MIBI subscales have acceptable to good internal consistency (α=.60 to .80) and validity (r=.27 to .32).[76]

Social Support.—Perceived social support was assessed using the Multidimensional Scale of Perceived Social Support,[77] a 12-item questionnaire designed to measure perceptions of support from family, friends, and significant others. Participants respond on a 7-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). All subscales have excellent internal consistency [Family (α =.90); Friends (α = .94); Significant Other (α =.95)].[77] Intercorrelations using varimax rotation showed strong validity between the three subscales Family (r=.10); Friends (r=.84); Significant Other (r=.28).[77]

Statistical Analyses

Differences in demographics between non-Hispanic Black and non-Hispanic White women were compared using a Rao-Scott chi-square or analysis of variance (ANOVA) for categorical or continuous variables, respectively. The primary outcomes were change in adiposity (percent weight change at 3-months, percent change in waist circumference at 3-months). In order to account for baseline indices of adiposity and anchor outcomes to established thresholds for clinical significance,[78] percent weight change (weight at 3 months-weight at baseline) / (weight at baseline x 100) and percent change in waist circumference (waist circumference at 3 months-waist circumference at baseline) / (waist circumference at baseline x 100) were used. Outcome analyses adhered to the intent-to-treat principle, and missing data at 3-months was handled by carrying baseline observations forward. This approach was selected over other alternatives for the following reasons: this was a short-term study with only a single follow-up time point; there was minimal missing data (≤10%); and there were no differences in retention by race. Non-Hispanic Black women and non-Hispanic White women were compared to examine differences between experiences with discrimination at baseline using independent t-test. Then, non-Hispanic Black women and non-Hispanic White women were compared to determine whether there was a difference between race groups on change in adiposity (i.e. percent weight change, percent change in waist circumference) at 3-months using ANOVA. To examine the association between discrimination and change in measures of adiposity, we fit a series of linear regression models. A total of four models were created. Our first model examined the association between race and differences in weight change between non-Hispanic Black and White women at 3-months. The second model added in racial discrimination and the third and fourth model adjusted for social support and hypervigilance respectively. Parallel models were generated to examine the association between race and differences in waist change at 3-months between non-Hispanic White and Black women. Within non-Hispanic Black women only, we created four comparable models, however, we adjusted for potential moderators (racial identity, social support, vigilance) in the final two models. Moderators that were statistically significant were centered on the mean and an interaction term was created. Given that the parent trial stratified randomization by race and sex, all treatment groups were collapsed in order to better address the research questions of this ancillary study and treatment arm was included as a covariate in all analyses. Effect sizes are presented, and an alpha level of p=0.05 was pre-specified for statistical significance. All analyses were conducted using JMP Pro for MAC, Version 15.2.

Results

Sample Characteristics

The sample was roughly balanced in terms of the numbers of non-Hispanic Black women vs. non-Hispanic White women (55.1% vs 44.9%, respectively). The mean age for the sample was 21.2±2.1 years and the mean baseline body mass index was 33.0±4.3 kg/m^2. See Table 1 for demographic characteristics by race. There were significant differences in mean racial discrimination between non-Hispanic Black women and non-Hispanic White women for both group ($t_{34.359}$=9.39, p<.001) and personal ($t_{43.975}$=7.17, p<.001) levels. The mean group-level racial discrimination scores (NHB: 4.96±.82 vs NHW: 1.68±1.25) and personal-level racial discrimination scores (NHB: 2.99±.99 vs NHW: 1.33±.61) were different at baseline.

Between group differences on racial discrimination and change in adiposity

There were significant differences in mean racial discrimination between non-Hispanic Black women and non-Hispanic White women for both group ($t_{34.359}$=9.39, p<.001) and personal ($t_{43.975}$=7.17, p<.001) levels. The mean group-level racial discrimination scores at baseline were different (NHB: 4.96±.82 vs NHW: 1.68±1.25). The mean personal-level racial discrimination scores were (NHB: 2.99±.99 vs NHW: 1.33±.61).

Race did not significantly predict percent weight change at 3-months (NHB: −2.96±3.2% vs. NHW: −4.11 ± 3.7%; F (1, 47) = 1.31; p = .243, ηp^2= .028). Mean absolute change in weight from baseline (SD) was −2.63 kg (2.7) and −3.41 kg (3.2) respectively for NHB and NHW women. (The associations between race, racial discrimination (group, personal) and percent weight change at 3-months in multivariable multiple regression models were not statistically significant (R^2=.047, p=.790; R^2=.046, p=.760). Race predicted percent change in waist circumference such that non-Hispanic White women demonstrated a greater reduction in waist circumference relative to non-Hispanic Black women (−5.13±4.5% vs. −1.95±2.7%; F (1,41) = 8.24, p=.004, ηp^2=.167). Mean absolute change in waist circumference from baseline (SD) was −3.60 cm (3.6) and −1.46 cm (2.1) respectively for NHW and NHB women. Personal-level racial discrimination did not predict percent change in waist circumference at 3-months (p=.402); however, the association between group-level racial discrimination and change in waist circumference was statistically significant (p=.015; Table 2) such that reporting greater group-level racial discrimination predicted a smaller decrease in waist circumference. Of note, the significant association between race and change in waist circumference dissolved once group-level racial discrimination was added to the model; results indicated that the model explained 22% of the variance.

Racial discrimination and change in adiposity within non-Hispanic Black women

Non-Hispanic Black women reported higher levels of group-level racial discrimination relative to personal-level discrimination (Mean:4.64 SD: ±.82 vs Mean:2.99 SD: ±.99). Within non-Hispanic Black women, neither group-level nor personal-level racial discrimination predicted percent change in weight (R^2=.087, p=.430; R^2=.000, p=.915) at 3-months; parallel outcomes were observed for percent change in waist circumference (R^2= .034, p=.139; R^2= .025, p=.911). Racial identity (private and public), social support

(friends, family, significant others), and vigilant coping were not significant when added to the model. However, racial identity-centrality was statistically significant (p=.03; Table 3) in the model such that higher centrality predicted greater reduction in waist circumference, although the interaction (centrality x racial discrimination-group) was not significant.

Discussion

Contrary to our hypotheses, reports of racial discrimination either at the group or personal level did not contribute to differences in weight change at 3-months between non-Hispanic Black and non-Hispanic White women. However, as hypothesized, group-level racial discrimination did account for differences in waist circumference such that once group RD was entered into the model, the differences between non-Hispanic Black and non-Hispanic White women were no longer significant. In the subsample of non-Hispanic Black women only, racial discrimination either at the group or personal level did not predict 3-month weight or waist change. These results are consistent with previous findings that non-Hispanic Black emerging adult women enrolled in a behavioral weight loss trial experience smaller reduction in waist circumference relative to their non-Hispanic White counterparts, even after controlling for self-monitoring behaviors.[20] The current study extends the extant literature by examining the association between personal and group-level racial discrimination and change in adiposity in a weight loss trial—and to our knowledge is the first to demonstrate a link between group-level racial discrimination and disparities in change in abdominal adiposity emerging adult women. This finding is consistent with previous research within Black-Caribbean women that reported a link between race-related stress, fasting glucose and waist circumference.[79, 80] Further, results also parallel prior findings related to general stress, which suggest greater exposure to stress is associated with elevated cortisol levels and greater abdominal fat.[81, 82, 49] It is plausible that increased cortisol production associated with race-related stress might have predisposed young Black women to smaller reductions in waist circumference observed in this trial.

Consistent with the personal group discrimination discrepancy (PGDD)[83] phenomenon and other research,[52, 51, 50] individuals in our study reported higher levels of group discrimination compared to personal discrimination. According to PGDD, individuals perceiving higher levels of group discrimination demonstrate better psychological health and those perceiving higher levels of personal discrimination experience worse psychological health. This is because people, particularly those belonging to a minority group, would rather report information about their group as a whole (i.e. women, Black people) than to believe they experienced racial discrimination because there was something wrong with them personally.[84] In this regard, attributing racial discrimination experiences to the group could serve as a protective factor because the stress/concern that would typically be associated with discrimination directed at the individual personally is essentially removed.[84] However, researchers caution against elevating the potential buffering effects of attributing discriminatory events to the group as beneficial.[84] In the current study, within non-Hispanic Black women only, neither personal nor group racial discrimination was significantly associated with psychological or physical health. This could mean young Black women as a whole are exposed to increased levels of racial discrimination both personally and vicariously, thus limiting within group variability. Perhaps among Black

women, the heterogeneity in treatment response is really rooted in individual factors such as racial identity, emotional and behavioral reactions to racial discrimination and not the exposure itself. Notably, within the full sample, group-level racial discrimination appeared to account for observed racial disparities in waist change between Black and White women —in fact, once group-level discrimination was entered into the model, the effect of race was no longer statistically significant. Although findings should be interpreted in light of the modest sample size, this finding suggests that group-level discrimination could be a driver of disparities in treatment response between non-Hispanic White and non-Hispanic Black emerging adult women. Considering the transitional nature of this developmental period, compounded with increased exposure to social media and the intricate intersection of race, weight and gender, it is imperative that researchers, policy makers and clinicians work to elucidate how experiences with different levels of racial discrimination might contribute to disparities and variability in treatment response within behavioral obesity treatment programs.

Current findings suggest non-Hispanic Black women may be at a greater risk for poorer overall health despite enrolling in a weight loss program due to smaller decreases in waist circumference and greater central abdominal adiposity. Abdominal fat in women is related to coronary heart disease, increased cardiovascular risk, breast cancer, and insulin resistance,[85–87] many of which have been linked to racial discrimination.[47, 88, 89] Of note, researchers have identified a correlation between high internalized racism, perceived stress, behavioral disengagement coping and cortisol dysregulation[80] among Caribbean-Black women, further linking differences in abdominal adiposity and waist circumference[90, 80] to the way individuals respond both physiologically and psychologically to racial injustices.[91–93] Results from our study further underscore that racial discrimination, particularly at the group-level, could be one of the factors contributing to smaller reductions in adiposity. Given that women carrying larger amounts of abdominal fat are at an increased risk of premature death, even with a normal body mass index[94, 95], these findings underscore that racial discrimination is a major public health crisis for Black women, both upon initial exposure and throughout the course of behavioral lifestyle interventions.

An important finding that emerged in these data was that within non-Hispanic Black women, higher racial identity-centrality predicted greater reductions in waist circumference at 3-months. Existing literature is mixed; however, it is possible that centrality could buffer against negative psychological effects of discrimination because although the discriminatory experience occurred, it’s not a part of how the individual sees themselves. Of note however, other findings suggest centrality could be detrimental to health outcomes.[93, 96] For example, some studies have shown that individuals with higher centrality are more likely to identify an ambiguous event or situation as racism[93, 96] thus putting them at an increased risk for hypervigilance, which could contribute to cardiovascular risk, particularly hypertension.[59, 97] Still other evidence suggests protection depends on the amount of exposure relative to preparedness.[98] For example, there is research to suggest people exposed to high levels of discrimination and whom also have high centrality are impacted more relative to those with lower centrality.[99, 75] Specifically, racial discrimination encountered by those whose racial identity is central to their being need to possess greater levels of awareness and vigilance[98] in order to be shielded from the harmful consequences

of racial discrimination. Researchers should continue to explore centrality and the role it could play in worsening or protecting the mental and physical health of young Black women following exposure to racial discrimination. Moreover, consideration of intervention elements that are theoretically capable of targeting centrality should be explored in order to improve treatment response in this population.

It is important for future studies to not only examine the potential buffering role of centrality, but also elucidate how racial discrimination is experienced day-to-day, to determine if centrality can help protect non-Hispanic Black women from the deleterious effect of racism. Further, researchers must examine whether this protective mechanism depends on the number of encounters one has with racial discrimination and/or how equipped one is to adjust and process in a positive way when faced with racial injustices[98] in addition to having high centrality. Moreover, it is important to identify effective, non-passive coping strategies such as social support tailored for experiences with racial discrimination[68] and self-care (e.g., doing something good for themselves) that could be serve as protective mechanisms for young Black women. In addition, researchers should explore behavioral and affective reactions following exposure to racial discrimination, with an eye towards identifying interpersonal and contextual factors that could contribute to differences in stress response and within group variability in obesity and cardiovascular treatment outcomes. Finally, researchers must work to dismantle systemic racial injustices and barriers in order to ensure prolonged racial equity, which will lead to better health outcomes for this vulnerable population.

Limitations and Strengths

A primary limitation of this work was the small sample size of primarily students—as such, we did not have adequate power to test our exploratory hypotheses and findings may not generalize to emerging adults as a whole. Indeed, these results should be interpreted in light of the sample size and future studies should examine these questions in a larger and more generalizable sample and over longer-term follow up. However, this is the first to demonstrate a link between exposure to racial discrimination and behavioral weight loss treatment response, and findings highlight important directions for future research. In addition, racial identity was only assessed in Black women, which does not allow for comparison with white women; however, the purpose of this study was to identify protective and risk factors unique to young Black women in order to inform future intervention efforts for this high-risk population. Further, there is potential for collinearity considering the relationship between private, public, and central identity, but results from our study provide preliminary evidence of an association between identity and treatment response among Black women. Our approach to the handling of missing data is not without limitations and could introduce bias; however, retention did not differ by race (p=.789) or baseline discrimination (p=.446) and we had very little missing data and only two time point

This study also has a number of strengths. First, to our knowledge, this is the first study to examine the association between racial discrimination and behavioral weight management outcomes among Black women during emerging adulthood. Next, this study examined two different types of discrimination—group-level and personal-level—which in

general has received very little attention with regard to objective health outcomes. The distinction is important because psychologically, most people want to feel as though they are accepted[84]; thus, making it easier to attribute unfair treatment to something related to the group as a whole. Without this distinction, researchers are likely underestimating the reach of racial discrimination. Future studies should consider pairing group/personal level racial discrimination measures with qualitative interviews to better understand this phenomenon. Further, we also explored risk and protective factors including vigilant coping, social support, and racial identity. Examining risk and protective factors in addition to racial discrimination allowed us to view the lives and identities of young Black women through an intersectional lens relative to assuming all Black women experience and respond to discriminatory acts the same way. Additionally, objective measurements of weight and waist circumference were used, avoiding bias inherent in self-report data. Finally, questionnaires were directly related to racism relative to generalized stress/discrimination questionnaires that may not accurately capture racism as a stressor in young Black women.

Conclusion

Our study highlights the importance of understanding the effects of racial discrimination and its association with obesity and cardiometabolic risk in non-Hispanic Black emerging adult women. Notably, differences in percent change in waist circumference between non-Hispanic Black and non-Hispanic White women were explained by group-level racial discrimination; thus, discrimination could contribute to greater cardiometabolic risk among emerging adult women during this unique developmental period. In addition, researchers should study racial identity and other psychological and physiological factors that could potentially buffer or exacerbate experiences with racial discrimination and examine how these experiences unfold in the lives of young Black women to inform mechanistic interventions to enhance health and well-being in this vulnerable population.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

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Availability of data and material:

Not applicable

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Table 1.

Participant baseline characteristics presented by race as sample size (percentage) for categorical variables and means (SD) for continuous variables.

	Total (N=49)		p-value
	Non-Hispanic Black N=27 (55.1%)	Non-Hispanic White N=22 (44.9%)	
Age, mean (SD)	20.8 (2.0)	21.7 (2.2)	.158
Student	7 (25.9%)	4 (18.2%)	.005
Working	2 (7.4%)	9(40.9%)	.051
Working and Student	18(66.7%)	9(40.9%)	.858
Weight, kg, mean (SD)	90.6 (13.7)	87.2 (13.1)	.377
BMI, kg/m ^{2}, mean (SD)	33.5 (4.2)	32.4 (4.4)	.350
Waist circumference, cm, mean (SD)	95.9 (9.8)	97.3 (9.5)	.613

Table 2.

Summary of Regression Analyses for Variables Predicting Percent Waist Change between non-Hispanic Black and non-Hispanic White women

Model	Variable	B	Std. Error	Std Beta	p-value
1	**Race**	1.69	0.56	0.43	0.01 *
2	**Race**	−0.08	0.95	−0.02	0.93
	Group-level racial discrimination	1.54	0.59	0.71	0.01 *
	Personal-level racial discrimination	−0.59	0.74	−0.17	0.42
3	**Race**	−0.17	0.97	−0.04	0.85
	Group-level racial discrimination	1.64	0.61	0.75	0.01 *
	Personal-level racial discrimination	−0.72	0.77	−0.21	0.35
	Hypervigilance	0.28	0.43	0.09	0.51
4	**Race**	−0.41	1.12	−0.10	0.71
	Group-level racial discrimination	1.68	0.66	0.77	0.01 *
	Personal-level racial discrimination	−0.72	0.85	−0.21	0.40
	Hypervigilance	0.19	0.52	0.06	0.71
	Perceived social support friends	0.33	0.49	0.14	0.46
	Perceived social support family	0.38	0.45	0.16	0.44
	Perceived social support significant other	−0.03	0.52	−0.01	0.95

* Statistically significant <0.05

Note: All models adjusted for treatment arm

Table 3.

Summary of Regression Analyses for Variables Predicting Percent Waist Change among non-Hispanic Black Women

Model	Variable	B	Std. Error	Std Beta	P-value
1	**Group-level racial discrimination**	−1.24	0.80	−0.32	0.13
	Personal-level racial discrimination	0.38	0.66	0.12	0.57
2	**Group-level racial discrimination**	0.96	0.79	0.30	0.24
	Personal-level racial discrimination	−0.11	0.61	−0.04	0.85
	Racial Identity-Centrality	−1.28	0.63	−0.45	0.06*
	Racial Identity-Private	−0.35	1.11	−0.08	0.75
	Racial Identity-Public	0.82	0.60	0.31	0.18
3	**Group-level racial discrimination**	1.09	0.83	0.34	0.21
	Personal-level racial discrimination	−0.25	0.66	−0.09	0.70
	Racial Identity-Centrality	−1.43	0.69	−0.50	0.05*
	Racial Identity-Private	−0.03	1.25	−0.01	0.97
	Racial Identity-Public	0.67	0.67	0.25	0.33
	Hypervigilance	0.29	0.49	0.16	0.55
4	**Group-level racial discrimination**	1.51	0.95	−0.03	0.13
	Personal-level racial discrimination	−0.09	0.82	0.47	0.91
	Racial Identity-Centrality	−1.83	0.76	−0.65	0.03*
	Racial Identity-Private	−1.21	1.53	−0.28	0.44
	Racial Identity-Public	0.45	0.69	0.17	0.52
	Hypervigilance	0.10	0.69	0.05	0.88
	Perceived social support friends	0.32	0.48	0.17	0.52
	Perceived social support family	0.79	0.68	0.39	0.27
	Perceived social support significant other	−0.25	0.51	−0.14	0.62

*Statistically significant <0.05

Note: All models adjusted for treatment arm