The role of emotional eating in the links between racial discrimination and physical and mental health

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Abstract The environmental affordances (EA) model posits that maladaptive self-regulatory strategies (e.g., emotional eating) directly and indirectly heighten African Americans' risk for downstream medical morbidities while also potentially mitigating the psychological impact of stressors. We empirically tested the full EA model. In doing so, we investigated the associations among racial discrimination, depressive symptomatology, and physical health proxies as well as the intervening role of emotional eating in these associations among 150 African Americans aged 18–27. The increased frequency of experiencing racial discrimination was significantly associated with poorer self-reported health, greater depressive symptomatology, and more emotional eating. There was no significant association between emotional eating and physical health and emotional eating did not mediate the relation between racial discrimination and physical health. Finally, racial discrimination was associated with depressive symptomatology, but only among African Americans with mean or high levels of emotional eating.

Keywords Racial discrimination · Physical health · Depressive symptoms · Emotional eating · Environmental affordances model · African Americans

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Introduction

African Americans generally have a lower prevalence of mental health disorders (Breslau et al., 2006), but a higher prevalence of medical morbidities (e.g., heart disease, stroke, hypertension, diabetes 2) as compared to their White counterparts (Daw, 2017; Mozaffarian et al., 2016). To reconcile this paradox, Jackson and colleagues recently developed the Environmental Affordances (EA) Model (Jackson et al., 2010; Jackson & Knight, 2006; Mezuk et al., 2013). The EA model posits that African Americans: (1) are disproportionately burdened with chronic, everyday stressors (e.g., racial discrimination) resultant from power asymmetries in the U.S., and (2) often engage in maladaptive health-related, self-regulatory strategies (hereafter self-regulatory strategies) to mitigate chronic, everyday stress. These self-regulatory strategies include smoking, alcohol use and abuse, drug use, and emotional eating, defined as the consumption of sweet and/or fatty foods to attenuate negative affect (Arnow et al., 1995; Jackson et al., 2010; Jackson & Knight, 2006; Mezuk et al., 2013). African Americans' use of these self-regulatory strategies is driven by social contextual factors that limit access to material and personal resources (Jackson et al., 2010; Jackson & Knight, 2006). These self-regulatory strategies that potentially preserve mental health in the face of stressors might simultaneously contribute to medical mor-
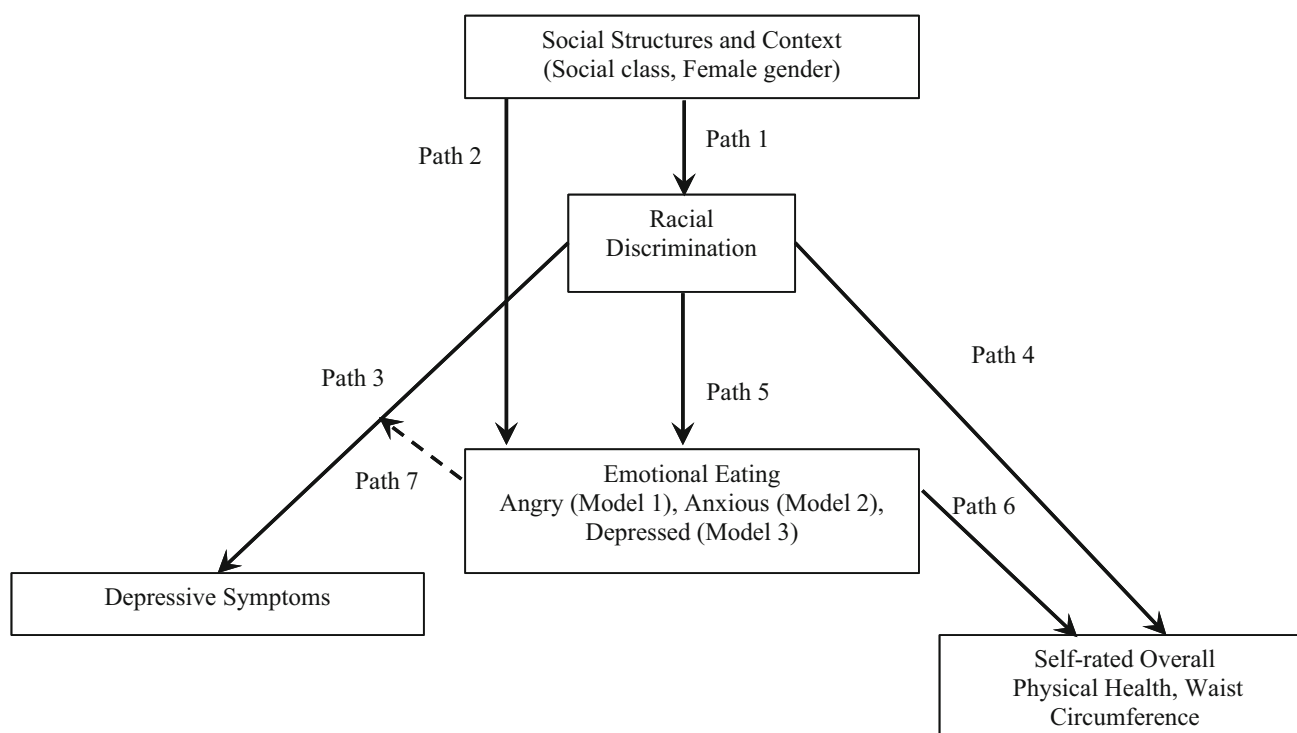
Fig. 1 Conceptual model based on the environmental affordances model. *Note* In accordance with the environmental affordances model, the dashed line for path 7 indicates that emotional eating is a moderator in the association between racial discrimination and depressive symptoms. All other paths are direct paths and therefore are represented by solid lines

bidities. In the present study, we empirically test and apply the EA model. Although Jackson and colleagues focus on Black-White disparities, we leverage the EA model to better understand disparities among African Americans. In doing so, we assess the interrelations among social contextual factors (gender and social class), a chronic, everyday stressor (racial discrimination), a self-regulatory strategy (emotional eating), and mental (depressive symptomatology) and physical (waist circumference and overall self-reported health) health.

Overview of the environmental affordances model

Social structures and context

As delineated by the EA model (see Fig. 1), social contextual factors, including gender and social class, are sources of constraints, shaping exposure to chronic stress (Path 1: Jackson et al., 2010; Mezuk et al., 2013). African American men report more frequent racial discrimination experiences than African American women in many studies (e.g., Klonoff & Landrine, 1999). African American men and women also experience qualitatively different kinds of racially discriminatory events (Kwate & Goodman, 2015). Mounting evidence also indicates that higher

social class is associated with greater self-reported discrimination and racism among African Americans (Dailey et al., 2010), although other studies report no relation between class and discrimination (Klonoff & Landrine, 1999).

Social contextual factors also result in social patterning of affordances, or opportunities to ameliorate stress (Jackson et al., 2010; Jackson & Knight, 2006; Mezuk et al., 2013). Social contextual factors are associated with the available range of self-regulatory strategies (Path 2) employed to combat stress. Gender may shape use of self-regulatory strategies in the face of everyday stressors. Indeed, emotional eating may be a primary strategy among African American women and a contributor to their relatively high obesity rates (Jackson et al., 2010; Jackson & Knight, 2006; Mezuk et al., 2013). However, emotional eating may also be a salient self-regulatory strategy for African American men (Ellis et al., 2015). Moreover, African Americans of lower social class have fewer personal and material resources, reside in neighborhoods characterized by the proliferation of fast food outlets and convenience stores (e.g., Jackson et al., 2010), and thus may be more likely to seek out sweet and fatty foods, tobacco, alcohol, and illicit substances to mitigate salient,

short-term psychological distress (Jackson & Knight, 2006; Mezuk et al., 2017).

Direct associations between stressors and health

African Americans are disproportionately burdened with racial discrimination (Harrell, 2000). Aligned with the previous literature, Paths 3 and 4 of the EA model delineate that racial discrimination and other stressors contribute to poorer mental (Path 3) and physical (Path 4) health outcomes for this population (Jackson et al., 2010; Jackson & Knight, 2006; Mezuk et al., 2013). Chronic racial discrimination-related stress is associated, often longitudinally or prospectively, with: elevated blood pressure, decreased heart rate variability, dysregulation of the Hypothalamic–Pituitary–Adrenal (HPA) axis, elevated C-Reactive protein, increased cellular aging, increased visceral fat, obesity, poorer self-reported physical health, depressive symptoms and clinical depression, and anxiety among African Americans and other racial/ethnic minorities (for reviews, see Hope et al., 2015; Lewis et al., 2015; Williams & Mohammed, 2013). Thus, racial discrimination has been increasingly implicated in health endpoints.

Mediating and moderating role of self-regulatory strategies

Whereas Path 4 indicates a direct relation between stressors and physical health, Paths 5 and 6 delineate an indirect relation, such that stressors positively relate to self-regulatory strategies (Path 5) and these self-regulatory strategies, in turn, relate to poorer long-term physical health (Path 6). Notably, emotional eating may be a primary strategy for managing discrimination-related stress. Higher levels of self-reported discrimination have been positively associated with increased waist circumference and abdominal fat as well as eating to manage stress among African American women (Cozier et al., 2009; Hickson et al., 2012; Hunte, 2011; Johnson et al., 2012). Undoubtedly, unhealthy strategies like emotional eating can heighten African Americans' risk for downstream medical morbidities (e.g., heart disease, diabetes 2) that develop by middle and later adulthood (Jackson et al., 2010; Jackson & Knight, 2006).

Interestingly, the EA model further posits that self-regulatory strategies are effective in preserving the mental health of individuals in the short term (Path 7). Specifically, these strategies are proposed to block the neurological cascade linking the experience of emotional distress to stress-related psychopathology (e.g., depression, anxiety) by acting on the HPA Axis (Jackson et al., 2010; Jackson & Knight, 2006; Mezuk et al., 2013). Notably, emotional

eating has garnered empiric attention as a self-regulatory strategy that may improve mood by reducing anxiety via feedback to the HPA Axis (Jackson et al., 2010; Jackson & Knight, 2006; Macht, 2008; Pecoraro et al., 2004). Thus, emotional eating and other self-regulatory strategies may be protective in the association between racial discrimination (and other stressors) and mental health outcomes. Ultimately, African Americans are presented with a zero-sum conundrum: How can they effectively cope with chronic stress in ways that are protective of short-term psychological well-being while also preserving their long-term health?

Previous research testing the environmental affordances model

To date, only a handful of investigations have explicitly tested the EA model. In two of these investigations (Jackson et al., 2010; Mezuk et al., 2010), stress-related depression risk—which was measured via a diagnostic instrument for assessing depressive symptomatology—was mitigated among African Americans who engage in self-regulatory strategies (Path 7). Moreover, Jackson and colleagues found a positive association between stressors and chronic health conditions (Path 4) and between several self-regulatory strategies and chronic medical conditions (Path 6), providing modest support for the EA framework (Jackson et al., 2010). In a third study, Lewis and Whitfield found a positive relation between stress and depressive symptomatology (Path 3), and an inverse relation between tobacco use and depressive symptomatology among Black adults (Lewis & Whitfield, 2016). Additionally, two other investigations documented no significant interaction between stress and self-regulatory strategies in predicting depressive symptomatology (Path 7; Boardman & Alexander, 2011; Keyes et al., 2011). Finally, in a more recent investigation, Mezuk and colleagues found that higher levels of depressive symptomatology were associated with the greater use of self-regulatory strategies among White, Black, and Hispanic older adults (Mezuk et al., 2017), contradicting the findings of Jackson, Mezuk, and colleagues (Jackson et al., 2010).

One potential explanation for these discrepant findings across the abovementioned studies is that the studies employed different methodologies: Boardman and Alexander (2011) and Mezuk et al. (2017) utilized a non-diagnostic instrument for assessing depressive symptomatology (i.e., Center for Epidemiologic Studies-Depression Scale [CES-D]) whereas Keyes and colleagues modeled stress as a categorical rather than continuous variable (Keyes et al., 2011). Moreover, some studies employed multi-ethnic samples whereas others focused solely on African Americans. Discrepancies notwithstanding, these

studies did not empirically test the full EA model. They do not explicitly assess the role of social contextual factors or the mediating/moderating roles of self-regulatory strategies in the associations among stressors and physical (mediation) and mental health (moderation) outcomes.

Finally, to our knowledge, only one study has empirically tested aspects of the EA model with an explicit focus on discrimination as a stressor, depression/depressive symptomatology, and physical illness/health risk (Reid et al., 2016). Specifically, Reid and colleagues found that everyday discrimination—including racial, gender, and weight discrimination—were associated with a 71% increase in the odds of excessive weight gain among pregnant Black and Latina women. Moreover, discrimination was predictive of excessive weight gain among women who were low in depressive symptoms but was unrelated to weight gain among women high in depressive symptoms. While these findings potentially substantiate the EA model, these researchers did not test the full EA model or assess participants' engagement in self-regulatory strategies, a central component of the EA model; instead, they focused on odds of weight gain, a proxy for engagement of self-regulatory strategies.

The present study

A primary objective of the present study was to test the full EA model. We aim to add to the extant literature by documenting linkages between racial discrimination and health outcomes and clarifying the role of a culturally acceptable, but socially and contextually-driven, self-regulatory strategy that may protect mental health, but contribute to poorer physical health. Whereas the EA model notes the importance of focusing on the onset of clinical depression, we focus on depressive symptoms. The use of diagnostic instruments among African Americans may be problematic, as there have been historical challenges regarding the diagnosis of depression in this population. Moreover, we are interested in *risk* for depression and medical morbidities, necessitating the examination of depressive symptoms prior to mental health disease onset. Our interest in disease risk also guided our decision to focus on African American emerging adults. Emerging adults are at the life stage between adolescence and fully independent adulthood, defined as age 18–29 (Arnett, 2000). Notably, African American emerging adults have a relatively earlier onset of medical morbidities as compared to emerging adults of other racial/ethnic groups (Jackson et al., 2010). Finally, we focused on emerging adults residing in the southeastern region of the U.S. ("stroke belt"), as many forms of physical illness are concentrated in this region (Center for Disease Control and Prevention, 2017).

We first hypothesized that social contextual variables (gender, social class) would be associated with racial discrimination (Path 1) and emotional eating in the context of angry, anxious, and depressed affect (Path 2). We hypothesized that African American men would report more frequently experiencing racial discrimination. We made no explicit hypothesis regarding gender differences in emotional eating, given previous research that African American men and women engage in emotional eating (Ellis et al., 2015). We also made no explicit hypothesis regarding the direct association between social class and racial discrimination given the mixed findings regarding the link between racial discrimination and social class. We further hypothesized that racial discrimination would associate with greater depressive symptomatology (Path 3) and proxies of physical health [poorer self-reported health and larger waist circumference (Path 4)]. Our third hypothesis was that racial discrimination would positively associate with emotional eating (Path 5) and that emotional eating, in turn, would associate with poorer self-reported health and larger waist circumference (Paths 4–6). Our fourth hypothesis was that emotional eating would moderate the association between racial discrimination and depressive symptoms; the relation between racial discrimination and depressive symptoms would be strongest among African Americans who engaged in less emotional eating (Path 7).

Materials and methods

Participants

The present questionnaire data were collected (December 2014 through July 2017) as part of a larger study examining the psychological and physiological consequences of stress. A list of self-identified African American students was generated by the university registrar to assist with recruitment, and a mass email was then sent to these students. Interested students contacted the Principal Investigator (first author) to express their interest in participating in the study and were provided with an individual research appointment. Participants were also recruited through the Introductory Psychology subject pool. One hundred and fifty-two participants participated in the study. Two of these participants self-reported high blood pressure and immune-related illness at the time of study participation and were therefore excluded from our analytic sample. Thus, our analytic sample comprises 150 ($n = 61$ males, 40.7% of sample; $n = 89$ females, 59.3% of sample) self-identified African American college students attending a large predominantly White public institution in the southeastern region of the U.S. Participants' ages ranged from

18 to 27 (M = 20.25; SD = 1.42). On average, participants' self-identified class was between "lower middle class" and "middle class" (M =3.44, SD =1.24; see measures section below).

Procedure

Upon arrival to his/her individual research appointment, the participant received the informed consent document and provided written consent. Thereafter, the researcher attained the participant's anthropometric measurements. The participant then completed a survey in Qualtrics web-based software (Qualtrics, Provo, UT) that consisted of measures assessing the study variables. Upon completion of the survey, the participant was debriefed about the purpose of the study and received $20 cash or earned course credit for the introductory psychology course. The present study was conducted in compliance with the Institutional Review Board at the university.

Measures

Racial discrimination

The Daily Life Experiences Scale, a subscale of the Racism and Life Experience scale (RaLes), was utilized to assess the frequency with which the participants experienced 18 racial hassles in the past year (Harrell, 1997). The Cronbach's alpha was .91, indicating that there was excellent internal consistency. A sample item is, "In the past year, how often have you been ignored, overlooked, or not given service because of your race?" Responses to all items were made on a 6-point Likert-type scale ranging from 1 (*never*) to 6 (*once a week or more*). Higher scores correspond to more frequent racial discrimination experiences. The RaLes has sound psychometric properties among Black American samples and has shown internal consistency (α = .83–.90) in Black community samples in other studies.

Depressive symptoms

The 20-item CES-D (α = .88) was used to assess depressive symptoms during the past week and demonstrated acceptable internal consistency (Radloff, 1977). The CES-D has also been shown to be internally consistent and valid in Black American samples in other studies (Conerly et al., 2002). A sample item is, "I felt depressed". Responses to all items ranged from 1 (*rarely or none of the time*) to 4 (*most or all of the time*). Higher scores indicate greater depressive symptomatology.

Self-rated overall physical health

Self-rated physical health was assessed using a single item: "In general, would you say your health is…". Responses ranged from 1 (*poor*) to 5 (*excellent*). This single item of self-rated health has been used worldwide since the 1950s and has been shown to predict morbidity and mortality (Manor et al., 2001; Streib et al., 1958).

Waist circumference

The National Heart, Lung, and Blood Institute (NHLBI) recommends using waist circumference, not BMI, as a predictor of disease risk. Waist circumference reflects the proportion of fat located intra-abdominally. Waist circumference was assessed using a standard tape measure and was measured, in centimeters, as the minimum circumference between the iliac crest and the rib cage (Taylor et al., 2000).

Emotional eating

The Emotional Eating Scale (EES) is a 25-item self-report measure assessing the urge to cope with negative affect by eating (Arnow et al., 1995). The EES comprises three subscales, all of which demonstrated good internal consistency in the present study: Anger/Frustration (11 items; α = .86), Anxiety (9 items; α = .80), and Depression (5 items; α = .76). The EES demonstrated moderate to strong internal consistency in a sample of White and African American participants (Goldbacher et al., 2012). Participants were instructed to indicate the extent to which 25 emotions have led them to experience an urge to eat. Sample items include "Angry" (Anger/Frustration subscale), "Worried" (Anxiety subscale), and "Sad" (Depression subscale). Responses to all items ranged from 1 (*No desire to eat*) to 5 (*An overwhelming urge to eat*), with higher scores indicating a greater urge to cope with negative affect through eating.

Social class and gender

A single item was used to assess participants' self-identified subjective social class standing within the U.S. social hierarchy. Responses were made on a 6-point Likert-type scale, ranging from 1 (*lower class or poor*) to 6 (*upper class*). Participants also self-reported their gender (female, male, transgender: female to male or male to female).

Analytic strategy

Descriptive statistics and correlational analyses were conducted to establish foundational support for our analytic strategy. Study variables were mean-centered in our subsequent analyses. We then examined the paths proposed by the EA Model (Mezuk et al., 2013) in a path analysis using MPlus 8.0 (Muthén & Muthén, 1998–2017) and full information maximum likelihood estimation. To ensure that our model had the necessary degrees of freedom given our sample size, we did not incorporate all emotional eating variables into one model and instead ran three separate models: one for each of our three emotional eating behaviors (anger, anxiety, or depression). Both measures of physical health (self-rated overall physical health and waist circumference) were included in each model. Apart from the specific eating behavior variable under examination, each model was identically parameterized. Model fit was first determined by examining absolute and relative model fit indices (i.e., Chi square test, comparative fit index (CFI), Tucker Lewis Index (TLI), and standardized root mean square residual (SRMR)). Generally, a non-significant Chi square test (Bentler & Bonett, 1980), CFI and TLI values close to or above .95, and a SRMR value close to or less than .08 (Hu & Bentler, 1999) is considered adequate. Model fit according to the root mean square error of approximation was not computed, based on recommendations indicating that it can provide an inaccurate index of fit for models with small degrees of freedom (Kenny et al., 2015).

After establishing model fit, path coefficients aligned with the EA model were examined (see Fig. 1). The direct associations between our social contextual variables, gender and social class, and racial discrimination (Path 1) and emotional eating (Path 2) were examined. Next, direct associations between racial discrimination and mental (depressive symptoms) and physical (self-rated health, waist circumference) health were examined (Paths 3 and 4, respectively). Finally, direct associations between racial discrimination and emotional eating (Path 5), emotional eating and physical health (Path 6), and the mediating (Paths 5 and 6) and moderating (Path 7) role of emotional eating were examined. The model indirect command in Mplus was used to assess the mediating role of emotional eating behaviors (Muthén & Muthén, 2015). Preacher's simple slopes calculator was used to interpret each significant interaction via the computation and plotting of simple slopes (Preacher et al., 2006).

A description of the missing data and how missing data were handled can be found in the Electronic Supplemental Materials (ESM). The data are also available in ESM.

Results

Preliminary results

Descriptive statistics (means, standard deviations, and bivariate correlations) can be found in Table 1. On average, participants endorsed experiencing racial discrimination "once" to "a few times" in the past year. They also reported a small to moderate desire to eat, on average, when experiencing anxiety, depressive affect, and anger. Moreover, participants had a mean waist circumference of 77.35, reported "rarely" to "occasionally" experiencing depressive symptoms in the past week, and generally reported having good overall health. Bivariate correlations indicated that racial discrimination was significantly related to depressive symptoms [r (148) = .30, $p < .001$] and self-rated physical health [r (148) = − .20, $p = .016$]. Discrimination was related to angry emotional eating [r (148) = .30, $p < .001$], but not anxious or depressed emotional eating. Women had significantly smaller waist circumferences ($M = 74.78$; $SD = 10.71$; range = 59.5 to 118.5) than men ($M = 81.07$; $SD = 8.45$; range = 65.3 to 106.5) and social class was positively associated with self-rated physical health [r (148) = .21, $p = .010$]. These analyses provided initial support for our path analysis.

Each model was a good fit to the data according to absolute and relative model fit indices. In our first model [$\chi^2(4) = .28$, $p = .991$; CFI = 1.00; TLI = 1.27; SRMR = .007; see Fig. 2], we examined angry eating. In our second model [$\chi^2(4) = .32$, $p = .987$; CFI = 1.00; TLI = 1.27; SRMR = .008; see Fig. 3], we examined anxious eating. In our third model [$\chi^2(4) = .96$, $p = .916$; CFI = 1.00; TLI = 1.32; SRMR = .014; see Fig. 4], we examined depressed eating. While our models were small degrees of freedom models, each model drew from a sample size of 150 and demonstrated good fit according to multiple fit indices.

Social structures and context

Each of our three models (angry, anxious, depressed eating) evidenced significant associations between female gender and racial discrimination, such that female gendered individuals reported significantly less racial discrimination than male gendered individuals (ß = − .20, $p = .009$; ß = − .20, $p = .009$; and ß = − .20, $p = .012$, respectively). There was no significant association between social class and racial discrimination (ß = − .04, $p = .611$; ß = − .04, $p = .611$; and ß = − .03, $p = .669$, respectively). No significant associations between female gender and the emotional eating behaviors (ß = − .01, $p = .926$; ß = − .10, $p = .218$; and ß = .13, $p = .102$, respectively)

Table 1 Descriptive statistics for study variables

	1	2	3	4	5	6	7	8	9
1. Social class	–								
2. Female gender	− .01	–							
3. Discrimination	− .03	− .20*	–						
4. Eating-anxious	− .01	− .13	.15	–					
5. Eating-depressed	− .03	.10	.15	.61**	–				
6. Eating-angry	− .09	− .06	.30**	.74**	.65**	–			
7. Waist circumference	− .07	− .30**	.09	− .04	.12	− .05	–		
8. Depressive symptoms	− .10	− .06	.30**	.21**	.15	.36**	.02	–	
9. Physical health	.21**	− .07	− .20*	.07	− .06	.01	− .25**	− .12	–
M	3.44	–	2.44	1.87	2.70	1.75	77.35	1.72	3.37
SD	1.24	–	.82	.75	1.09	.77	10.34	.45	.87
N	150	150	150	150	150	150	147	150	150

Within our path analysis, all continuous study variables have been mean-centered for ease of interpretation, however the descriptive values (M, SD) corresponding to their original scales have been retained here to ensure that this table is maximally informative. Female gender (0 = male, 1 = female)
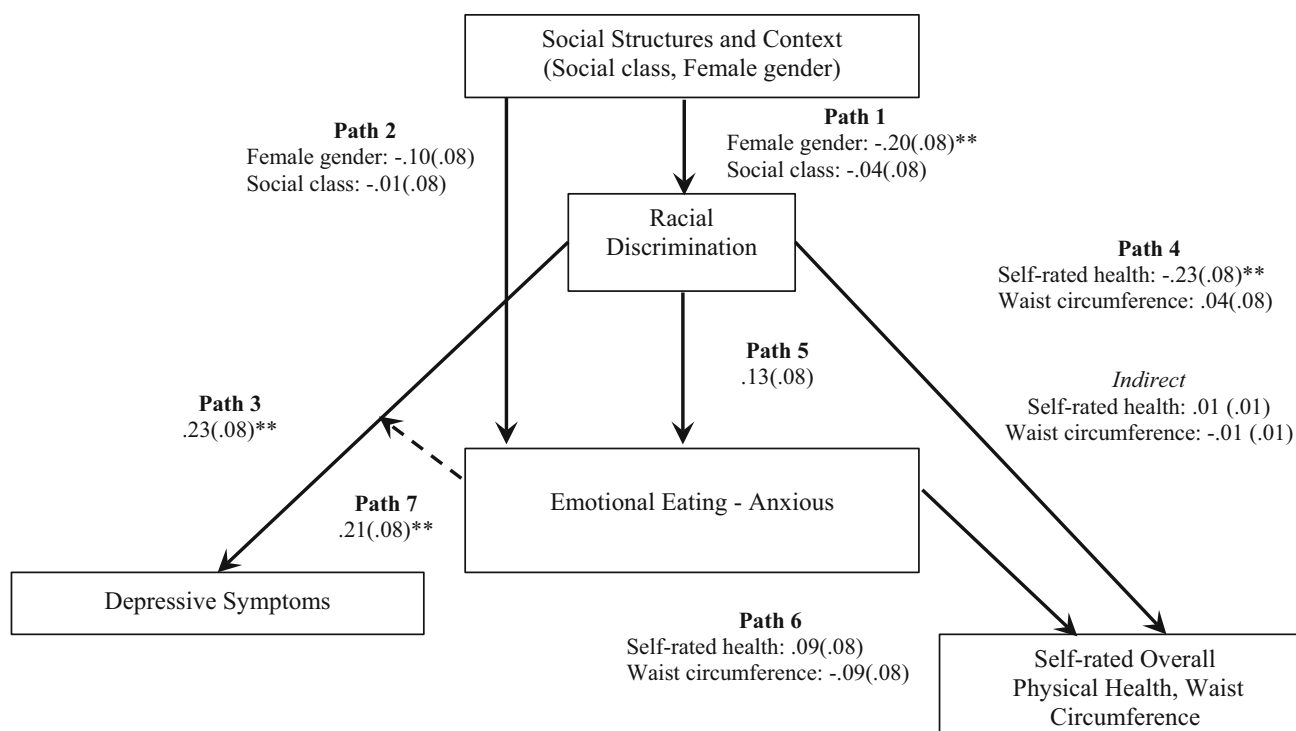
*$p < .05$; **$p < 0.01$
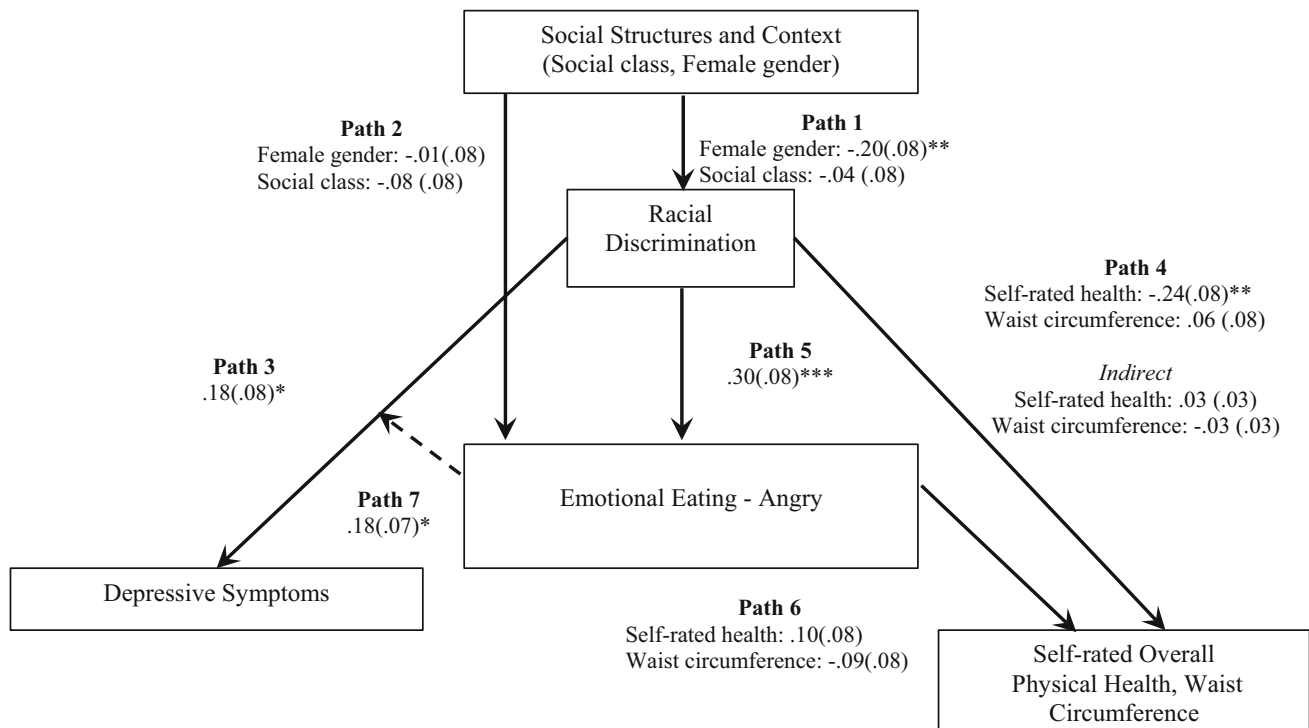
Fig. 2 Model 1: path model examining angry emotional eating. *Note* Standardized coefficients for each path are displayed, followed by standard errors in parentheses. *$p < .05$; **$p < .01$; ***$p < .001$. The dashed line represents a moderated path while the other lines represent direct paths

or social class and the emotional eating behaviors (ß = − .08, $p = .290$; ß = − .01, $p = .883$; and ß = − .02, $p = .814$, respectively) were observed.

Direct associations between stress and health

We examined direct associations between racial discrimination and: depressive symptoms (Path 3) and self-rated physical health and waist circumference (Path 4). Experiencing racial discrimination was positively associated with

Fig. 3 Model 2: path model examining anxious emotional eating. *Note* Standardized coefficients for each path are displayed, followed by standard errors in parentheses. **p < .01. The dashed line represents a moderated path while the other lines represent direct paths

poorer self-rated physical health (ß = − .24, p = .003; ß = − .23, p = .004; and ß = − .21, p = .008, respectively), but was not associated with waist circumference (ß = .06, p = .503; ß = .04, p = .620; ß = .002, p = .975, respectively). Increased frequency of experiencing racial discrimination was significantly associated with more depressive symptoms (ß = .18, p = .020; ß = .23, p = .002 and ß = .27, p < .001, respectively). Racial discrimination was also positively related to angry (ß = .30, p < .001) and depressed (ß = .18, p = .029) emotional eating, but was not directly associated with anxious emotional eating.

Mediating and moderating role of self-regulatory strategies

We examined the direct association between racial discrimination and emotional eating (Path 5), emotional eating and physical health (Path 6), and the mediated pathway from racial discrimination to emotional eating to physical health (Paths 5 and 6). Across the three models, we did not find a significant relation between emotional eating and self-rated overall health or waist circumference. Indirect pathways from racial discrimination to self-rated overall health and waist circumference via emotional eating behaviors were also nonsignificant.

Finally, we examined the interaction of racial discrimination and emotional eating on depressive symptoms (Path

7). There was a significant interaction between racial discrimination and emotional eating in the first (angry emotional eating; ß = .18, p = .019; see Fig. 2), second (anxious emotional eating; ß = .21, p = .006; see Fig. 3) and third (depressed emotional eating; ß = .22, p = .003; see Fig. 4) model. For each model, the general relation was the same (see Fig. 5a–c). Experiencing more racial discrimination was associated with increased depressive symptomatology among participants with mean and high (+ 1 SD above the mean) levels of angry emotional eating [simple slope mean ß = .10, t(144) = 2.32, p = .022; simple slope high ß = .18, t(144) = 3.49, p < .001]. Similarly, experiencing more racial discrimination was associated with increased depressive symptomatology among participants with mean and high (+1 SD above the mean) levels of anxious emotional eating [simple slope mean ß = .13, t(144) = 2.98, p = .003; simple slope high ß = .22, t(144) = 4.43, p < .001]. Finally, experiencing more racial discrimination was associated with increased depressive symptomatology among participants with mean and high (+ 1 SD above the mean) levels of depressed emotional eating [simple slope mean ß = .16, t(144) = 3.52, p < .001; simple slope high ß = .26, t(144) = 4.57, p < .001]. Racial discrimination was not associated with depressive symptomatology when angry [ß = .01, t(144) = .24, p = .809], anxious [ß = .03, t(144) = .48, p = .630], or depressed [ß = .03, t(144) = .55, p = .580]
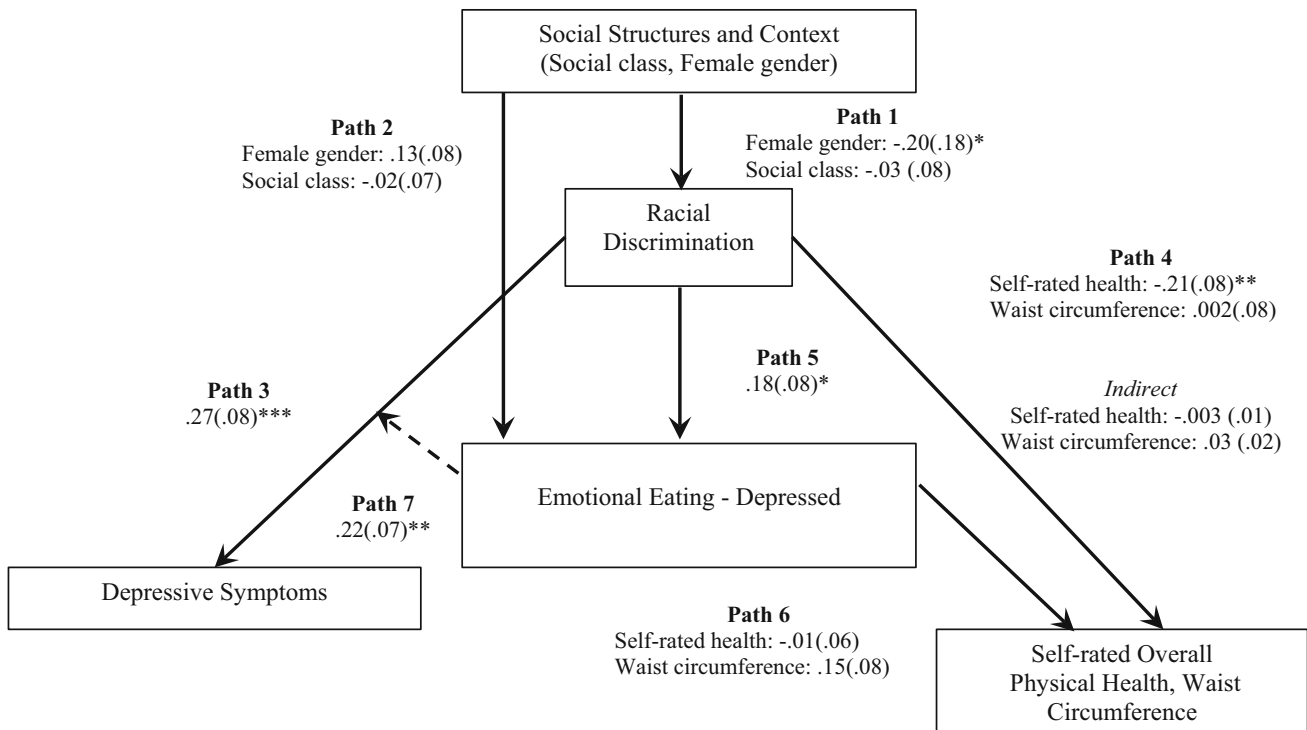
Fig. 4 Model 3: path model examining depressed emotional eating. *Note* Standardized coefficients for each path are displayed, followed by standard errors in parentheses. *p < .05; **p < .01; ***p < .001.

The dashed line represents a moderated path while the other lines represent direct paths

Discussion

To the best of our knowledge, this is the first study to test the full EA model. Our study findings build upon evidence from the handful of existing studies that have tested some, but not all, components of the EA model. Upon testing all proposed paths of the EA model, we found that African American men reported a higher prevalence of racial discrimination than African American women. Social class was not related to discrimination experiences. Moreover, neither female gender nor social class was related to emotional eating. We also found significant associations between racial discrimination and both depressive symptomatology and self-rated overall physical health. However, we found no significant association between racial discrimination and waist circumference. Further, we found no significant associations between emotional eating and our proxies of physical health. However, as hypothesized, we observed direct associations between racial discrimination and angry and depressed emotional eating. Moreover, we found no evidence of a significant indirect effect

of racial discrimination on physical health via emotional eating. Finally, as hypothesized, we found that the association between racial discrimination and depressive symptomatology was moderated by emotional eating. Surprisingly, racial discrimination was associated with depressive symptomatology among participants who reported mean or high levels of emotional eating (anger, anxiety, and depression).

These findings raise several possibilities and pose several questions. First, as per the EA model, gender is an important social contextual factor, especially in terms of frequency of racial discrimination experiences. It is critical for future investigations testing the full EA model to examine other social contextual factors that may shape racial discrimination prevalence and the available range of self-regulatory strategies. For instance, neighborhood factors such as neighborhood-level SES or the presence of fast food outlets and healthy food stores may be critical examinations. Second, aligned with previous research, we found that racial discrimination was directly associated with greater depressive symptomatology and poorer physical health. Interestingly, racial discrimination was not associated with waist circumference, contradicting previous scholarship documenting significant relations between discrimination and increased waist circumference. Our
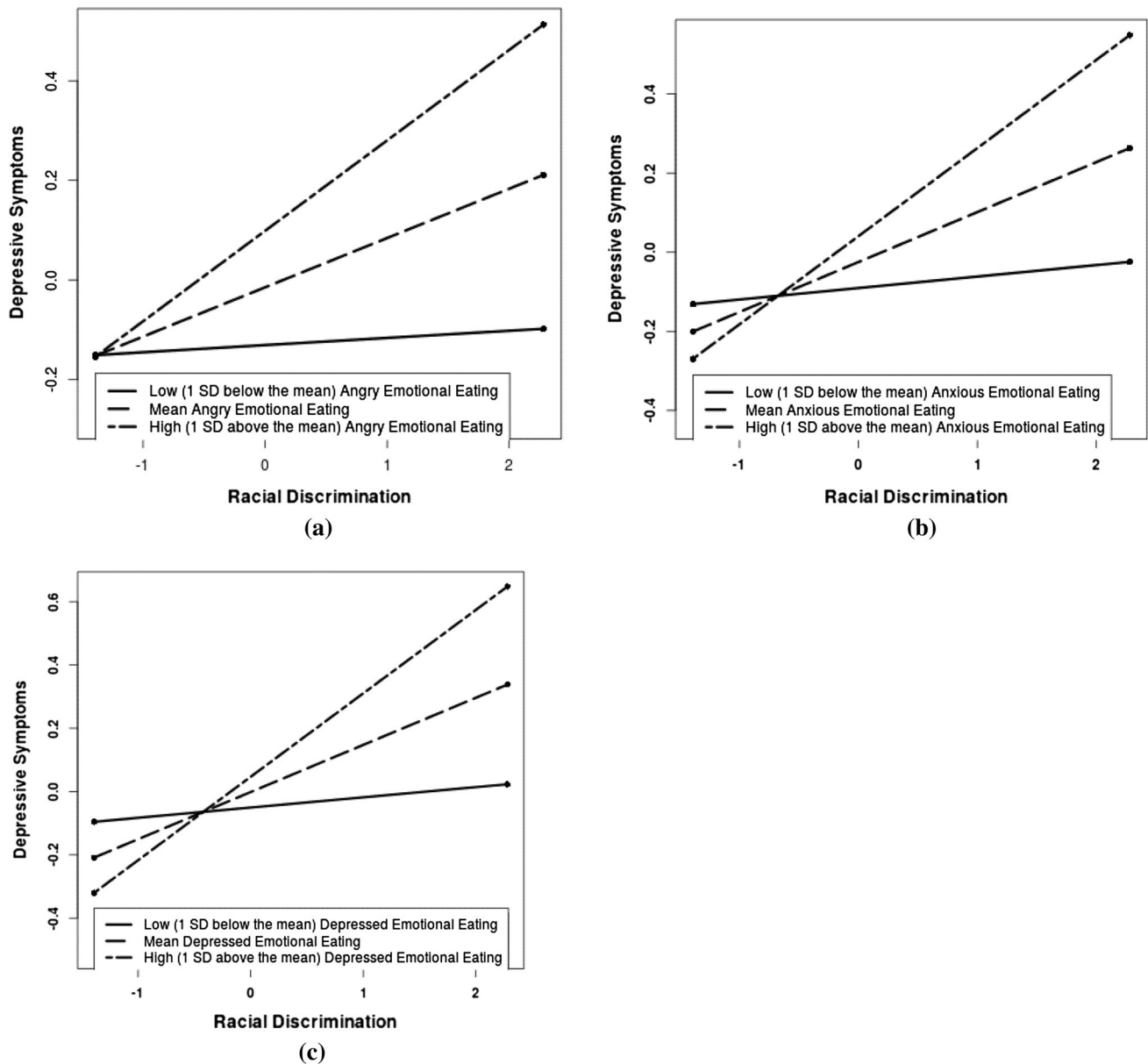
Fig. 5 **a** Simple slopes plot of the significant interaction between discrimination and depressive symptoms by angry emotional eating, **b** simple slopes plot of the significant interaction between discrim-ination and depressive symptoms by anxious emotional eating and **c** simple slopes plot of the significant interaction between discrim-ination and depressive symptoms by depressed emotional eating

failure to observe a significant association might be a function of our young, healthy sample (age range 18–27). Previous studies (Cozier et al., 2009; Hickson et al., 2012) employed samples with median or mean ages of 38 and 55. The average waist circumference of our participants also fell below the high-risk cut-off of 88 cm in women and 102 cm in men (Janssen et al., 2002). Finally, our null finding might be explained by the fact that Cozier et al. (2009) utilized longitudinal data, noting an association between discrimination and change in waist circumference over time. Nonetheless, the impacts and correlates of racial

discrimination may be evident by emerging adulthood (Hope et al., 2015). Third, we observed that racial dis-crimination was associated with angry and depressed emotional eating, but these forms of emotional eating were not associated with proxies for health. Thus, it is con-ceivable that emotional eating may be a salient coping strategy used to manage racial discrimination-related stress, but the link between emotional eating and health has, fortunately, not yet been established in this healthy, young sample.

Fourth, in terms of the most central tenets of the EA model, we found no evidence of a significant indirect effect of racial discrimination on physical health via emotional eating. It is possible that African Americans do not suffer the negative physical health consequences of emotional eating until well into their adult years. Alternatively, the association between emotional eating and waist circumference may differ among non-obese versus obese individuals or those who otherwise already eat in a way that negatively impacts their health. Further, reports of emotional eating as a self-regulatory strategy may be contingent upon the conscious connection between emotions and eating behaviors, and individuals are not always consciously aware of these links (Park & Iacocca, 2014). In contrast to the moderation hypothesis of the EA model, racial discrimination was associated with greater depressive symptomatology among participants who reported mean or high levels of emotional eating (anger, anxiety, and depression). A plausible explanation is that emotional eating minimizes depressive symptoms in the short term but does not combat or manage the stressor (i.e., racial discrimination) contributing to increased depressive symptomatology over time. An alternative explanation is that participants with higher levels of depressive symptoms are more likely to use emotional eating to manage these symptoms. Yet, it is also plausible that the moderating effect of emotional eating in the relation between racial discrimination and depressive symptomatology may differ in non-obese versus obese individuals. Longitudinal investigations would yield useful insights regarding issues of directionality and causality.

There are several limitations of the present study. Our sample size was relatively small, thereby limiting our power to detect statistical effects. Our sample characteristics also minimized the generalizability of our findings to the broader African American population. Specifically, our participants were college students residing in the southeastern region of the U.S. Moreover, the average waist circumference of our participants fell below the high-risk cut-off of 88 cm in women and 102 cm in men, further limiting the generalizability of our sample. Finally, the data are cross-sectional and are therefore limited with regard to the examination of changes over time and causality.

We have several recommendations for future explorations of the EA model. First, these investigations should test all proposed theoretical paths—while also attending to social contextual factors—in large samples of African American participants. Second, these investigations should be longitudinal, thereby addressing issues of directionality and causality. Moreover, such longitudinal investigations would address the key question: How can African Americans cope with chronic racial discrimination in ways that are protective of short-term psychological well-being and long-term physical health? Similarly, experimental studies that assess eating behaviors or urges following racial discrimination exposure might offer stronger insights regarding the extent and context of emotional eating use. Third, future explorations that test the EA model among different cohorts of African Americans (e.g., differential health status) would also significantly contribute to the literature by elucidating how the EA model operates across the lifespan. Fourth, future studies should employ depressive symptomatology measures as well as diagnostic measures of depression, thereby explicating any divergences in existing EA study findings. It is noteworthy that our depressive symptomatology findings converged with those in Mezuk and colleagues' recent investigation (2017), which also assessed psychological distress via the CES-D. Finally, future studies might focus on: (1) emotional eating and various other self-regulatory strategies, and (2) racial discrimination as well as general stressors or discrimination attributed to various social identities.

Conclusion

Our findings revealed that racial discrimination is related to depressive symptoms and self-reported physical health in African Americans. Moreover, we demonstrate that emotional eating may exacerbate the noxious link between racial discrimination and depressive symptoms for African Americans. The relation between emotional eating and health is complex. It is important that researchers further investigate the EA framework among African Americans across the lifespan, carefully considering the role of social contextual factors. Given our findings, it is possible that emotional eating functions both as symptomatology for experiencing racial discrimination and as a self-regulatory strategy with potential negative prognoses and/or as a common response among those already experiencing depressive symptoms. Clinicians may be wise to explore such behaviors in the presence of racial discrimination and among African Americans. Finally, clinicians might assist their African American clients in developing a repertoire of racism-related strategies, as emotional eating may not preserve African Americans' physical or mental health. Such preventive interventions are paramount to the promotion of health equity.

Compliance with ethical standards

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