Implicit Ethnic–Racial Self-Stereotyping's Relation to Children's Body Mass Index and Diet: The Moderating Role of Self-Esteem

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Childhood obesity in the United States has disproportionately affected Latinx and Black children. The authors examine this issue by drawing upon implicit social cognition theory and social–psychological models of health and stress to propose and test a relation between negative implicit self-stereotyping and body mass index (BMI) and diet. Furthermore, it was predicted that self-esteem would buffer this relation because it is a psychological resource that functions to protect against stressors like the psychological experience of stigma. The authors recruited a community sample of 9–12-year-old Latinx and Black children and measured individual differences in implicit and explicit associations between the self and group stereotypes, self-esteem, objective BMI, and diet. Consistent with the main hypotheses, strong negative implicit (but not explicit) self-stereotyping was associated with higher levels of body mass indices in the obesity range and less healthy diet, but only among children with low self-esteem. Among children with high self-esteem, these relations were absent. These results held even after controlling for the contribution of parents' BMI, diet, education, and household income. These data are the first to theoretically and empirically link implicit self-stereotyping and self-esteem with physiological risk factors for chronic health conditions. Thus, this research contributes to understanding disparities among stigmatized ethnic–racial children in the United States and beyond.

Keywords: health disparities, obesity, stigma, Latinx, Blacks

Childhood obesity is a pressing health concern in the United States (Fryar et al., 2014; Hales et al., 2017; Institute of Medicine, 2005). The ramifications for obese children are staggering, namely greater risk of short-term and long-term poor physical and mental health, which, in turn, can adversely affect their social functioning and academic performance (Dietz, 1998; Erickson et al., 2000; Nesbitt et al., 2004; Schwartz & Puhl, 2003; Strauss & Pollack, 2003). Obesity and its health implications beset children from all backgrounds, but children from socially disadvantaged and low-status ethnic–racial groups have been disproportionately affected (Nesbitt et al., 2004). For example, obesity rates for 2011–2016 indicate that Latinx and Black children were more likely to be obese (and overweight) than their White counterparts (Hales et al., 2017; Ogden et al., 2014, 2016). Moreover, relative to Whites, Latinx, and Black children are at far greater risk of developing diabetes and hypertension over time, which are likely health outcomes of obesity (Fagot-Campagna et al., 2000; Nesbitt et al., 2004; Rosenbloom et al., 1999). The aforementioned ethnic–racial difference in obesity and its health consequences are referred to in the United States as child health disparities (Cheng et al., 2009; Robinson et al., 2017). Although such disparities have been explained by family (e.g., parents' obesity), community/environmental (e.g., safe play areas), and economic (e.g., socioeconomic status) variables (Krueger & Reither, 2015; Puder & Munsch, 2010), reviews suggest that they persist even after considering these factors (Dressler et al., 2005; Smedley et al., 2003).

The present research adopts a social–psychological perspective to understand the factors linked to Latinx and Black children's obesity. One hypothesis stemming from social–psychological frameworks of health disparities is that exposure to stigma can have detrimental health consequences via self and identity processes (Brondolo et al., 2012; Major et al., 2013; Major & O'Brien, 2005; Rivera, 2014; Rivera & Paredez, 2014). For Latinx and Black children, the effect of ethnic–racial stigma on their self and identity can be operationalized as negative self-stereotyping, a social cognitive process by which negative stereotypes are implicitly and explicitly associated with the self-concept in memory (Devos & Banaji, 2003; Hogg & Turner, 1987; Lun et al., 2009; Rivera & Benitez, 2016). The present research with Latinx and Black children tests the individual-level hypothesis that strong implicit negative self-stereotyping will be associated with higher body mass indices and less healthy diets, an obesity-related factor. However, because the factors linked to stigmatized children's obesity tend to be complex (Major et al., 2013), we expect the predicted relation to be moderated by self-esteem, a psychosocial resource that can buttress life's stressors such as experiences with stigma (Clark et al., 1999; Meyer, 2003).

Self-Stereotyping as a Social Cognitive Process Related to Childhood Obesity

One approach to understanding the self and identity processes linked to childhood obesity is through stigma-based psychological experiences (Goffman, 1963; Major et al., 2013; Major & O'Brien, 2005). Goffman's (1963) early sociological work conceptualized stigma as a negative attribute associated with an individual that, in turn, reduces his or her social advantage and status. A social–psychological extension of stigma characterizes these negative attributes as stereotypes and, further, these can be exhibited by ingroup members (Crocker et al., 1998; Major & O'Brien, 2005). This hypothesis is consistent with social identity and self-categorization theories (Tajfel & Turner, 1986; Turner et al., 1987), which posit that individuals categorize and mentally represent themselves into social groups. One consequence of self-categorization is self-stereotyping—that is, individuals associate their self-concept with the group's characteristics, including those that are cultural stereotypes (Hogg & Turner, 1987; Lun et al., 2009). For example, Latinx participants are more likely to associate themselves with characteristics that reflect their group's stereotypes when compared to White participants (Rivera & Paredez, 2014). Although self-categorization processes and their self-stereotyping outcomes have been examined mostly in adults, they appear to shape children's self and identity as well (for a review, see Bennett & Sani, 2004; also see Bennett & Sani, 2008). Related to ethnic–racial self-stereotyping, children begin to exhibit ethnic–racial identity awareness around age 3, are aware of ethnic–racial stereotypes by ages 5–6, see themselves as members of an ethnic–racial group by ages 6–7, and these cognitions and behaviors are fully developed and solidified by ages 9–10 (Aboud, 1988; Augoustinos & Rosewarne, 2001; Bennett & Sani, 2004; Rogers & Meltzoff, 2017).

The above research relies on children's conscious awareness of the associations between themselves and their group's stereotypes. Implicit social cognition theories (Devos & Banaji, 2003; Greenwald et al., 2002), however, posit that members of a given social group exhibit self-stereotyping outside of conscious awareness because ingroup members have knowledge of their group membership as well as their group's stereotypes. Evidence for ethnic–racial implicit self-stereotyping has been documented with adults (Lun et al., 2009), and we expect Latinx and Black children also to exhibit meaningful individual differences in implicit self-stereotyping because, as noted above, they hold mental representations of their ethnic–racial groups and their stereotypes.

Strong negative implicit self-stereotyping should be related to higher body mass indices and less healthy diets, an obesity-related factor. This relation would be consistent with social–psychological models of health, which posit that the psychological experience of stigma in the form of negative stereotypes can be stressful (Clark et al., 1999; Major et al., 2013; Meyer, 2003). Stigma-based stress is known to negatively affect individuals' health because it undermines healthy behaviors. The most widely recognized stereotypes about Latinx and Black people (in the United States, at least) are strongly negative (e.g., unintelligent, violent, criminal; Crocker et al., 1998; Devine & Elliot, 1995), a reality that Latinx and Black children are well aware of (Aboud, 1988; Augoustinos & Rosewarne, 2001; Bennett & Sani, 2004; Rogers & Meltzoff, 2017). To the extent that these stereotypes shape self and identity processes and outcomes, we would expect it to be related to poor health outcomes.

The above posits that the relation between self-stereotyping and health risk factors is predicted to emerge when measuring implicit rather than explicit self-stereotyping. Children, like adults, are often unaware of the extent to which they harbor implicit biases (Newheiser & Olson, 2012). An extension of implicit bias is the mental association of stereotypes with the self-concept outside of conscious awareness (Devos & Banaji, 2003). This is consistent with the general implicit social cognition literature (Dunham et al., 2008), which posits and demonstrates that individuals of all ages are sometimes unable to explicitly report their beliefs about socially sensitive issues (like stigma). Furthermore, children, like adults, are susceptible to the effect of social desirability concerns on self-report measures of negative psychological constructs (Miller et al., 2015). Finally, seminal research on the self-concept demonstrates that individuals tend to exhibit the effects of cultural factors on their self-concept when measured indirectly than when measured directly (Markus & Kunda, 1986; Markus & Nurius, 1986). Taken together, and as applied to the present study, the above lines of research suggest that negative implicit rather than negative explicit self-stereotyping should be related to childhood body mass index (BMI) and diet.

The Moderating Role of Psychosocial Resources: Self-Esteem

However, we expect that the implicit self-stereotyping and health risk factors relation is not obligatory. Consistent with stress models of health (Clark et al., 1999; Meyer, 2003), moderating factors are expected to reveal which Latinx and Black children are vulnerable to the role of implicit negative self-stereotyping in health risk factors. Psychosocial resources, a set of self-enhancement social–psychological factors, are expected to buffer the health effects of life stressors in general. Self-esteem, a key self-enhancing factor based on one's positive self-views, is one such psychosocial resource (Stinson et al., 2008). However, like any other resource, individuals vary in the degree to which they possess self-esteem. Among low self-esteem individuals, resources are low and thus they are unable to draw from them to help avoid the types of risky health behaviors that lead to (or maintain) obesity (Heatherton & Baumeister, 1991; Martens et al., 2008; Miller & Downey, 1999). Relative to high self-esteem individuals, low self-esteem individuals are less able to effectively deal with stress, less able to self-regulate, and less optimistic about their coping abilities, including as they relate to eating behaviors (Baumeister et al., 2003; French et al., 1995; Harter, 1993; Miller et al., 2009; Miller & Downey, 1999; Pruessner et al., 1999; Sassaroli & Ruggiero, 2005; Schieman, 2002; Schwartz & Puhl, 2003; Seeman et al., 1995). Finally, related to the current research, the association between experiencing stigma and poor mental health only emerges among individuals from stereotyped groups who have low self-esteem, but not those who have high self-esteem (Corning, 2002). Considering these lines of research and extending them to physical health, we posit that among low (but not high) self-esteem Latinx and Black children, implicit self-stereotyping should be linked to obesity and its risk factors.

Overview of the Present Research

The goal of the current research is to provide a test of the relation between implicit negative self-stereotyping and obesity with a sample of Latinx and Black children, a relation that should be buffered by self-esteem. We address this goal with two obesity-related measures, BMI and diet. Following the Centers for Disease Control and Prevention (CDC) (2018a, 2018b) standards, we calculated continuous BMI scores and categorized them into obese, overweight, and normal weight. Also, we examine diet healthiness as a criterion because it is critical for preventing unhealthy weight gain and chronic disease (Centers for Disease Control and Prevention [CDC], 2018c, 2018d). Our main prediction is that among Latinx and Black children with low self-esteem, implicit negative self-stereotyping will be related to a less healthy diet, higher body mass indices, and, more specifically, BMI scores that fall in the overweight and obese categories. However, among Latinx and Black children with high self-esteem, a psychological resource that can short circuit the effects of stigma-related stress, implicit negative self-stereotyping should not be related to diet healthiness and BMI. We did not expect these hypothesized relations to emerge on a measure of explicit negative self-stereotyping because children (like adults) should be less able to consciously report the impact of negative stereotypes on their self-concept. Also, because positive stereotypes are not a source of stigma for Latinx and Black children, we did not expect implicit nor explicit positive self-stereotyping to be negatively related to obesity-related factors. Finally, we expect to find support for our hypotheses for both Latinx and Black children because, as discussed in the literature review above, both have knowledge of the ethnic–racial stereotypes that target their ethnic–racial groups, are expected to self-categorize and thus self-stereotype, and obesity disproportionately affects Latinx and Black children at similar rates in the United States.

Method

Participants

A community sample of 91 African American/Black and Hispanic/Latino(a) children and their parents or guardians participated in the study entitled the "Child Health Study" in exchange for $25. Table 1 reports demographics for all children and parents and as a function of the ethnic–racial group. Analysis of variance (ANOVA) and Chi-square tests yielded no statistically significant differences in any of the demographics between African American/Black and Hispanic/Latino(a) children and parents, $F < 0.31$,

Table 1

Sample Demographics

Variable	All	African American/Black	Hispanic/Latino(a)
Children	$N = 91$	$n = 58$	$n = 33$
Age	10.85 (*0.83*; 9–12)	10.81 (*0.76*; 10–12)	10.91 (*0.95*; 9–12)
Gender			
Male	52.7	46.6	63.6
Female	47.3	53.4	36.4
Parents	$N = 72$	$n = 46$	$n = 26$
Age	39.44 (*9.89*; 20–72)	39.30 (*9.44*; 28–64)	39.69 (*10.82*; 20–72)
Gender			
Male	6.6	3.4	12.1
Female	93.4	96.6	87.9
Education			
Less than 8th grade	4.4	6.9	0.0
8th grade, less than high school/GED	0.0	0.0	0.0
High school/GED	77.8	74.1	84.4
College/4-year degree	17.8	19.0	15.6
Graduate degree	0.0	0.0	0.0
Employment status			
Unemployed	46.2	50.0	39.4
20 hr or less	9.9	12.1	6.1
21–30 hr	20.9	15.5	30.3
31–40 hr	15.4	15.5	15.2
41 hr or more	7.7	6.9	9.1
Annual household income			
$0–10,000	30.8	37.9	18.2
$10,001–20,000	18.7	15.5	24.2
$20,001–30,000	11.0	8.6	15.2
$30,001–40,000	17.6	19.0	15.2
$40,001–50,000	5.5	3.4	9.1
$50,001–60,000	6.6	6.9	6.1
$60,001–70,000	8.8	6.9	12.1
$70,001–80,000	0.0	0.0	0.0
$80,001–90,000	0.0	0.0	0.0
$90,001–100,000	0.0	0.0	0.0
$100,001 or more	1.1	1.7	0.0

Note. GED = General Educational Development diploma. Values represent percentages, except for those that are means, which are indicated with *standard deviations* followed by a range in parentheses.

$p > .58$; $\chi^2 < 6.99$, $p > .11$. Child and parent sample sizes are discrepant because 12 African American/Black parents and 7 Hispanic/Latino(a) parents brought more than one child to participate in the study (see Supplemental Analyses under Results). Recruitment was done with flyers posted at local businesses and community agencies in Newark, New Jersey. This research has been approved by the Rutgers University Institutional Review Board (#11-533Mc).

Measured Variables

Implicit Self-Stereotyping

Child participants completed a sequential subliminal priming task, which was presented as a lexical decision task, to measure individual differences in implicit associations between the self and negative and positive stereotypes (adapted from Lun et al., 2009). Across 48 critical trials, self-relevant or neutral words were subliminally primed before the presentation of a negative or positive stereotype word or a nonword. The negative stereotypes (*dirty*, *bad*, *naughty*, *mean*, *nasty*, *rude*, *stupid*, and *lazy*) and positive stereotypes (*clean*, *good*, *nice*, *friendly*, *kind*, *helpful*, *smart*, and *hard-working*) were shared stereotypes of both (and unique to) Hispanic/Latino(a) and African American/Black children identified in the literature (Baron & Banaji, 2006; Dunham et al., 2006; Rutland, Cameron, Bennett, et al., 2005; Rutland, Cameron, Milne, et al., 2005; Williams, Best, et al., 1975). The nonwords were *oub*, *gpow*, *moob*, *diart*, *wibard*, *vetetable*, *tosorrow*, and *miprochone*. The nonwords were originally words selected from a set of age-appropriate vocabulary lists (Kuperman et al., 2012; http://crr.ugent.be/) that were similar in size to the stereotype-relevant words, then 1–2 letters were changed or exchanged (e.g., *out* was changed to *oub* and *microphone* was changed to *miprochone*).

During the task, participants were first instructed to direct their attention to a fixation point (X) that was presented in the middle of the screen. Next, a string of X's was presented in the center of the screen for 1,000 milliseconds (ms; forward mask). This was immediately replaced with either a self (*self*, *I*, *me*) or neutral word (*a*, *at*, *the*) for 15 ms. The subliminal prime was then replaced with the string of X's for another 1,000 ms (backward mask). Following the forward mask–prime–backward mask sequence, a negative stereotype-relevant word, positive stereotype-relevant word, or nonword appeared. Then, participants made their lexical judgment—they pressed the right control key if they judged the string of letters as a word or the left control key if they judged the string of letters as a nonword. A red exclamation mark overlaid the word or nonword if participants provided an incorrect response, and the computer program waited for a correct response before continuing to the next trial. To familiarize participants with the task before completing the critical trials, four nonprimed practice trials were completed including two-word (*apple*, *pencil*) and two-nonword (*youey*, *njoue*) trials. The presentation of stimuli across all trials was randomized.

Following standard scoring procedures for sequential priming tasks (Wentura & Degner, 2010), latencies that were more than 3 SDs above the individuals' average reaction time across critical trials or lower than 150 ms were excluded from the analyses. Next, we log transformed the response latencies to normalize their distribution. For each type of word response latency (negative stereotypes, positive stereotypes), we calculated difference scores by subtracting the self-prime latencies from the neutral-prime latencies. The analyses included the average amount of time participants took to respond to positive or negative stereotype words following the manipulation of a self-prime versus a neutral prime. Thus, higher reaction times greater than zero mean that participants' judgments to stereotype-related words were facilitated by a self-prime compared with a neutral prime, or stronger implicit self-stereotyping; and, following this logic, reaction times equal to zero or lower mean no implicit self-stereotyping.

Explicit Self-Stereotyping

Children rated the same eight positive and eight negative stereotypes included in the implicit self-stereotyping measure on a 4-point scale ranging from (1) *Does not describe me at all* to (4) *Describes me perfectly*. We created an index of explicit positive ($\alpha = .77$) and an index of explicit negative ($\alpha = .81$) self-stereotyping by averaging self-ratings for the positive and negative stereotypes, respectively, where higher scores indicate stronger explicit self-stereotyping, lower scores indicate weaker explicit self-stereotyping, and a score of 1 indicates no explicit self-stereotyping.

Self-Esteem

Children completed six-items from the global self-worth subscale of the Self-Perception Profile for Children (SPPC; Harter, 1985), which is the most widely used measure of self-esteem with children as young as five. Most relevant to the present research, the SPPC has been used with different ethnic–racial groups and high self-esteem on the SPPC is associated with children's less positive implicit and explicit attitudes toward outgroups and stronger ingroup identification (Davis et al., 2007) and higher body mass indices (Young-Hyman et al., 2003). Two sample SPCC items are "Some kids are often unhappy with themselves but other kids are pretty pleased with themselves. Which one is most like you?" with responses as follows: (1) "I am often unhappy with myself," (2) "I am sometimes unhappy with myself," (3) "I am sometimes pretty pleased with myself," and (4) "I am often pretty pleased with myself"; and "Some kids are often unsure about themselves but other kids are pretty confident about themselves. Which one is most like you?" with responses as follows: (1) "I am often unsure about myself"; (2) "I am sometimes unsure about myself"; (3) "I am sometimes pretty confident about myself"; and (4) "I am often pretty confident about myself." Higher scores indicate higher self-esteem ($\alpha = .62$).

Body Mass Index

All child participants and their parents allowed us to objectively measure their height and weight. We used CDC's child-specific and adult-specific BMI calculators to compute individual BMI scores (CDC, 2018a, 2018b). We also created a categorical measure of child participants' BMI by plotting participant's age and BMI scores on the CDC's gender-matched BMI-for-age percentile growth charts for boys and girls ages 2–20 (CDC, 2018a, 2018b). We used these percentiles to categorize children into one of four established CDC weight status categories: underweight (less than 5th percentile), normal or healthy weight (5th percentile—less than 85th percentile), overweight (85th percentile—less than 95th percentile), or obese (equal to or greater than 95th percentile; Centers for Disease Control and Prevention, 2018b). Because the

underweight sample size ($n = 3$) was trivial, we combined them with the normal weight ($n = 45$) children in the analyses. Also, we combined the overweight and obesity categories because individuals who are overweight are at greater risk to advance to obesity, and both overweight and obesity are risk factors for chronic health conditions such as coronary heart disease, Type 2 diabetes, certain cancers, hypertension, and other life-threatening chronic conditions (Halfon et al., 2013; Lloyd et al., 2012; May et al., 2012).

Diet Healthiness

To measure their healthy diet behavior, children, as well as their parents, completed four self-developed items that were adapted or inspired by the Family Nutrition and Physical Activity Tool (Ihmels et al., 2009; http://www.myfnpa.org/), a measure designed to assess behaviors that may lead an individual to become overweight or obese, and by the eating behavior research of Croll et al. (2001). The items were as follows: (1) "How often do you eat nutritious and healthy foods?"; (2) "How often do you eat fruits and vegetables"; (3) "How often do you drink water?"; and (4) "How often do you think carefully about selecting healthy foods over unhealthy foods?" Children and parents responded on a 4-point scale ranging from *Not at all* to *All the time*. The items were averaged such that higher values indicated a healthier diet ($\alpha_{children} = .64$; $\alpha_{parents} = .79$).

Socioeconomic Status

Parents reported three single-item indicators of SES: employment status (Unemployed, 20 hr or less/week, 21–30 hr/week, 31–40 hr/week, 41+ hr/week), annual household income (in $10,000 ranges from $0–10,000 to $90,001–100,000, and finally $100,001 or more), and highest level of education (General Educational Development diploma (GED), High School, Some College, College Graduate, Other [and then asked to specify]). Consistent with Gallo and Matthews (2003), since each SES indicator was expected to linearly relate to BMI, annual household income and employment status were treated as continuous variables. To interpret the highest level of education as a continuous variable, participant responses were recoded onto the following scale of highest educational attainment, consistent with Gallo and Matthews (2003): "Less than 8th grade," "Completed 8th grade," "Completed high school/GED," "Completed college/4-year degree," and "Completed graduate degree." One participant who responded "Other" did not specify their highest level of education and could therefore not be recoded.

Procedure

All child participants completed the measures in a private room under the guidance of a female research assistant. The main task of the research assistant was to read the instructions of all procedures and measures aloud as the child followed along; however, the research assistant kept a reasonable distance from child participants to ensure that they completed the procedures and measures in privacy. Parents reported demographic information individually. After completing the computer-based portion of the study, the research assistant measured the height and weight of each child and parent.

Results and Discussion

Analytic Plan

Table 2 lists descriptives of measured variables for the entire sample and as a function of ethnic–racial group. ANOVAs revealed that, on average, Hispanic/Latino(a) children had a higher BMI and a less healthy diet than African American/Black children, $F > 4.33$, $p < .05$ (see Supplemental Analyses under Results). No other statistically significant group differences emerged in the predictor—including the self-stereotyping and self-esteem variables—and criterion variables, $F < 3.61$, ns. Table 3 lists zero-order correlations among all measured variables for the entire sample. Results show that the criterion variables child BMI and/or child diet healthiness were at least marginally significantly related to parents' BMI, so this was used as one covariate, and to employment status and annual household income. The latter two SES variables were strongly correlated, so we standardized their scores and created an overall mean SES score, which was used as the second covariate. Also unsurprisingly, the measures of implicit and explicit self-stereotyping were not correlated, which is consistent with most social cognition research on self and identity processes related to stigmatized groups (Devos & Banaji, 2003; Rivera & Veysey, 2015).

For the main analyses, we regressed the two criterion continuous variables (child's BMI continuous and child's self-reported diet healthiness) and the one criterion dichotomous variable (child's BMI categorical, dummy coded: 0 = underweight/normal or healthy weight, 1 = overweight/obese) on four different hierarchical linear and logistic regressions,[1] respectively, with 1,000 bootstraps.[2] For all regressions, the two control variables were entered in the first step of the regression. In the second step, we entered one of the four mean-centered child self-stereotyping variables (implicit negative, implicit positive, explicit negative, and explicit positive) and mean-centered self-esteem. In the third and final step, we entered the interaction term between self-stereotyping and self-esteem. Significant interactions were unpacked by conducting simple slopes analyses at 1 SD above and below the mean of the self-stereotyping and self-esteem variables (Aiken & West, 1991).

Implicit Self-Stereotyping

BMI Continuous

Hierarchical linear regression analyses yielded no main effects of negative implicit self-stereotyping, $b = 1.24$, $SE = 2.74$, 95% CI [-3.55, 6.99], or self-esteem, $b = .27$, $SE = 1.07$, 95% CI [-1.58, 2.63], but there was a negative implicit Self-stereotyping × Self-esteem interaction effect, $b = -19.51$, $SE = 5.85$, 95% CI [-31.22, -8.30]. In support of our main hypothesis, higher levels of negative implicit self-stereotyping were associated with higher body mass indices ($M_{estimated} = 16.53$) than lower levels of negative implicit self-stereotyping ($M_{estimated} = 11.26$), but only among participants

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[1] We also ran a regression model in which all four self-stereotyping constructs and their interaction with self-esteem were entered simultaneously. The results were identical to those reported in the Results section. However, because of multicollinearity among some of the self-stereotyping measures, we report four separate models in the Results section.

[2] Bootstrapping in regression models offers the advantage of making more accurate inferences when a sample size is not large (Fox, 2016).

Table 2
Descriptives for Measured Variables

Variable	All			African American/Black			Hispanic/Latino(a)		
	M	SD	Range	M	SD	Range	M	SD	Range
Parents									
BMI continuous	32.07	8.48	20.12–56.28	32.77	8.85	20.73–56.28	30.66	7.74	20.12–47.80
Diet healthiness	2.95	0.65	1.50–4.00	3.05	0.64	1.50–4.00	2.78	0.65	1.50–3.75
Children									
Negative ISS	0.01	0.16	−0.39–0.57	−0.01	0.15	−0.39–0.38	0.03	0.18	−0.21–0.57
Positive ISS	0.00	0.22	−0.53–0.80	0.02	0.23	−0.43–0.80	−0.03	0.19	−0.53–0.80
Negative ESS	1.40	0.42	1.00–3.00	1.40	0.42	1.00–3.00	1.40	0.41	1.00–3.00
Positive ESS	3.27	0.50	1.50–4.00	3.34	0.49	1.50–4.00	3.14	0.52	1.50–4.00
Self-esteem	3.07	0.57	1.00–4.00	3.06	0.54	1.50–4.00	3.08	0.61	1.00–4.00
BMI continuous	20.57	4.68	6.12–34.13	19.18	3.88	14.18–32.16	21.90	5.64	6.12–34.13
Diet healthiness	2.93	0.56	1.24–4.00	3.04	0.57	1.25–4.00	2.72	0.49	1.75–4.00

Note. BMI = body mass index; ISS = implicit self-stereotyping; ESS = explicit self-stereotyping.

with low self-esteem, $b = 15.42$, $SE = 4.80$, 95% CI [6.22, 25.13]. By comparison, among high self-esteem participants, the relation between negative implicit self-stereotyping and body mass indices was not significant, $b = -6.72$, $SE = 3.63$, 95% CI [−13.99, 0.44]. Also, the positive implicit self-stereotyping regression analyses did not yield any main effects of self-stereotyping, $b = -2.05$, $SE = 1.97$, 95% CI [−6.06, 1.82], or self-esteem, $b = 0.22$, $SE = 0.03$, 95% CI [−1.49, 1.94], and no interaction effect, $b = 1.74$, $SE = 6.02$, 95% CI [−10.01, 13.97].

BMI Dichotomous

Logistic regression analyses yielded no main effects of negative implicit self-stereotyping, $b = 0.44$, $SE = 1.64$, 95% CI [−2.50, 3.96], or self-esteem, $b = .11$, $SE = 0.44$, 95% CI [−0.75, 1.02], but there was a negative implicit Self-stereotyping × Self-esteem interaction effect, $b = -7.85$, $SE = 4.68$, 95% CI [−20.39, −1.26]. Consistent with the continuous BMI data, among low self-esteem

participants, higher levels of negative implicit self-stereotyping were associated with a 431.55-fold increase in the odds of being overweight or obese, $b = 6.07$, $SE = 3.37$, 95% CI [1.09, 14.06]; however, among high self-esteem participants, negative implicit self-stereotyping was not associated with increased odds of being overweight or obese ($OR = .06$), $b = -2.84$, $SE = 2.71$, 95% CI [−9.17, 1.52]. Also, the positive implicit self-stereotyping logistic regression analyses did not yield any main effects of self-stereotyping, $b = -1.59$, $SE = 1.41$, 95% CI [−4.76, .82], or self-esteem, $b = 0.07$, $SE = 0.44$, 95% CI [−0.77, 0.98], and no interaction effect, $b = 0.88$, $SE = 3.16$, 95% CI [−4.34, 8.65].

Diet Healthiness

Hierarchical linear regression analyses yielded no main effects of negative implicit self-stereotyping, $b = -0.38$, $SE = 0.40$, 95% CI [−1.19, 0.41], or self-esteem, $b = .16$, $SE = 0.10$, 95% CI [−0.02, 0.38], but there was a negative implicit

Table 3
Zero-Order Correlations Among Measured Variables for Full Sample (N = 91)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Parents														
1. Education	—													
2. Employment status	.22*	—												
3. Annual household income	.14	.61**	—											
4. BMI continuous	−.04	.08	−.03	—										
5. Diet healthiness	−.01	.10	.10	−.04	—									
Children														
6. Age	−.04	−.01	−.09	.07	.04	—								
7. Gender	.11	−.07	−.15	.02	−.04	−.06	—							
8. Ethnicity/race	.04	.11	.10	−.12	−.20†	.06	−.17	—						
9. ISS negative	−.02	−.08	−.05	−.08	.08	−.05	−.01	.15	—					
10. ISS positive	−.07	−.06	−.08	.20†	.11	.20†	−.13	−.09	.03	—				
11. ESS negative	−.15	−.27*	−.13	.05	.09	−.13	−.32*	.00	.03	.03	—			
12. ESS positive	.13	−.02	−.14	.06	−.09	.13	.28**	−.19†	−.06	.03	−.54**	—		
13. Self-esteem	−.03	.20†	.14	−.10	−.10	.01	.01	.01	−.04	−.08	−.49**	.30**	—	
14. BMI continuous	−.09	.18†	.12	.25*	.01	.16	−.12	.22*	.01	−.05	.09	−.22*	.04	—
15. Diet healthiness	.05	−.09	−.20†	.07	.01	−.03	.05	−.28**	−.11	−.08	−.16	.35**	.12	−.14

Note. BMI = body mass index; ISS = implicit self-stereotyping; ESS = explicit self-stereotyping; gender coding: 0 = male, 1 = female; ethnicity/race coding: 0 = African American/Black, 1 = Hispanic/Latino[a].
† $p < .09$. * $p < .05$. ** .01.

Self-stereotyping × Self-esteem interaction effect, $b = 1.35$, $SE = 0.77$, 95% CI [0.05, 3.07]. Simple slope analyses were consistent with the above BMI results and our main hypothesis. Higher levels of negative implicit self-stereotyping were associated with less healthy diets ($M_{estimated} = 2.72$) than lower levels of negative implicit self-stereotyping ($M_{estimated} = 3.15$), but only among participants with low self-esteem, $b = -1.36$, $SE = 0.62$, 95% CI [-2.64, -0.16]. However, this relation did not emerge among high self-esteem participants ($M_{estimated\ low\ negative\ ISS} = 3.04$ vs. $M_{estimated\ high\ negative\ ISS} = 3.06$), $b = 0.17$, $SE = 0.52$, 95% CI [-0.81, 1.24]. Also, the positive implicit self-stereotyping regression analyses did not yield any main effects of self-stereotyping, $b = -0.32$, $SE = 0.27$, 95% CI [-0.88, 0.21], or self-esteem, $b = 0.14$, $SE = 0.10$, 95% CI [-0.03, 0.36], and no interaction effect, $b = 0.84$, $SE = 0.56$, 95% CI [-0.16, 2.07].

Explicit Self-Stereotyping

BMI Continuous, BMI Categorical, and Diet Healthiness

We followed the same plan of analyses from above, but with explicit negative and positive self-stereotyping and self-esteem entered as the predictor variables. No significant main or interaction effects emerged for any of the criterion variables when negative explicit self-stereotyping and self-esteem were entered in the models, BMI continuous: $-1.09 < b < 0.48$, $SE < 1.04$, 95% CI [LL -5.78 to -0.89, UL 3.57–5.14]; BMI categorical: $-0.89 < b < 1.90$, $SE < 2.37$, 95% CI [LL -4.50 to -0.56, UL 1.08–1.90]; diet healthiness: $-0.23 < b < 0.31$, $SE < 0.32$, 95% CI [LL -0.61 to -0.12, UL 0.04–1.01]. When positive explicit self-stereotyping and self-esteem were entered in the models, stronger positive explicit self-stereotyping was associated with lower BMI scores, $b = -2.43$, $SE = 1.03$, 95% CI [-4.30, -0.12], and healthier diets, $b = 0.35$, $SE = 0.15$, 95% CI [0.09, 0.65], but no main effect on BMI categorical, $b = -0.68$, $SE = 0.50$, 95% CI [-1.71, 0.38]. Although outside the main goal of the present research, these data lend some support for the general stigma and health notion that positive stereotypes are *not* the source of poor health for stigmatized individuals (see introduction). Finally, the main effect of self-esteem or positive explicit Self-stereotyping × Self-esteem interaction were not significant, BMI continuous: $0.85 < b < 0.99$, $SE < 1.68$, 95% CI [LL -2.52 to -1.26, UL 3.06–4.12]; BMI categorical: $0.32 < b < 0.46$, $SE < 0.90$, 95% CI [LL -1.27 to -0.47, UL 1.38–1.58]; diet healthiness: $-0.14 < b < 006$, $SE < 0.23$, 95% CI [LL -0.50 to -0.13, UL 0.27–0.40].

Supplemental Analyses

Here, we report additional analyses that address two issues. First, as reported earlier, Hispanic/Latino(a) and African American/Black children differed on the BMI continuous and diet healthiness criterion variables. However, consistent with our literature review, we did not expect our predicted interaction effects to be further moderated by child participants' ethnic–racial, as well as gender, group identities. To confirm our expectations, we ran analyses similar to the ones above, but added ethnic–racial identity (dummy coded: 0 = African American/Black, 1 = Hispanic/Latino[a]) or gender identity (dummy coded: 0 = male, 1 = female) to the second step, all two-way interactions to the third step, and finally

the three-way interactions to a fourth step. In summary, none of the three-way interactions related to ethnic–racial identity were statistically significant, (BMI continuous: $-11.31 < \Delta F < -0.79$, $p > .15$; BMI categorical: $-9.62 < \Delta \chi^2 < -2.33$, $p > .33$; diet healthiness: $-2.05 < \Delta F < 0.50$, $p > .18$) and none of the three-way interactions related to gender identity were statistically significant (BMI continuous: $-1.83 < \Delta F < 1.20$, $p > .83$; BMI categorical: $1.24 < \Delta \chi^2 < 3.41$, $p > .11$; diet healthiness: $-1.31 < \Delta F < 0.91$, $p > .20$).

Second, to address the possible issue of shared variance by including siblings in the sample (see the Participants section), we removed participants who were siblings of a child participant ($n = 21$) as well as their respective parents' data, then reran all main analyses. In summary, the negative implicit Self-stereotyping × Self-esteem interactions for all three criteria were similar to the ones reported in the main analyses above (BMI continuous: $b = -16.37$, $p < .02$; BMI categorical: $b = -6.43$, $p = .06$; diet healthiness: $b = 1.48$, $p = .05$). Also similar to the main analyses across all three criterion variables, no significant interaction effects emerged between self-esteem and positive implicit self-stereotyping ($0.72 < b < 4.14$, $p > .16$), negative explicit self-stereotyping ($-0.56 < b < 0.20$, $p > .49$), and positive explicit self-stereotyping ($0.07 < b < 0.79$, $p > .28$).

General Discussion

Obesity in the United States and its physical health implications have disproportionally affected Latinx and Black children (Fagot-Campagna et al., 2000; Hales et al., 2017; Nesbitt et al., 2004; Ogden et al., 2014, 2016; Rosenbloom et al., 1999). To better understand this health issue, the present research adopted implicit social cognition theory and social–psychological frameworks of stigma and health to demonstrate the roles of negative implicit self-stereotyping and self-esteem in the diet and BMI of a sample of Latinx and Black children. Consistent with the main hypothesis, among Latinx and Black children with low self-esteem, negative implicit self-stereotyping was associated with higher body mass indices, the BMI weight categories overweight and obese, and less healthy diets. By comparison, among those with high self-esteem, these relations did not emerge. Finally, these results held even after controlling for parents' BMI, diet, and SES.

The present research adds to the literature on stigma and health in three ways. First, past research posits that the self and identity are major sources of an individual's health status (James, 1950; Oyserman et al., 2007; Stryker & Burke, 2000; Taylor et al., 2003), but past work does not explicate the stigma-based self and identity implicit cognitive processes that explain ethnic–racial individuals' health outcomes. The present research contributes to understanding these processes by demonstrating the conditions under which implicit self-stereotyping is related to an unhealthy diet and obesity. Second, we demonstrate that these processes are present around 9–12 years of age, a relatively early developmental period when children's self and identity are susceptible to stigma in their social environments (Phinney, 1989, 1992), and when an accelerated rate of obesity appears to emerge (Ogden et al., 2014, 2016). Finally, we demonstrate that the processes emerged on a measure of implicit self-stereotyping and not one of explicit self-stereotyping. This suggests that Latinx and Black children are not consciously aware of the impact of stigma on their self-concept

at the individual level and its potential role in unhealthy diets and obesity.

Implications for Health Disparities

Ethnic–racial physical health disparities are pervasive in the United States and identifying the factors that determine health disparities among ethnic–racial groups is a top and critical public health issue (Brondolo et al., 2012; Rivera, 2014; Robinson et al., 2017; Woolf et al., 2004). More broadly speaking, emergent research is documenting health disparities and their underlying processes (U.S. Department of Health & Human Services, Federal Register, 2007), but more work focused on children is needed, especially when compared to the relatively expansive work on adults (Cheng et al., 2009; Robinson et al., 2017). It is important to understand how early in the life-course health disparities emerge and what their underlying psychological and cognitive processes are (among other important factors, e.g., SES) because it may provide opportunities to intervene at a formative period of a child's health. Furthermore, intervening early in life can have long-term health implications because one's childhood health is a strong predictor of adulthood health. For example, and central to the present research, studies suggest that rates of overweight and obesity among Latinx and Black children appear to predict those of adults from the same ethnic–racial groups, and these adults have a greater chance of suffering from diabetes, coronary heart disease, and colon cancer, which are all risk factors of obesity (Dietz, 1998; Kleinfield, 2006; Must et al., 1992). Moreover, Latinx and Black children and adolescents who are stereotyped because of their ethnic–racial groups but who are also obese may additionally be the target of weight stigma and stereotypes (Tyler et al., 2009; Wang et al., 2020; Wigginton et al., 2009). Because they cause psychological and health harms and overall poor quality of life (for reviews, see Pont et al., 2017; Puhl & Latner, 2007), stigma and stereotypes related to weight in combination with those related to ethnicity and race may promote and maintain health disparities.

The present research identifies one potential social cognitive mechanism underlying the poor health-related outcomes of ethnic–racial stigmatized groups at an early developmental stage. By isolating mechanisms, specific interventions can be developed to address obesity in socially disadvantaged groups (Adler, 2009). Past general interventions target motivational strategies for engaging in healthy behavior (e.g., exercise more such as Michelle Obama's *Let's Move!* program for children; White House Task Force on Childhood Obesity, 2010) and changing the environment to facilitate healthy behavior (e.g., access to recreational facilities). The present study suggests that obesity can also be addressed by minimizing the impact of negative cultural stereotypes on the self-concept of stigmatized children.

One way to do so may be to change the local environment by enhancing the representation of successful and counter-stereotypical members from one's group; perhaps such an environmental intervention can attenuate the mental associations between the self-concept and stereotypes, yielding less self-stereotyping (Rivera & Benitez, 2016). Another intervention might be to remind individuals of their valued personal attributes (but unrelated to stereotypes); if such a self-affirmation can protect one's self-image from threats and even promote good health (e.g., Creswell et al., 2005), perhaps it can buffer the detrimental role of negative stereotypes

in the self-concept and, ultimately, its role in healthy eating behavior and obesity.

Limitations

Although our tested relations are consistent with theory and research, we acknowledge two limitations. First, the study's design was cross-sectional and correlational, so evidence for causality is not definitive. One might argue, for example, that obese Black and Latinx children are more likely to experience stressors associated with their physical health, which may make them more vulnerable to implicit self-stereotyping and eating poorly, especially if they have low self-esteem. To demonstrate cause-and-effect evidence, future research can adopt experimental designs that manipulate implicit self-stereotyping associations (e.g., using a subliminal priming procedure to present either stereotypes or non-stereotypes preceded by self-related primes in a between-participants design; see Lun et al., 2009) and test its effect on unhealthy versus healthy food choices. Also, longitudinal research following individuals over their life course could help determine the potential long-term causal role of implicit self-stereotyping in obesity.

Second, the internal consistency of two child measures, self-esteem and diet healthiness, were .62 and .64, respectively, which are levels of reliability that may raise concerns. However, Cronbach's alphas in the 0.60–0.70 range have been interpreted as acceptable (Ursachi et al., 2015; also see Nunnally & Bernstein, 1994) or questionable (George & Mallery, 2003), but not as poor ($.60 < \alpha < .50$) or unacceptable ($\alpha < .50$; George & Mallery, 2003). Furthermore, measures with six or less items (which was the case for the present measures of self-esteem and diet healthiness) tend to have less-inflated alphas (Cortina, 1993). Important to note that consistent with research on the moderating role of psychological resources and our a priori predictions, self-esteem buffered the relation between negative implicit self-stereotyping and all three health-related criterion variables, including one assessed with the measure of diet healthiness. Finally, self-reported measures of retrospective diet similar to the one used in the present research are related to BMI (CDC, 2018c, 2018d) and to food consumption assessed 6 years later (Conner et al., 2002).

Future Directions

As noted above, we demonstrate that the main hypothesis was supported with a measure of implicit (but not explicit) self-stereotyping, which has three suggestions for future research. First, this contribution highlights the importance of including measures of implicit social cognition in health research with children from stigmatized, socially disadvantaged, and low-status ethnic–racial groups. Including these measures may reveal processes and effects unbeknownst to researchers if they continue to rely on self-report measures of explicit social cognition alone. Second, when thinking about interventions, the role of conscious awareness should be considered. Although simply making individuals aware of implicit stereotyping and prejudice (e.g., implicit bias training) is insufficient to reduce their expression in the long-term (Forscher et al., 2017), it does appear that its awareness may circumvent its impact on downstream behavioral outcomes (see Dasgupta & Rivera, 2006). This research suggests that making children aware of stigma and its potential nonconscious effect on their self and identity may

break the circuit between implicit self-stereotyping and poor health. A self-affirmation may be another way to intervene when children are making eating-related behavioral decisions. According to self-affirmation theory, individuals have numerous sources of self-worth such as values and traits tied to their personal and group identities (Sherman & Cohen, 2006). When self-image is threatened by behavior in one domain (e.g., when stressful situations lead children to engage in uncontrolled eating and emotional eating; Nguyen-Rodriguez et al., 2009), an individual may draw from an alternative source of self-worth to restore the integrity of their overall self-concept and well-being. Consistent with this hypothesis, a self-affirmation promotes healthy eating and the avoidance of unhealthy eating (Cornil & Chandon, 2013; Harris et al., 2014).

Conclusions

The present research represents an extension to psychology's approach to understanding the health of stigmatized individuals. We highlight in particular the importance of examining self-stereotyping processes in physical health outcomes, particularly with children from stigmatized ethnic–racial groups. We drew from implicit social cognition theory and methodology to understand how these processes may operate outside of conscious awareness. Further, we demonstrate that the relation between implicit self-stereotyping and physical health-related outcomes is not obligatory; it depends on the psychological resources children possess. Altogether, this research contributes to understanding child health disparities, which is important to address because it is a social justice issue. That is, every child should have the right to enjoy optimal health regardless of their ethnic–racial identification because it can have long-term implications for functioning optimally in society.

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