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Ethnic Differences in Body Mass Index

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
Department of Psychology
College of Arts and Sciences
University of South Florida

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Dedication

This dissertation is dedicated to my parents, Anne and Jerry Vaughan, who have unfailingly supported me in every possible way in all of my academic pursuits. Their unwavering confidence in me motivated me to persist in completing this dissertation when my enthusiasm and determination were waning. I would also like to express gratitude for the enduring friendships of a select subset of my fellow psychologists-in-training, Susan Himes, Michelle LeVasseur, Kristen Wells, and Evelyn Alvarez, whose thoughtfulness and warmth have been great sources of solace and satisfaction during my graduate school years.

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ABSTRACT

The greater body mass of African American females relative to Caucasian females is a well-documented finding implicated in ethnic disparities in health outcomes. The principal aim of the current study was to evaluate a theoretical account that may explain ethnic differences in body mass index. The proposed theoretical account focused on appearance-related concerns regarding the desirability of a thin body type as motivation to engage in weight control behavior. It was hypothesized that Caucasians would evidence greater internalization of the thin ideal than African Americans, which would then be associated with greater dietary restriction and physical activity, thereby predicting lower body mass among Caucasians relative to African Americans. It was expected that this model would demonstrate greater applicability to individuals who lack constitutional thinness, i.e., individuals who have struggled with weight management in the past or at present.

The study's design was cross-sectional. African American (n = 113) and Caucasian (n = 633) undergraduate, unmarried, heterosexual females between the ages of 18 and 30 completed online questionnaires in which they provided information on their ethnicity, socioeconomic status, ethnic identity, thin-ideal internalization, the perceived romantic appeal of thinness, the importance of romantic need fulfillment, dietary restriction, physical activity, height, current weight, and their highest weight since attaining their current height. Structural equation modeling with LISREL 8.72 was used to evaluate the proposed model.

Support for hypotheses was mixed. Among the subset of participants categorized as lacking constitutional thinness, the relationship between ethnicity and body mass was mediated by thin-ideal internalization and the perceived romantic appeal of thinness, each of which contributed independently to dietary restriction, which in turn evidenced a curvilinear relationship with body mass. Results are consistent with the notion that ethnic differences in body mass may be partially accounted for by differences in standards for physical appearance, which may then motivate weight control behavior to a greater extent in Caucasians than African Americans.

Introduction

Background

Overweight and obesity, defined as a body mass index (BMI) greater than 25 and 30, respectively, have become very prevalent in the U.S., with recent epidemiological surveys of the population estimating that approximately 55% of adults qualify as overweight or obese (Flegal, Carroll, Kuczmarski, & Johnson, 1998; Kuczmarski, Carrol, Flegal, & Troiano, 1997). Weight problems plague African Americans at a rate disproportionately greater than that observed among Caucasians (Burke & Bild, 1996). Conversely, Caucasians carry a greater risk of developing eating disorders than African Americans (Dolan, 1991). Ethnic disparities in BMI are more pronounced among women than men, with 66.5% of African American females satisfying the definition of overweight or obesity, whereas 45.5% of Caucasian females fall into one of these categories (Flegal et al., 1998). In contrast, rates of overweight or obese are relatively comparable for African American and Caucasian males, with 57.5% of African American males and 59.6% of Caucasian males meeting criteria for overweight or obese. Additionally, in one five-year longitudinal study of changes in young adults' BMI over time, African American females' mean BMI was 26 at baseline, whereas Caucasian females' mean BMI was 23.1 at baseline; at the end of the five-year period, both groups had gained weight, but African American females had gained more weight than their

Caucasian counterparts: The mean BMI of African American females had increased by 2.2, while the mean BMI of Caucasian females had increased by 1.2 (Burke & Bild, 1996). In the current study, an explanation for these ethnic divergences in body weight among females will be proposed and evaluated. Among the many possible sources of motivation to manage weight that may be operative in producing the ethnic difference in BMI, the role of romantically relevant motivations in particular will be explored.

While genetics play a role in determining one's BMI, behaviors with a strong environmental influence, such as diet and exercise, have a tremendous impact on BMI and are believed to account for the dramatic upsurge in overweight and obesity that has occurred in the last two decades (Corsica & Perri, 2003). The role of environmental factors in influencing BMI is further emphasized by the fact that most weight-loss interventions utilize principles of behavioral modification to produce lifestyle alterations in dieting behavior and physical activity (Corsica & Perri, 2003). Dieting behavior or dietary restriction is defined as deliberate attempts to limit caloric intake to attain or maintain a desired weight (Stice, Mazotti, Krebs, & Martin, 1998), and physical activity consists of "any bodily movement produced by skeletal muscles that results in energy expenditure" (Caspersen, Powell, & Christenson, 1985, p. 126). To the extent that BMI reflects engagement (or a lack of engagement) in weight management practices such as dietary restriction and physical activity, then, it would be expected that Caucasians more frequently and reliably perform these weight management behaviors, both healthy and unhealthy, than African Americans. Empirical studies have corroborated this hypothesis, overwhelmingly demonstrating that Caucasian females are more likely than African American females to report engaging in weight management behaviors such as dieting

(Akan & Grilo, 1995; Gluck & Geliebter, 2002; Lowry, Galuska, Fulton, Wechsler, & Kann, 2002; Neff, Sargent, McKeown, Jackson, & Valois, 1997; Neumark-Sztainer, Story, Falkner, Beuhring, & Resnick, 1999; Rucker & Cash, 1992; White, Kohlmaier, Varnado-Sullivan, & Williamson, 2003) and physical activity (Dowda, Ainsworth, Addy, Saunders, & Riner, 2003; Neff et al., 1997; Neumark-Sztainer et al., 1999). Additionally, Caucasian females are more likely than African American females to report using diet pills, vomiting, and ingesting laxatives to control their weight (Lowry et al., 2002; Neff et al., 1997). Given the putative supremacy of these behavioral factors as mediators of BMI, researchers have sought to understand the different sources of motivation for weight control that may produce the observed ethnic difference in BMI.

A commonly espoused explanation for ethnic differences in motivations for weight management is that Caucasians place much greater emphasis on thinness in their standard of attractiveness than do African Americans, thus giving Caucasians a greater psychological incentive—that of satisfying the standard of physical attractiveness--to attain and maintain a low body weight (e.g., Adams et al., 2000; Flynn & Fitzgibbon, 1996; Mastria, 2002; Neff et al., 1997; Osvold & Sodowsky, 1993). While the terms Caucasian and African American refer first and foremost to categories of ethnicity, they also may connote different cultural milieus, as ethnicity is often a proxy for culture. By examining fashion models and sexual icons featured in the media, it is readily apparent that Caucasian females are presented with a physical ideal that is much thinner than that prescribed for African American females (Ruiz, Pepper, & Wilfley, 2004). Additionally, while the influence of the media and peers looms large in establishing the appearance standards internalized by Caucasian females, the influence of family members and other adult role models may figure more prominently in setting appearance standards adopted by African American females (Flynn & Fitzgibbon, 1996). Indeed, it has been suggested that the physical ideal featured in the media is so thin that it is impossible for the majority of women to achieve, with one estimate placing the fraction of women for whom such an ideal is a reality at 1 in 40,000 (Wolf, 1991). The internalization of this thin ideal, or acceptance of sociocultural standards of female thinness and attractiveness (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999), has been amply assessed. As expected, Caucasian females endorsed the thin ideal of physical attractiveness to a greater extent than did their African American peers: Caucasian females' selected a thinner ideal body size for both themselves (Powell & Kahn, 1995) and for their ethnic group (Perez & Joiner, 2003) than did African American females on a measure with differently sized silhouettes of the female figure.

In light of African American women's lower adherence to an ultra-thin standard of beauty, it is perhaps not surprising that, in spite of African American women's greater BMI, African American women express greater satisfaction with their bodies than do Caucasian women (Akan & Grilo, 1995). The waiflike physical ideal of Caucasians appears to be all but absent among African Americans, with some evidence suggesting that not only is there less emphasis on thinness in this group, but that larger African American women may actually be more positively viewed by others than thinner African American women (Wade & DiMaria, 2003). Other studies have found that thinness, as measured by BMI, is positively associated with self-perceived physical attractiveness among Caucasian women and not associated with physical attractiveness among African American women (Vaughan, Stewart, Ceo, & Sacco, 2003).

Further underscoring the pervasiveness of these different sociocultural standards of physical attractiveness are data demonstrating that African American males desire a female mate with a larger body size than that preferred by Caucasian males (Powell & Kahn, 1995; Sargent & Kemper, 1996). Moreover, in a cross-sectional study of dating behavior in college students, Caucasian females who reported a lower BMI had a greater likelihood of dating, whereas the BMI of females from other ethnic groups was not reliably predictive of their dating behavior (Vaughan, Stewart, & Sacco, 2004). Similarly, a prospective, longitudinal study of dating behavior in early adolescents revealed that Caucasian girls' likelihood of dating was prospectively predicted by their level of body fat, with girls who had less body fat being much more likely to date than their heavier peers (Halpern, Udry, Campbell, & Suchindran, 1999). Among African American girls, body fat was predictive of the likelihood of dating to the same extent only among girls whose mothers were college-educated; among African American girls whose mothers were not college-educated, body fat did not reliably predict dating behavior. This finding tentatively suggests that different standards of physical attractiveness may predominate within different socioeconomic subgroups of African Americans, with African Americans of a higher socioeconomic status having a higher degree of acculturation to the values and beliefs espoused by the Caucasian majority. More importantly, though, these results, in conjunction with the findings of Vaughan et al. (2004), illustrate that ethnic differences in standards of physical attractiveness are grounded in social reality, with behavioral data corroborating ethnic differences in males' self-reported preferences for particular body types. Thus, ethnic differences in physical attractiveness ideals are abundantly evident, with both men and women indicating that, among Caucasian women who aspire to be desirable, thinness is a commodity to be strived for, whereas among African American women, a thin body type confers no particular advantage in the pursuit of pulchritude.

Among women who place a high premium on being in a romantic relationship, it would be expected that, to the extent that physical attractiveness influences relationship status and to the extent that women believe that this is so, women would seek to engage in behaviors that enhance their physical attractiveness as a means of increasing their value in the eyes of prospective mates. In light of Caucasian women's greater internalization of the thin ideal, then, it seems that they should be more motivated than African American women to engage in weight management behaviors that will increase their chances of attaining the thin ideal, and consequently, enhance their desirability to existing and/or prospective mates. Moreover, there is some evidence to suggest that Caucasian females are more inclined to consider having a boyfriend important than African American females (Halpern et al., 1999). The combination of thin-ideal internalization and high valuation of having a significant other may translate into greater motivation to manage weight among Caucasian females relative to African American females. Evidence of Caucasian women's greater desire to control their body weight comes from studies showing ethnic differences in the predicted direction on the Drive for Thinness subscale of the Eating Disorders Inventory (EDI-DT; Garner, 1991), which assesses the extent to which one is motivated to attain and maintain a thin body, in samples of college-aged women (Rucker & Cash, 1992) and adolescent girls between the ages of 13 and 16 (Striegel-Moore et al., 2000). In the latter of these studies, a comparison of Caucasian and African American adolescent girls in the same BMI quintile (estimated using the distribution of the sample) revealed that, within each BMI quintile, Caucasian girls scored significantly higher on the EDI-DT subscale than their African American peers at all but the lowest BMI quintile (Striegel-Moore et al., 2000). This greater motivation to achieve the thin ideal, then, may inspire greater engagement in weight management behaviors.

Primary Aims and Hypotheses

In sum, ethnic differences in BMI and rates of overweight and obesity among women may be due, in part, to the different standards of physical attractiveness that characterize appearance ideals for Caucasian and African American females, which may in turn yield ethnic differences in weight management behaviors, thus accounting for the observed ethnic differences in BMI. While many of the aforementioned studies have examined different pieces of this puzzle, the pieces have yet to be connected to each other. Thus, the two principal aims of the current study are to: 1) replicate previous findings of ethnic differences in internalization of the thin ideal, weight management behaviors, and BMI, and 2) extend these findings by evaluating these variables in the context of an integrative model that may help to explain ethnic differences in BMI. Because young adulthood has been identified in previous research as a high-risk period for weight gain (Burke & Bild, 1996), the current study focused on women between the ages of 18 and 30. Focusing on a high-risk period for weight gain was intended to increase the likelihood that weight management behaviors and BMI would be characterized by a high degree of variability, which creates propitious conditions for examining relationships among the variables in the proposed model.

It was hypothesized that Caucasian females' greater internalization of the thin ideal would interact with the desire to be in a romantic relationship to produce greater levels of actual weight management behavior relative to African American females. That is, among women to whom being in a relationship is very important, believing that being thin is tantamount to being physically attractive should produce a greater desire to be thin and hence greater engagement in weight management behaviors, whereas among women to whom being in a relationship is not very important, endorsement of the thin ideal of physical attractiveness should be less predictive of weight management, as one of the principal reinforcements for being physically attractive—that of attracting prospective mates and/or keeping a current mate—is less operative. Caucasian females' more frequent engagement in weight management behaviors should in turn result in a lower BMI than that observed among African American females. This model was evaluated using structural equation modeling, a method of data analysis that is well-suited for evaluating complex models involving mediating and moderating relationships among latent variables.

An additional aim of this study is to attempt to make sense of counterintuitive findings from previous research. Dietary restriction has demonstrated a positive correlation with BMI (e.g., Stice, Mazotti, Krebs, & Martin, 1998), a finding that seems counterintuitive, as it would be expected that engaging in behaviors that keep caloric intake within reasonable limits should predict a lower BMI. However, closer scrutiny of some of the more popular dieting measures, such as the Dutch Eating Behavior Questionnaire—Restrained Scale (DEBQ-R; van Strien, Frijters, van Staveren, Defares, & Deurenberg, 1986), reveals that the items may be more pertinent to people who are overweight or who struggle to control their weight insofar as they contain references to weight loss efforts (e.g., “When you have put on weight do you eat less than you usually do?”) and conscious effort to control one’s weight (e.g., “Do you try to eat less at mealtimes than you would like to eat?”). For the thin person who has never put on weight or eats a reasonable amount of food at mealtimes without feeling deprived or having to make a conscious effort to do so, these items are less relevant, and therefore, at second glance, it should not be particularly surprising that endorsing these items to a lesser extent is associated with a lower BMI. Individuals who fit this description may be characterized as constitutionally or persistently thin (Slof, Mazzeo, & Bulik, 2003); these individuals apparently possess an innate predisposition to maintain a healthy weight without having to make a conscious effort to do so. If members of the constitutionally thin category were excluded from an analysis of the association between dieting behaviors and BMI, or if only individuals who currently or previously had struggled to achieve and/or maintain a healthy weight were included, it is possible that the direction of the relationship between dieting and BMI would be reversed, so that greater endorsement of strategies to keep caloric intake within reasonable limits would be predictive of a lower BMI. That is, among individuals who must make a conscious effort to control their weight, greater use of the strategies for limiting caloric intake should predict a lower BMI. This hypothesis was evaluated in this study by testing the aforementioned hypothesized model in a multigroup analysis in which groups of constitutionally thin women were compared to those who lack constitutional thinness. It was expected that this model would be better suited to account for ethnic differences in BMI among individuals to whom weight control does not come easily, i.e., the group of individuals lacking in constitutional thinness.

Secondary Aims

As the current model is predicated on the assumption that behavior is largely motivated by the basic biological drive to procreate, an additional variable was included to assess more directly the perception that thinness increases one's romantic appeal to men, as endorsement of this belief would represent strong motivation to attain a thin stature in order to satisfy the underlying biological motivation to procreate. This variable, the perceived romantic appeal of thinness, was assessed with a measure created specifically for the current study; the construct validity of this newly created measure was evaluated by comparing it to extant measures of similar constructs, including the Ideal Body Stereotype Scale--Revised (IBIS-R; Stice, Ziemba, Margolis, & Flick, 1996), the General Internalization subscale of the Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3; Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004), and the Perceived Sociocultural Pressure Scale (PSPS; Stice & Agras, 1998). The perceived romantic appeal of thinness served as a proximal predictor of weight management behaviors in the structural model.

Although not specified in the aforementioned theoretical explanation of ethnic differences in body mass index, an interaction between dietary restriction and physical activity was explored in the current study. This interaction was evaluated to ascertain if dietary restriction and physical activity combine to produce a synergistic effect on body mass index, such that one of these in the absence of the other may exert a negligible influence on body mass index, while both in concert may exert a much greater influence on body mass index. The cross-sectional design of the current study precludes assessment of the causal, longitudinal relationship implicit in this hypothesis, but analyzing this interaction in the current context can at least indicate whether the pattern of results is consistent with this proposed relationship, thus providing a justification for its inclusion in subsequent longitudinal investigations of similar phenomena.

In addition to the variables delineated above, socioeconomic status was included in the model as a covariate, as this variable has been shown to be associated with both weight-related attitudes (Wardle et al., 2004) and ethnicity and could therefore possibly underlie ethnic differences in BMI. In addition, inclusion of socioeconomic status also allowed for an evaluation of ethnicity as a moderator of the relationship between socioeconomic status and beliefs about the importance of thinness to one's physical attractiveness and romantic desirability to males. The possibility that ethnicity moderates this relationship is suggested by the finding that, among African American adolescent females, body fat was predictive of the likelihood of dating only for females who had college-educated mothers, whereas body fat was predictive of dating for Caucasian females independently of the educational attainment of their mothers (Halpern et al., 1999). In a similar vein, socioeconomic status may be more strongly predictive of beliefs about the importance of thinness to one's physical attractiveness in African American females than their Caucasian peers; this hypothesis was explored in the current study.

Ethnic identity, or the extent to which one esteems their ethnic group and bases their self-concept on their ethnic group membership, was also included in the model as a covariate. It was anticipated that African Americans who identify more strongly with their ethnic group would be less susceptible to sociocultural pressures to adopt and strive for the thin ideal, as the thin ideal appears to permeate Caucasian culture to a much larger extent than African American culture; based on this assumption, it was expected that ethnic identity would account for the relationship between ethnicity and sociocultural standards of appearance (i.e., internalization of the thin ideal). It was also expected that ethnicity would moderate the relationship between ethnic identity and sociocultural standards, such that greater ethnic identity would be associated with lower internalization of the thin ideal in African Americans, whereas ethnic identity would fail to predict internalization of the thin ideal in Caucasians. Although this hypothesis is intuitively appealing, it should be noted that the relationship between acculturation (i.e., identification with the larger majority group) and eating attitudes has failed to emerge in previous research on ethnic differences in eating behaviors and attitudes (Akan & Grilo, 1995; Aruguete, Nickleberry, & Yates, 2004). Thus, although the observed relationship between ethnicity and eating attitudes has not been wholly attributable to the extent of identification with the norms of one's ethnic group in past research, the current study will evaluate these relationships to ascertain the reliability of this finding across samples.

Summary

The hypothesized structural model, depicted in Figure 1 below, is a mediational model in which ethnic differences in BMI are posited to be accounted for by the chain of variables elucidated above. In other words, it was hypothesized that if African Americans internalized the thin ideal to the same extent that Caucasians do, they would likely report commensurate levels of weight management practices and, as a result, comparable BMIs. It was not expected that the magnitudes of the relationships among the posited motivational variables (e.g., internalization of the thin ideal, the valuation of communal need fulfillment, the interaction between internalization of the thin ideal and the valuation of communal need fulfillment, and the perceived romantic appeal of thinness), weight management behaviors, and body mass index would vary as a function of ethnicity, i.e., that race would moderate their relationships. However, the fit of the model was evaluated in both ethnic groups to ascertain the accuracy of the assumption that the model fits both ethnic groups equally well. The fit of the model was also evaluated in groups consisting of constitutionally thin individuals and individuals lacking in constitutional thinness, but substantive differences were expected to emerge in this group comparison, particularly with regard to the relationship between dietary restriction and body mass; it was expected that the fit of the model would be superior in the group of individuals lacking in constitutional thinness relative to those who are constitutionally thin. The hypothesis that the relationship between ethnicity and body mass would be mediated by the variables delineated above was evaluated within each of the constitutional thinness subgroups, with the expectation that mediation would occur within the group of individuals who lack constitutional thinness and would not occur within the group of individuals who are constitutionally thin.

An important caveat to mention is that the hypothesized model is not intended to constitute a comprehensive explanation of ethnic differences in BMI. That is, there are likely other factors not included in the model, such as weight management self-efficacy, barriers to effective weight management, and other sources of motivation to manage weight, such as the desire to avert stigmatization in nonromantic contexts (e.g., in the workplace) as a result of being obese, that contribute to the ethnic disparity in BMI among females. As noted earlier, this model focuses primarily on romantically relevant motivations to manage weight as the critical variable underlying the ethnic difference in BMI. In light of the basic universal human drive to mate and reproduce, it was expected that, to the extent that appearance-related concerns have implications for one's likelihood of accomplishing these basic biological purposes of life, this model would hold much explanatory power.

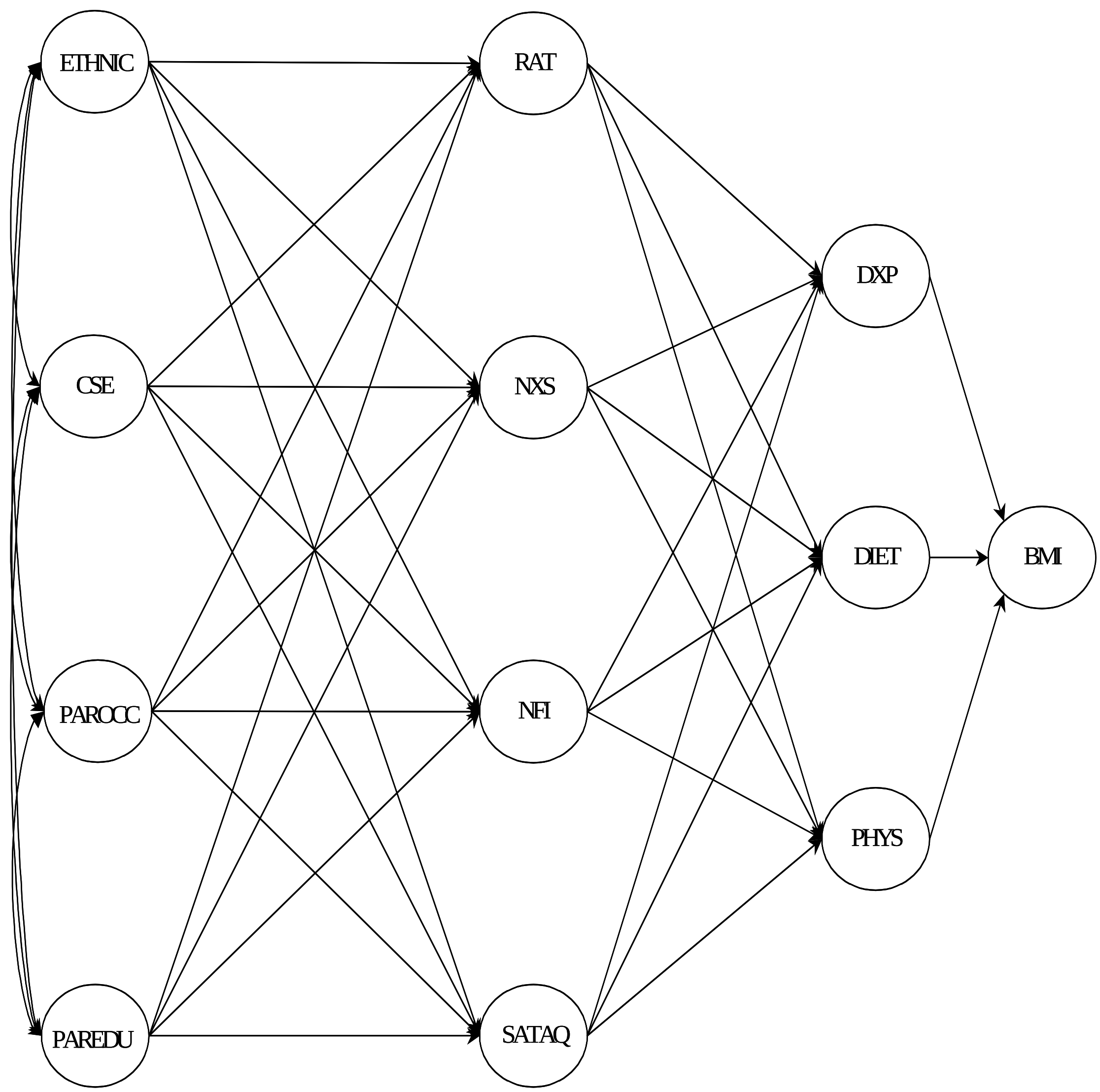

Figure 1. Structural model hypothesized to explain ethnic differences in body mass index. ETHNIC = ethnicity, CSE = ethnic identity, PAROCC = parent occupation, PAREDU = parent education, RAT = perceived romantic appeal of thinness, NFI = valuation of romantic need fulfillment, SATAQ = thin-ideal internalization, NXS = interaction between NFI and SATAQ, DIET = dietary restriction, PHYS = physical activity, DXP = interaction between DIET and PHYS, BMI = body mass index.

Method

Participants

Participants were undergraduate students recruited from psychology courses at the University of South Florida during the Fall 2005 and Spring 2006 semesters. Inclusion criteria for the current study were the following: female, Caucasian or African American, heterosexual, unmarried, and between the ages of 18 and 30. Students were awarded extra credit points in their psychology courses for participating.

Eight hundred and fifty students completed the study. Of the 850 participants, 104 (12%) were deleted listwise from analyses due to missing data and/or invalid or implausible responses. Specifically, 3% (n = 27) provided incorrect responses to items assessing attention, 0.4% (n = 3) provided data with more than 25% of their responses missing, 2% (n = 13) reported implausibly high amounts of time spent exercising (i.e., > 16 hours of exercise per day), 2% (n = 18) reported an invalid value for their height, 3% (n = 23) had an implausibly low value for their current, highest, or lowest body mass index, 0.4% (n = 4) had an implausibly high value for their current, highest, or lowest body mass index, 3% (n = 27) had a range of body mass index values that were inconsistently ordered relative to each other (e.g., lowest body mass index ever was higher than current or highest body mass index), and 0.9% (n = 8) indicated that both their mother's and father's occupation and educational attainment were "unknown" or "not applicable." The data of 19 participants were notable for more than one of the aforementioned errors, and thus the sum of observations referenced in the specific categories delineated above is 123, rather than 104.

Of the 746 participants whose data lacked discernible errors and were therefore included in data analysis, 15% (n = 113) were African American and 85% (n = 633) were Caucasian. The average age for the sample was 19.93 years (SD = 2.20 years), and participants' class standing was characterized by the following proportions: 36% (n = 272) freshmen, 21% (n = 158) sophomores, 21% (n = 160) juniors, 20% (n = 152) seniors, and 0.5% (n = 4) non-degree seeking students. Mean body mass index was 23.20 (SD = 4.47) for Caucasians and 25.99 (SD = 6.20) for African Americans; these descriptive statistics very closely resemble those reported in a large, national multisite study of weight gain trends in young adult females in the same age range (Burke & Bild, 1996). With regard to relationship status, 15% (n = 110) of participants were single, 26% (n = 119) were casually dating, 43% (n = 321) were exclusively dating, 12% (n = 88) were cohabiting, 5% (n = 34) were engaged, and 0.3% (n = 2) were divorced. As expected for a college-aged sample, the great majority of participants (97%, n = 724) did not have children. Also consistent with expectation for a college student sample, the majority of participants reported that their fathers (63%, n = 468) and mothers (69%, n = 513) had at least one to three years of college. In a similar vein, the majority of participants classified their fathers' (61%, n = 456) and mothers' (52%, n = 390) occupations in one of the top three categories (e.g., major professional, lesser professional, minor professional) of a list of occupations ranked by status (Hollingshead, 1958), suggesting that most participants' parents were gainfully employed in jobs that require some skill or specialization.

To address concerns about differential attrition, available data on the demographic characteristics of the 104 participants who were excluded from analyses are reported here, and the results of significance testing of comparisons between the participants who were included and excluded are summarized. With regard to ethnicity, 37% (n = 38) of excluded participants were African American. The average age of excluded participants was 19.95 years (*SD* = 1.99 years), and the breakdown of their class standing was the following: freshmen (32%, n = 33), sophomores (21%, n = 22), juniors (19%, n = 20), seniors (25%, n = 26), and non-degree seeking students (n = 0). Twenty-one percent (n = 22) classified themselves as single, 21% (n = 22) were casually dating, 37% (n = 38) were exclusively dating, 13% (n = 14) were cohabiting, 5% (n = 5) were engaged, and 0 were divorced. The vast majority of participants were childless (95%, n = 99). Slightly over half of participants reported that their fathers (54%, n = 56) and mothers (51%, n = 53) had at least one to three years of college. Slightly under half of the sample (44%, n = 47) described their fathers' occupation as falling in one of the three categories with the highest occupational status, while slightly over half (51%, n = 53) characterized their mothers' occupation as belonging in one of the three categories with the highest occupational status. Excluded and included subjects significantly differed on race [χ^2 (1) = 30.68, p = 0.00], suggesting that the ratio of African American to Caucasian participants was significantly greater among excluded participants relative to included participants. In addition, the groups demonstrated significantly different categorical distributions on father occupation [$\chi^2(10) = 43.58$, p = 0.00], mother occupation [$\chi^2(10)$ = 35.33, p = 0.00], and mother education [$\chi^2(8) = 64.79$, p = 0.00]. It appeared that, in general, the participants who provided completely viable data had parents who were characterized by a higher level of educational attainment and occupations with greater status. Groups did not differ significantly on any other demographic variables.

Because of the disproportionately high rate of attrition (25%) among African American participants relative to Caucasian participants (9%), it appeared that the results obtained on the African American group may be characterized by particularly limited generalizability to other African American females, even within a college student population. To address this concern, African American participants whose data were included in analyses were compared to those whose data were excluded from analyses on all demographic variables and the variables included in the proposed structural model. The only variable on which these two groups differed significantly was the valuation of romantic need fulfillment, which was significantly higher among African American females whose data were included (M = 4.12, SD = .73) than African American females whose data were excluded (M = 3.85, SD = .68), $t(149) = -2.00$, $p = .05$. It is not clear why this difference emerged, and the most parsimonious explanation would seem to be that it is a Type 1 error. Thus, despite the high rate of attrition among African American females, it appears that the African Americans who were included in analyses were generally comparable to the African American females who were excluded from analyses.

Measures/Variables

Because structural equation modeling (SEM) was used to evaluate the hypotheses of this study, the items from some measures were divided up to create multiple indicators of the same construct. Thus, some of the scoring procedures typically used with several of these measures were not applicable in this study. Where appropriate, the division of a measure into multiple indicators and alternative scoring strategies that allow for SEM was described.

Demographics

Basic demographic information, such as age, ethnicity, sexual orientation, relationship status, class standing, and parental status were assessed by self-report. The latent exogenous variable ethnicity (ETHNIC) was represented by a single indicator (ETHNIC1) that was dummy coded (Caucasian = 1, African American = 0). In the absence of a precedent on which to base the estimation of measurement error for the indicator, measurement error was estimated at .05. The questions posed in this section are depicted in Appendix A.

Socioeconomic Status

The Hollingshead Index of Social Position (ISP; Hollingshead, 1958) was used to assess socioeconomic status. The ISP consists of two items, one that assesses the highest level of education attained and one that assesses current occupational status. Because the sample consisted of undergraduate students who have approximately similar levels of educational attainment and who, for the most part, have not yet enjoyed an occupational status of note, the socioeconomic status of their parents was used to represent their socioeconomic status. The current occupation and highest level of educational attainment of both primary mother and father figures were assessed. Parents' occupational status was represented by a single latent variable with a single indicator created by averaging the occupational status of mothers and fathers; the same was done for parents' educational attainment. To accommodate the requirements of SEM, these variables were conceptualized as continuous variables. The labels that correspond to the latent variables for parents' occupational status and parents' educational attainment are PAROCC and PAREDU, respectively, and the labels for their indicators are referred to as PAROCC1 and PAREDU1. In the absence of a precedent on which to base estimation of measurement error for these single indicators, measurement error for both indicators was assumed to be .05. The scales are contained in Appendix B.

To assess parents' occupations, participants were asked to select one of eleven response options that most aptly described the current occupation for their primary mother figure and (in a separate question) their primary father figure; the seven occupational choices provided in the ISP are ranked by status, with 1 corresponding to the category "Higher executive of large company, proprietor, or major professional," and 7 corresponding to the category "Unskilled employee." Two response options were added to the scale in the current study to assess whether the participant's parent was unemployed and receiving public assistance or unemployed and not receiving public assistance, and these were coded as 8 and 9, respectively, on the rank-ordered scale. The response options "Unknown" and "Not applicable—no father (or mother) figure was present" were also included. Possible values for the indicator PAROCC1 ranged from 1 to 9, and the instrument was recoded so that higher scores on this scale indicate greater occupational status.

The scale assessing parents' highest level of educational attainment consisted of nine response options, two of which were the "Unknown" and "Not applicable" categories included in the measure of parents' occupational status. The seven remaining response options were rank-ordered from 1 to 7 in terms of level of educational attainment, with 1 indicating that the parent in question possesses a professional degree and 7 indicating less than seven years of school. The resultant values for the indicator PAREDU1 ranged from 1 to 7, and the instrument was recoded so that higher scores on this scale indicate a higher level of educational attainment.

Given that the response options “Unknown” and “Not applicable” options have no meaning with reference to the rank-ordered list of occupations or levels of educational attainment, the data of participants who selected this option for one or both parental figures were modified for inclusion or excluded entirely from analyses. As described above, participants who had selected the response option “Not applicable” or “Unknown” for both parents were excluded from analyses. For participants who selected the “Not applicable” response option for one parent but had provided viable data on the other parent’s occupational status and educational attainment, the occupational status and educational attainment of the parent for which viable data were available served alone as the score for parents on those two variables. Ninety-one participants (33 African American, 58 Caucasian) selected the “Not applicable” option in reference to one parent’s occupation and educational attainment but provided a viable response in reference to the other parent’s occupation and educational attainment. For participants who selected the “Unknown” response option for one parent but had provided viable data on the other parent’s occupational status and educational attainment, the means of the occupational status and educational attainment for the parent in question were imputed within the participant’s ethnic group, and this value was then averaged with the values of the other parent’s occupational status and educational attainment to obtain scores on the variables parents’ occupational status and educational attainment. Twenty-three participants (10 African American, 13 Caucasian) selected the “Unknown” option to describe the occupational status and educational attainment of one parent but provided viable data for the other parent.

Body Mass Index

Self-reported height and weight were used to calculate body mass index (kg/m^2), which is an index of adiposity. Self-reported height and weight were highly correlated (*r* = .98, .99) with actual height and weight in a sample of undergraduates from the same university (Vaughan, Stewart, & Sacco, 2004), indicating that self-reported body mass index is fairly accurate. Past research has demonstrated the validity of body mass index as a measure of adiposity (Garrow & Webster, 1985; Kraemer, Berkowitz, & Hammer, 1990). Due to limitations of the online data collection system (Experimentrak) used in the current study, it was not possible to solicit open-ended responses from participants regarding their weight and height, and therefore this information had to be obtained by framing these questions in a multiple choice format in which the number of response options could not exceed 11. Working within these parameters, an alternative method of inquiring about height and weight, displayed in Appendix C, was devised.

Body mass was represented by a latent variable (BMI) with a single indicator, body mass index (BMI1). Because BMI has only a single indicator, the error term was fixed using a reliability estimate obtained from previous research. To determine the error term for the indicator, the correlation between self-reported body mass index and actual body mass index recorded by a nurse in a previous study (*r* = .97, Attie & Brooks-Gunn, 1989) served as the reliability estimate for BMI1, and measurement error was therefore estimated to be .03.

Constitutional Thinness

Respondents were classified as constitutionally thin or not based on their current BMI and their history of BMI since attaining their current height. As indicated above, participants were asked to indicate their current weight and height to allow for the calculation of current BMI. They were also asked to provide an estimate of the highest weight they have experienced since attaining their current height. Again, due to programming limitations of Experimentrak, information on participants' greatest weight since attaining their current height was solicited in a series of questions that were a less direct, less parsimonious means of obtaining this information than the usual way of requesting the information in an open-ended format; the questions created to ascertain this information are contained in Appendix C.

It was expected that, as most females have attained their current (e.g., full-grown) height by the age of 13 or 14, the time frame on which respondents reported began with early adolescence. The beginning of adolescence, which often coincides with or closely follows the onset of puberty, is a time during which many girls experience an increase in adiposity and begin to struggle with their weight (Striegel-Moore, 1993). To be considered constitutionally thin, both respondents' current body mass index and highest body mass index experienced since attaining their current height had to be less than 23. To be categorized as lacking constitutional thinness, individuals were required to have a body mass index of 23 or greater and/or a history of having a body mass index that was 23 or greater since attaining their current height. A threshold of 23 was selected for body mass index because this places individuals approximately fifteen pounds above the ideal body mass index of 21, which has been identified as ideal based on data from actuarial tables (Jeffery, French, & Rothman, 1999). Although individuals with a body mass index of 23 have not officially crossed the threshold of the overweight category, being or having been in the past fifteen or more pounds above one's ideal weight suggests that thinness is a condition that cannot be attained effortlessly, and these are the individuals most likely to avail themselves of intentional weight control methods such as dietary restriction and exercise. By using past weight status in addition to current weight status to inform the determination of constitutional thinness, individuals who have been overweight in the past and learned effective weight control practices that place them close to their ideal body mass index at present can be more accurately categorized as lacking constitutional thinness. Based on this operationalization of constitutional thinness, it was treated as a dichotomous variable. Constitutionally thin individuals were assigned a value of 0, and individuals lacking constitutional thinness were assigned a value of 1 in the current analyses.

Valuation of Romantic Need Fulfillment

The Need Fulfillment Inventory (NFI; Prager & Buhrmester, 1998), contained in Appendix D, was used to assess the importance of psychological needs that are commonly fulfilled in a relationship. The importance of having these needs fulfilled taps into the desire to be in a romantic relationship, which would allow for fulfillment of these needs. Although the NFI consists of two primary factors, communal and agentic needs, only the communal needs scale will be administered in the current investigation, as these are the needs that are usually fulfilled in the context of a romantic relationship. The communal needs subscale has demonstrated excellent internal consistency in previous research, (alpha = 0.91, Prager & Buhrmester, 1998), and it demonstrated excellent internal consistency in the current study as well (alpha = 0.96).

The communal needs factor consists of another set of factors, including intimacy, sexual fulfillment, nurturance, love and affection, and fun and enjoyment. Respondents rated the importance of the needs on a scale with options ranging from 1 (Not at all important) to 5 (Extremely important). The appropriate preposition (e.g., to, by, with, or from) followed by the words “a romantic partner” were added to all of the items except those on the sexual fulfillment subscale (because the fulfillment of these needs with a romantic partner is implicit in the nature of the items) to make the items specific to the importance of communal need fulfillment in a romantic relationship. Thus, the measure was modified to assess the importance or valuation of romantic need fulfillment.

To create indicators that were interchangeable with one another, i.e., equally representative of the latent variable (NFI) they measure, the items from each of the five factors were divided up to form three indicators so that each indicator consisted of approximately equal numbers of items from each lower-order factor of the communal needs factor; this resulted in two indicators that consisted of eight items each and one indicator comprised of nine items. A score for each indicator was obtained by computing the mean for the items that comprise each indicator. Each of the three indicators evidenced a high level of internal consistency: Cronbach’s alpha for NFI1 = 0.89, Cronbach’s alpha for NFI2 = 0.88, Cronbach’s alpha for NFI3 = 0.87. High scores on these item parcels indicate that the fulfillment of romantic needs is very important to the respondent.

Thin-Ideal Internalization

Two measures of internalization of the thin ideal were included to determine which of the measures had greater factorial validity and was therefore better suited to represent the construct of thin-ideal internalization in the structural model. The Ideal-Body Stereotype Scale—Revised (IBIS-R; Stice et al., 1996), contained in Appendix E, and the General Internalization subscale of the Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3; Thompson et al., 2004), contained in Appendix F, were both included.

On the IBIS-R, participants were asked to report their agreement with beliefs about which physical attributes of women connote physical attractiveness. Statements were rated on a 5-point Likert scale with options ranging from 1 (strongly disagree) to 5 (strongly agree). Excellent levels of internal consistency reliability, as well as convergent, discriminant, concurrent, and predictive validity have been documented in past investigations of this scale (Stice et al., 1996). This 10-item measure demonstrated a high level of internal consistency in the current investigation (Cronbach's alpha = 0.82). High scores on this measure connote greater thin-ideal internalization.

Although the IBIS-R was originally designed to capture thin-ideal internalization, more recent psychometric investigations of the measure have indicated that this measure assesses awareness of appearance norms, rather than one's own subscription to the physical ideal of thinness (Thompson et al., 2004). The SATAQ-3 has been offered as a more construct valid alternative to the IBIS-R. In the current study, the General Internalization subscale of the SATAQ-3 was evaluated as an alternative to the IBIS-R. The psychometric properties of the SATAQ-3, including good convergent validity with measures of body image and eating disturbance and excellent internal consistency (alphas

= 0.92, 0.96) for the General Internalization subscale in particular, have been established in previous research (Thompson et al., 2004). As expected, internal consistency for the General Internalization subscale of the SATAQ-3 in the current study was very high (alpha = 0.96). This subscale consists of nine items in which the respondent rated her endorsement of the desire to resemble and tendency to compare her physical appearance to those of prominent media figures. Response options range from 1 (Definitely disagree) to 5 (Definitely agree); high scores indicate greater thin-ideal internalization. The General Internalization subscale will be referred to as SATAQ from here on out.

On the basis of a confirmatory factor analysis conducted on the SATAQ and IBIS-R, the results of which are described in greater detail in a later section, the SATAQ was deemed superior to the IBIS-R due to the greater consistency of its metric invariance across racial groups. Thus, the SATAQ was used to represent thin-ideal internalization in the structural model. The item parcels created from the nine-item SATAQ each contained three items, and scores on the item parcels were obtained by computing the mean of the items for each parcel. The internal consistency coefficients for the SATAQ1, SATAQ2, and SATAQ3 were uniformly excellent, with alphas ranging from 0.87 to 0.91.

Perceived Pressure to Be Thin

The Perceived Sociocultural Pressure Scale (PSPS; Stice & Agras, 1998), displayed in Appendix G, was used to assess perceived pressure to be thin from the sociocultural influences of parents, peers, and the media. The adequacy of this instrument's psychometric properties, including internal consistency (alpha = 0.88), test-retest reliability (r = 0.93), and predictive validity, have been demonstrated in previous research

(Stice & Agras, 1998). Internal consistency in the current study was comparably high (alpha = 0.87). This scale consists of eight items that are rated on a 5-point Likert scale with response options ranging from 1 (Never) to 5 (Always); respondents indicate the extent to which they feel pressure to be thin or lose weight from each type of sociocultural influence and the extent to which they have "noticed a strong message" from the influence to "have a thin body." High scores on this scale connote a high level of perceived pressure to be thin.

Romantic Appeal of Thinness

This variable was included to capture women's beliefs about the importance of thinness to romantic desirability or appeal to men. This latent construct, referred to as RAT, was represented by three indicators derived from a newly created measure specifically designed to assess this construct. The measure, displayed in Appendix H, consists of four items that assess women's perceptions of the influence of their thinness on their attractiveness to men. Each item has response options ranging from 1 (Definitely disagree) to 5 (Definitely agree), with high scores representing strong endorsement of the belief that thinness enhances one's romantic appeal in the eyes of men. The scale evidenced high internal consistency in the current investigation (alpha = 0.89); evidence of its construct validity is described in detail in a later section. The first of the item parcels, RAT1, was constructed by computing the mean of the first two items on the scale; its alpha was 0.78, suggesting that the items are assessing the same construct. Each of the other two indicators consists of only a single item, thus precluding an assessment of their internal consistency.

Latent Interaction

The interaction between the importance of romantic needs and internalization of the thin ideal is represented by a latent variable (NXS) with a single indicator SATAQNFI. Although it is possible to generate a total of nine indicators for the product term by multiplying all of the indicators from each of the product term's constituent variables with each other (3 indicators x 3 indicators = 9 indicators), others have suggested that it is not necessary to use all of these indicators, maintaining that a single indicator produces perfectly satisfactory results (Joreskog & Yang, 1996). Thus, the latent variable representing an interaction between these two variables will have only a single indicator.

To compute the product term SATAQNFI, the items on the NFI were averaged, as were the items on the SATAQ, and the resultant mean scores for each of these measures were then multiplied to form SATAQNFI. Prior to forming the product term, the main effects were centered in order to reduce multicollinearity among the predictor variables; centering the main effects before computing the product term reduces multicollinearity among the predictor variables (Aiken & West, 1991). The error variance for a single indicator product term x:z for a latent variable XZ is estimated using the formula provided by Ping (1996):

$$\varepsilon_{x:z} = [(\lambda_{x1} + \lambda_{x2} + \lambda_{x3})/3]^2 Var(X)[(Var(\varepsilon_{z1}) + Var(\varepsilon_{z2}) + Var(\varepsilon_{z3}))/3^2] + [(\lambda_{z1} + \lambda_{z2} + \lambda_{z3})/3]^2 Var(Z)[(Var(\varepsilon_{x1}) + Var(\varepsilon_{x2}) + Var(\varepsilon_{x3}))/3^2]$$

where X and Z are the latent variables for the main effects and x_1, x_2, x_3, z_1, z_2, z_3 correspond to the indicators for the main effects. Because product terms were formed separately within each subgroup (e.g., African American, Caucasian, constitutionally thin, not constitutionally thin) that was evaluated in multigroup modeling analyses, the error variance for SATAQNFI was estimated separately within each of these subgroups. The resultant error variances for SATAQNFI within each group were as follows: Caucasian = 0.02, African American = 0.04, not constitutionally thin (NCT) = 0.03, constitutionally thin (CT) = 0.02. Ping's (1998) method of estimating the error variance for an interaction effect is part of a strategy designed to reduce the positive bias associated with parameter estimates for product terms. Other components of this strategy include constraining the factor loading for a product indicator ($\lambda_{x:z}$) to be the product of the means of the factor loadings of the indicators for the main effects X and Z, as well as constraining the variance of XZ (Var(XZ)) to be a function of the variances of X and Z and the covariance between X and Z. The formula used to estimate the factor loading for a product indicator is:

$$\lambda_{x:z} = [(\lambda_{x1} + \lambda_{x2} + \lambda_{x3})/3][\,(\lambda_{z1} + \lambda_{z2} + \lambda_{z3})/3]$$

Based on this formula, the factor loadings for SATAQNFI within each of the groups were as follows: Caucasian = 1.00, African American = .96, NCT = 1.03, CT = 1.11. The formula for the variance of a latent interaction effect XZ is:

$$\mathrm{Var}(XZ) = \mathrm{Var}(X)\mathrm{Var}(Z) + \mathrm{Cov}(X,Z)^2$$

The variances of NXS were constrained to be the following values: Caucasian = .42, African American = .70, NCT = .57, CT = .33. The variances for the latent main effects, error variances for the indicators of the latent main effects, and factor loadings of the indicators of the latent main effects were obtained using a two-step estimation technique in which a linear-terms-only measurement model (i.e., absent the interaction effect) was estimated, thereby yielding the values necessary to calculate the variance of the latent interaction effect and error variance and factor loading for the product indicator (Ping, 1998). These values were then fixed in the estimation of the structural model, which included the latent interaction effect.

Dietary Restriction

Two measures, the Dutch Eating Behavior Questionnaire—Restraint subscale (DEBQ-R; van Strien et al., 1986) and Dietary Intent Scale (DIS; Stice, Shaw, & Nemeroff, 1998), were used to create indicators for the latent construct dietary restriction (DIET). The DEBQ-R and DIS were highly correlated (r = .90) in a previous study (Stice, Mazotti, et al., 1998), indicating that they are good candidates to be indicators of the same latent construct. The DEBQ-R and DIS are contained in Appendices I and J, respectively. The DEBQ-R contains 10 items with response options ranging from 1 (never) to 5 (always), with high scores indicating greater dietary restriction. To be consistent with the DIS, the instructions were modified to request that respondents report on dietary restriction over the past six months. Past research has confirmed the DEBQ-R's reliability (Stice, Mazotti, et al., 1998; van Strien et al., 1986) and validity (van Strien et al., 1986). Most importantly, scores on the DEBQ-R have been shown to predict reduced caloric intake (van Strien et al., 1986). In the current study, internal consistency for the DEBQ-R was excellent (alpha = 0.95).

The DIS consists of 9 items with response options ranging from 1 (never) to 5 (always), where high scores connote greater dietary restriction. Based on recommendations from previous research, the instructions specified a time frame of six months over which respondents reported on their dieting behavior (French & Jeffery, 1994). The DIS has demonstrated excellent internal consistency reliability (alpha = .95) and test-retest reliability over a one-month period (r = .92) (Stice, Mazotti, et al., 1998). Additionally, the convergent validity of the DIS has been established through its negative association with fat-gram consumption (Stice, Mazotti, et al., 1998). Internal consistency for the DIS in the current study was excellent (alpha = 0.93).

To create item parcels for the latent construct DIET, items from the DEBQ and DIS were combined to generate three item parcels that consisted of approximately equal numbers of items from the DEBQ and DIS; this resulted in two item parcels that consisted of six items each and a third item parcel that consisted of seven items. Scores on the item parcels were obtained by computing the mean of item responses. Internal consistencies for each of the three resultant parcels, DIET1, DIET2, and DIET3, were high, ranging from 0.89 to 0.92.

Physical Activity

The short version of the International Physical Activity Questionnaire (IPAQ; Craig et al., 2003) was used to assess the time spent engaging in physical activities of varying intensity during the course of everyday life over the last seven days. Due to limitations of Experimentrak, the questions could not be asked using the open-ended response format from the design of the original version; thus, the questions were modified so that they could be asked in a multiple choice format. The modified version of the IPAQ appears in Appendix K. The short version of the IPAQ consists of items pertaining to days of the last week and time spent during the day engaged in vigorous physical activity (e.g., activities that “take hard physical effort and make you breathe much harder than normal”), moderate physical activity (e.g., “activities that take moderate physical effort and make you breathe somewhat harder than normal”), and walking. A total score can be obtained by multiplying the amount of time spent engaging in each type of physical activity (vigorous, moderate, and walking) per week by a weight for its level of intensity and then summing each of these products to get a total score. The weight that corresponds to each category of physical activity is: vigorous-8, moderate-4, walking-3.3. By weighting the activity for its level of intensity, participants who engage in more intense levels of physical activity are given more “credit” for the amount of exercise they completed than another participant who exercised for the same amount of time but engaged in a less intense type of exercise. Days, hours, and minutes of exercise per week in each category of intensity were summed and then divided by 60 so that the amount of time spent engaging in each type of exercise was expressed as hours per week of exercise; participants who reported having engaged in more than 16 hours of exercise per day for all three categories combined were excluded from analyses, as this amount of exercise is highly implausible. Subsequently, the value for each of the three categories of intensity was multiplied by the appropriate weight, and the products were summed to obtain a score for exercise. The test-retest reliability, criterion, and concurrent validity of the short version of the IPAQ were established in a large-scale validation study conducted in 14 research centers in 12 countries (Craig et al., 2003).

Physical activity will be represented by a latent variable PHYS with PHYS1 (the label used to refer to the IPAQ throughout the remainder of the paper) as its lone indicator. Because it is not appropriate to compute internal consistency for a single-item measure, the test-retest reliability obtained in the validation study of the IPAQ was used to estimate the error term. Test-retest reliability or "repeatability," which was established by administering the IPAQ to respondents at two different times not more than eight days apart, was estimated to be 0.75 (Craig et al., 2003); thus, measurement error for PHYS1 was fixed at .25.

Ethnic Identity

Two subscales from the Collective Self-Esteem Scale (CSE; Luhtanen & Crocker, 1992), the Private Esteem and Ethnic Identity subscales, were used to measure ethnic identity. These subscales are contained in Appendix L. Private esteem refers to beliefs about the "goodness" of one's ethnic group, whereas the ethnic identity subscale taps the extent to which ethnic group membership influences the respondent's self-image. In previous investigations of the psychometric properties of the CSE, the individual subscales and the parent scale demonstrated high internal consistencies (range of alphas = 0.83 to 0.88), and adequate test-retest reliability over a six-week period (overall scale: $r = 0.68$; Private Esteem subscale: $r = 0.62$; Ethnic Identity subscale: $r = 0.68$) was established (Luhtanen & Crocker, 1992). The convergent validity of the Private Esteem and Ethnic Identity subscales has also been evidenced by moderate, positive correlations with other measures of similar constructs, such as personal self-esteem and the importance of being active in socially important causes, respectively (Luhtanen & Crocker, 1992).

The Private Esteem and Ethnic Identity subscales consist of four items each; alphas for all eight items together and for each subscale in the current study were high, ranging from 0.82 to 0.86. Items were rated on a 7-point Likert scale with response options ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). Three item parcels (CSE1, CSE2, CSE3) that were comprised equally of items from these two subscales were created; one indicator consisted of two items, and the other two indicators consisted of three items each. The items for each parcel were averaged to obtain a score on the indicator. Internal consistencies for these item parcels ranged from low (e.g., CSE1 alpha = 0.36) to adequate (CSE2 alpha = 0.65, CSE3 alpha = 0.57). High scores on the item parcels represent positive regard for and importance of one's ethnic group in assessing one's self-worth.

Procedure

Data collection transpired online using Experimentrak. The Experimentrak filter was programmed to recruit only female participants between the ages of 18 and 30 for the study, and the other inclusion criteria (relationship status, sexual orientation) were assessed in the questionnaires themselves; participants who did not meet these latter two requirements were excluded from analyses.

Due to the nature of online data collection, participants were able to complete the questionnaires on a computer in any location that afforded them access to the internet. Completion of questionnaires took approximately 60 minutes. Due to limitations of Experimentrak, it was not possible to randomize the order in which questionnaires were completed. The order of questionnaires was as follows: Dietary Intent Scale, Dutch Eating Behavior Questionnaire—Restraint subscale, International Physical Activity Questionnaire, Need Fulfillment Inventory, Ideal Body Stereotype Scale—Revised, Romantic Appeal of Thinness scale, SATAQ-3 General Internalization subscale, Perceived Sociocultural Pressure Scale, current weight, height, history of weight, demographics questions, and Collective Self-Esteem subscales. To assess the extent to which participants were attending thoughtfully to the questionnaires rather than responding randomly, four simple items with right and wrong answers (e.g., What is the fourth letter in the word HEART?) were inserted throughout the questionnaires. This strategy allowed for more accurate identification of respondents who failed to attend appropriately to item content so that they could be excluded from analyses.

Results

Mechanics of Structural Equation Modeling in LISREL

Overview of Analytic Strategy

Structural equation modeling with latent variables was used to evaluate the fit of the proposed model. Models were estimated with LISREL 8.72 (Joreskog & Sorbom, 2005). Prior to evaluating the hypotheses of the current study, it was necessary to conduct preliminary analyses to ascertain whether the estimation of the structural model should proceed. Preliminary analyses included the identification and listwise deletion of outliers and out-of-range values (described in the Method section), assessment of univariate and multivariate normality, and the examination of bivariate relationships among indicators. In addition, based on the recommendation of Kline (1998), the tenability of the measurement model was assessed prior to evaluating the structural model, as the adequacy of the proposed measurement scheme is a prerequisite for establishing the adequacy of the proposed structural model. That is, problems with the measurement model may pose problems for the estimation of the structural model, thereby precluding a valid test of the structural model, and thus it is important to verify the validity of the measurement model before proceeding with the evaluation of the structural model. When conducting multigroup analyses, it is also helpful to assess *multigroup metric invariance* to ascertain whether the latent constructs are comparably measured in each group. Before estimating the structural model within each subgroup and in the overall sample, the viability of the measurement model was assessed, and when multigroup analyses were involved, the assumption of multigroup metric invariance was evaluated.

The first phase of data analysis involved a confirmatory factor analysis (CFA) to evaluate the construct validity of RAT, the measure of the romantic appeal of thinness that was created specifically for the current study. The next and primary phase of data analysis concerned the evaluation of the hypothesized structural model and associated tests of moderators and mediators. Rather than beginning with the evaluation of the proposed structural model in the overall sample, the model was first evaluated within each of the grouping variables (e.g., ethnicity and constitutional thinness) that were under consideration as potential moderators of the hypothesized relationships among the latent variables. By examining the model separately within the specified subgroups prior to pooling the data and conducting a single-group analysis, an informed decision about whether the data from the entire sample should be pooled at all could be made; that is, if the model fit varies considerably across groups, it may not make sense to conduct a single-group analysis in which all of the data have been pooled, as important relationships may be obscured and the model would not be expected to evidence adequate fit in the overall sample if the model failed to evidence adequate fit in a sizeable subset of the sample. Thus, the hypothesized structural model was first evaluated within each ethnic group. The hypothesis that the relationships among the latent variables specified in the structural model would demonstrate a comparably good fit across Caucasian and African American groups, i.e., would demonstrate *structural invariance*, was tested.

Next, the hypothesized structural model was evaluated with constitutional thinness serving as the grouping variable; the two groups compared in this group were the group of individuals lacking in constitutional thinness and the constitutionally thin group; from here on out, these groups will be referred to as the NCT (not constitutionally thin) and CT (constitutionally thin) groups for the sake of brevity. The structural invariance of the proposed model across the NCT and CT groups was assessed to evaluate the hypothesis that the model would evidence a superior fit in the NCT group relative to the CT group, both in terms of its global fit and the magnitude of the path coefficients. The hypothesis that the relationship between ethnicity and body mass index is mediated by appearance-related motivational factors and weight loss behaviors was then evaluated within the NCT and CT groups using Baron and Kenny's (1986) recommendations for assessing mediation and tests of indirect effects. Finally, based on the results of the models evaluated within each of the aforementioned subgroups, the evaluation of the model in the overall sample was deemed inappropriate in light of the structural noninvariance of the NCT and CT groups. The procedures used to conduct the types of analysis mentioned here are described in greater detail below.

Estimation Method

Based on the recommendations of Jaccard and Wan (1996) for conducting SEM when product terms, such as the product term created by the interaction of thin-ideal internalization and the importance of romantic needs, are present, maximum likelihood (ML) estimation was used. An assumption of ML is that of multivariate normality, thus rendering it more restrictive than some of the alternative methods of estimation. However, alternative approaches that are "distribution-free" and do not require multivariate normality, such as a weighted least squares (WLS) estimator, instead require very large sample sizes (e.g., $N > 1{,}000$) and therefore are less useful to the psychological researcher whose sample size is limited by practical constraints.

Given the assumption of multivariate normality, ML may seem inappropriate in the current context because a product term, which corresponds to the latent interaction effect for thin-ideal internalization and romantic need fulfillment, created from two normally distributed variables will almost invariably have a nonnormal distribution. Univariate normality is a necessary but not sufficient condition for the establishment of multivariate normality (Jaccard & Wan, 1996; West, Finch, & Curran, 1995), and thus the presence of a product indicator with a nonnormal distribution will preclude multivariate normality.

The principal consequences of violating multivariate normality when using a normal theory estimator such as ML are: 1) an increase in the value of chi-square and the associated probability of erroneously rejecting a model that is correct, 2) modest underestimation of fit indices such as the CFI, and 3) underestimation of standard errors for parameter estimates accompanied by an inflation of the Type 1 error rate for significance tests of parameter estimates (West et al., 1995). Although these hypothesized consequences of multivariate nonnormality on model estimation have been empirically demonstrated (West et al., 1995), considerable controversy surrounds the extent to which a departure from normality should be considered problematic and the extent to which different methods of estimation (e.g., ML, WLS) are robust to violations of normality (Jaccard & Wan, 1996; Olsson, Foss, Troye, & Howell, 2000). Some Monte Carlo studies designed to assess the effects of departures from nonnormality on model estimation have indicated that, for ML, the effect of nonnormality on parameter estimates is nominal (Finch, West, & MacKinnon, 1997). In addition, ML has demonstrated robustness to moderate deviations from normality in the estimation of empirical fit of a model (Chou, Bentler, & Satorra, 1991). Moreover, relative to other estimator options such as GLS and WLS, ML has evidenced less sensitivity to varying degrees of skewness and kurtosis in the assessment of empirical and theoretical model fit (Olsson et al., 2000). The effect of nonnormality on model estimation using ML has also been shown to be negligible as long as very few of the indicators have distributions that are univariate nonnormal (Ping, 1995). Thus, it appears that concerns regarding the effect of nonnormality on model estimation for ML may be exaggerated. However, the aforementioned aspects of model fit and significance testing that may be distorted by nonnormality are discussed, and associated concerns are addressed.

With regard to the proposed effect of nonnormality on the chi-square statistic, given that the sample size in the current study is relatively high and, as a result, the power for rejecting the null hypothesis is high, the probability of a correct model being rejected even under conditions of multivariate normality is high; thus, to the extent that the chi-square statistic is unduly influenced by sample size, and therefore fails to provide a veridical depiction of the adequacy of the model's fit, then, the effect of multivariate nonnormality on the value of chi-square is less troubling. In addition, although other fit indices may be underestimated, the degree of underestimation is relatively minor even in the presence of severe nonnormality, with only a 3 or 4% downward bias evidenced by the Comparative Fit Index (CFI) when the model has been correctly specified (West et al., 1995). CFI is recommended as a less biased fit index under conditions of multivariate nonnormality (West et al., 1995). Thus, the strong likelihood of the rejection of chi-square, irrespective of the degree of multivariate nonnormality, coupled with empirical evidence suggesting that ML estimation functions adequately in the presence of multivariate nonnormality, suggests that deviations from multivariate normality are less problematic for the current investigation than they might appear at first blush. With regard to the issue of negatively biased standard errors and positively biased parameter estimates under the condition of multivariate nonnormality, it should be noted that others who have evaluated the viability of an ML estimation approach with a nonnormally distributed product term have reported success in obtaining unbiased parameter estimates (Jaccard & Wan, 1996), again suggesting that concerns about nonnormality may be overstated.

To ascertain the degree of univariate and multivariate nonnormality for variables in the current study, PRELIS was used to calculate univariate skewness and kurtosis coefficients for each of the indicators and multivariate skewness and kurtosis (i.e., Mardia's coefficients) for all of the indicators collectively. Normality was evaluated separately for each subgroup (e.g., Caucasian, African American, not constitutionally thin, constitutionally thin) and for the overall sample for each set of variables to be analyzed. Because the significance tests for univariate and multivariate normality reported in PRELIS tend to be overly sensitive to sample size and therefore indicate statistically significant skewness and kurtosis even in the presence of minor deviations from normality (Jaccard & Wan, 1996), significance testing for normality was deemed an inaccurate representation of the normality of data. To supplant significance testing as an index of univariate normality, an alternative method of assessing univariate normality was employed. Based on the findings of Monte Carlo studies, Curran, West, & Finch (1996) have prescribed general thresholds for skewness and kurtosis values at which a variable's distribution can no longer be classified as univariate normal. Accordingly, the skewness of a distribution becomes moderately nonnormal when it exceeds a value of approximately two and severely nonnormal when it exceeds a value of three (Curran et al., 1996); the kurtosis of a distribution is considered moderately nonnormal when it exceeds a value of seven and severely nonnormal when it exceeds a value of 21 (Curran et al., 1996). Thus, a variable's distribution qualifies as normal if its skewness is less than two and its kurtosis is less than seven. Analogous alternatives to significance testing for the assessment of multivariate normality are lacking, as no clear guidelines exist for classifying Mardia's coefficients for multivariate skewness and kurtosis as problematic based on the magnitude alone (Jaccard & Wan, 1996); nonetheless, these values will be presented for the benefit of the curious reader.

The absence of comparable guidelines for classifying the degree of departure from multivariate normality on the basis of the magnitude of Mardia's coefficients, in conjunction with the limitations of significance testing for multivariate normality, preclude an effective assessment of the degree of multivariate nonnormality. As multivariate normality cannot exist in the absence of univariate normality for any indicators, the assumption of multivariate normality cannot be said to be satisfied if any indicator is univariate nonnormal. Multivariate normality is, therefore, extremely unlikely to hold in the presence of a product term, which is almost always nonnormally distributed. Thus, the aforementioned evidence attesting to the robustness of ML in the presence of multivariate nonnormality is adduced in support of the valid and appropriate use of ML estimation under conditions of multivariate nonnormality.

LISREL Matrices

The structure of the model is communicated in LISREL via a set of matrices that correspond to different components of the model. LISREL estimates parameters for matrix elements that are assigned a value of 1; imputing a value of 0 in the matrix for a given parameter fixes that parameter estimate at zero. Matrices are denoted by Greek notation; each of these matrices, their corresponding Greek notation, and the aspects of the model to which the matrices and their elements correspond are described below in Table 1.

Table 1

Summary of LISREL Matrices and Greek Notation

Matrix Title	Matrix Symbol	Element Symbol	Model Components
Lambda X	Λ_x	λ_x	Paths from exogenous variables to their indicators
Lambda Y	Λ_y	λ_y	Paths from endogenous variables to their indicators
Theta Delta	Θ_δ	θ_δ	Error terms of indicators for exogenous variables and correlations among these error terms
Theta Epsilon	Θ_ε	θ_ε	Error terms of indicators for endogenous variables and correlations among these error terms
Phi	Φ	ϕ	Variances and covariances for exogenous variables
Gamma	Γ	γ	Causal paths from exogenous to endogenous variables
Beta	B	β	Causal paths from endogenous to endogenous variables

Table 1 (Continued)

Matrix Title	Matrix Symbol	Element Symbol	Model Components
Psi	Ψ	ψ	Disturbances for endogenous variables and correlations among disturbances
Kappa	K	κ	Exogenous variable means
Alpha	A	α	Endogenous variable means
Tau-X	T_x	τ_x	Intercept for the regression of observed indicators for exogenous variables on the exogenous variable
Tau-Y	T_y	τ_y	Intercept for the regression of observed indicators for endogenous variables on the endogenous variable

Model Fit Indices

Numerous fit indices exist by which to evaluate the fit of a given model. Model fit in the current investigation was evaluated using a variety of fit indices chosen to represent the three extant classes of fit indices. Each class of fit indices utilizes a different approach to the evaluation of model fit, and convergence of fit indices from all three classes indicating tenable model fit buttresses support for the model (Jaccard & Wan, 1996).

Fit indices belonging to the first class are based on calculation of the differences in predicted and observed covariances and variances (Jaccard & Wan, 1996). The traditional chi-square test (χ^2), goodness-of-fit index (GFI), and standardized root mean square residual (standardized RMR) were selected to represent the first class of fit indices. The traditional chi-square test is a significance test that evaluates the null hypothesis that the model fit is perfect in the population. However, given the high improbability of obtaining perfect model fit in the population and the excessive sensitivity of the chi-square statistic to sample size (i.e., the null hypothesis is likely to be rejected if the sample size is high even if model fit is perfect in the population), several researchers recommend use of alternative fit indices that provide an assessment of the degree of model fit and are less influenced by sample size. One such fit index, the GFI, ranges from 0 to 1, with higher values suggesting better model fit; a GFI greater than 0.90 suggests a model whose fit is good. The standardized RMR, which represents the average discrepancy between the predicted and observed correlations, also ranges from 0 to 1, but lower values are indicative of better fit. A standardized RMR lower than .08 suggests good fit of the model (Hu & Bentler, 1999).

Fit indices in the second class penalize the researcher for specifying a large number of parameter estimates, as additional paths tend to improve the fit of the model while compromising parsimony of the model. The root mean square error of approximation (RMSEA) was chosen from this class of fit indices. Smaller values convey better model fit; general guidelines for the evaluation of this fit index suggest that an RMSEA less than .08 is indicative of adequate model fit, while an RMSEA less than .05 is indicative of good model fit (Browne & Cudek, 1993).

The third class of fit indices contrasts the absolute fit of the model to a competing model that is specified a priori or arbitrarily imposed on the data (Jaccard & Wan, 1996). The comparative fit index (CFI), which compares the absolute fit of the model to a null model that assumes an absence of correlations among the observed variables, was chosen from this class of fit indices. According to Jaccard and Wan (1996, p. 88), the CFI is a "well-behaved index of model fit, especially in small sample situations." The CFI ranges from 0 to 1, with larger values implying better model fit. A CFI above .90 is suggestive of good model fit.

In sum, the models will be evaluated using the traditional chi-square statistic, GFI, standardized RMR, RMSEA, and CFI; however, comparisons of fit among stacked models do not yield GFI or standardized RMR, and thus only the chi-square statistic, RMSEA, and CFI values will be reported when comparing stacked models.

Measurement Model

Evaluation of the measurement model provides information about the extent to which the observed variables or indicators load on their latent factors. The sum of squared loadings for all indicators corresponding to a particular latent variable is equivalent to the squared multiple correlation (R^2) for the latent variable. To estimate the measurement model, the latent variables can all be treated as latent exogenous variables, regardless of their role in the structural model, and covariances can be specified among all of the latent exogenous variables. Thus, in LISREL, specification of the Λ_x, Φ, and Θ_δ matrices is sufficient to estimate the measurement model. For latent variables with multiple indicators, it is necessary to fix the unstandardized factor loading for one of the indicators to one in order to set the scale for the latent variable. For latent variables with a single indicator, it is necessary to fix measurement error; if available, reliability estimates from previous research can serve as a precedent for the estimation of measurement error, and if not, measurement error is arbitrarily estimated (i.e., 5% would likely be considered a reasonable estimate of measurement error).

Multigroup Measurement Invariance

The assumption of measurement invariance, in which the measure is assessing the same construct in both groups, must be empirically demonstrated prior to using the measure to compare the groups (Byrne, 1998). The assumption of measurement invariance may fail to be satisfied as a result of group differences in interpretations of items, which would ultimately translate into disparities in the way the construct itself is measured across groups. The consequence of violating the assumption of measurement invariance is that between-group comparisons on the measure will fail to reflect true group differences on the construct itself, but rather will represent artifacts of measurement. Thus, satisfying the assumption of measurement invariance is integral to establishing the integrity of the measure as a culturally sensitive instrument and obviating errors in interpretation of findings obtained with the measure.

As the hypotheses of the current study require analysis of covariance structures, the facets of measurement invariance of predominant importance in the current study are configural invariance and metric invariance. *Configural invariance* refers to the consistency of the factor structure (i.e., number of factors and collections of items that load on them) across groups, and *metric invariance* refers to the equivalence of factor loadings across groups. If both covariance and latent means structures are the focus of analysis, then scalar invariance should also be evaluated prior to conducting analyses of latent means structures (Byrne, 1998). *Scalar invariance* refers to the equivalence of indicator intercepts across groups.

Configural invariance is assessed by estimating a model in which data for the two groups in question are pooled (i.e., group models are stacked) and all of the matrices are freely estimated; estimation of this model produces one set of fit indices that describes the adequacy of the hypothesized factor structure across groups, and a model that fits the data well implies configural invariance. The model estimated to assess configural invariance then serves as a baseline model for the evaluation of metric invariance.

As metric invariance pertains to the equivalence of factor loadings across groups, it is tested by constraining the Λ_x matrices to be equal across groups and then observing the significance of the deterioration in the fit of the model as a result of imposing these equality constraints. If the change in chi-square is significant, the assumption of metric invariance is rejected. The particular source(s) of noninvariance can then be identified by imposing an equality constraint on each λ_x coefficient one at a time and examining the associated change in chi-square relative to the baseline model; a significant degradation of the fit of the model indicates that the λ_x coefficient in question is noninvariant.

To assess scalar invariance, a baseline model is estimated in which the λ_x coefficients that are known to be invariant are constrained to be equal across groups. Next, while continuing to impose these equality constraints, a model is estimated in which the T_x matrices are also constrained to be equal across groups, and the significance of the degradation of the fit of the model produced by imposing these additional constraints is examined to determine whether the assumption of scalar invariance has been satisfied. If the fit of the model is significantly degraded, then the assumption of scalar invariance has not been met. The source(s) of noninvariance can subsequently be identified by freeing each τ_x element one at a time to determine if relaxing this restriction improves the fit of the model. If the model is significantly improved by allowing the intercept estimate in question to vary across groups, then the intercept estimate has demonstrated noninvariance. It is important to note that items whose λ_x coefficients are noninvariant are automatically deemed scalar noninvariant, as scalar invariance cannot exist in the absence of metric invariance.

Although complete metric invariance is optimal for the evaluation of the structural model across groups, it is not essential that the entire Λ_x matrix demonstrate multigroup invariance. If the assumption of metric invariance is not completely satisfied for a scale, it is still possible to have partial invariance, which exists if at least one item of the scale is invariant across groups. Under partial invariance, the structural model can be estimated and its integrity preserved by allowing the matrix elements that are not invariant to vary freely across groups.

Structural Model

Estimation of the structural model involves both estimation of the measurement model and path analysis, in which paths are specified to connect the latent variables in the manner delineated in the hypotheses. Global fit indices provide information about the goodness-of-fit of the structural model overall, and standardized path coefficients, which are interpreted in the same way as standardized regression coefficients, provide information about the strength and direction of relationships among the latent variables.

Several matrices must be specified in LISREL to estimate the structural model, including the Λ_x, Λ_y, Θ_δ, Θ_ε, Γ, B, Φ, and Ψ matrices.

Multigroup Structural Invariance

Multigroup structural invariance refers to the equivalence of relationships among latent variables across two or more groups. Structural noninvariance is indicative of a moderating effect, in which the path coefficient for a pair of latent variables varies as a function of the grouping variable.

To evaluate multigroup structural invariance, it is first necessary to establish a baseline model. Having established measurement invariance across groups in the previous analysis, the baseline structural model is estimated with the Λ_x and Λ_y matrices constrained equal across groups, while the Γ and B matrices are freely estimated. Structural invariance is then tested by conducting tests in which the Γ and B matrices are constrained equal across groups one at a time and the fit of the model is then examined to ascertain whether imposing equality constraints on each of these matrices significantly degrades it. If imposing equality constraints on the Γ or B matrix produces a significant degradation in the fit of the model relative to the baseline model, then at least one of the structural relationships among the latent variables is noninvariant, and additional tests must be conducted in the manner described above to identify the noninvariant element or elements of the matrix in question. Path coefficients that vary significantly across groups imply a moderating effect of the grouping variable on the relationship between the latent variables.

Mediation

Conceptually, mediation of the effect of an independent variable on a dependent variable occurs when the effect of the independent variable is exerted on the dependent variable through an intervening variable (Baron & Kenny, 1986). In the simplest mediational model with only one intervening variable, mediation is established if the four following conditions are satisfied (Baron & Kenny, 1986): 1) The independent variable and dependent variable are correlated with each other (this demonstrates that there exists an effect or relationship to be mediated), 2) The independent variable is correlated with the putative mediator, 3) When regressing the dependent variable on the independent variable and the mediator simultaneously, the mediator is significantly predictive of the dependent variable, and 4) The effect of the independent variable on the dependent variable is reduced to zero in the presence of the mediator (this step is necessary only to establish complete mediation—partial mediation occurs if the first three steps are satisfied but this one is not).

In the current study, the model under examination consists of multiple mediational pathways. Consistent with the method for assessing mediation in a simple model, when evaluating mediation in structural equation modeling, it is first necessary to establish that the independent variable (i.e., ethnicity) is correlated with the dependent variable (i.e., body mass). Thus, formal tests of mediation were conducted only if there was an effect to be mediated such that ethnicity and body mass were significantly correlated with one another. After establishing that the independent variable is significantly correlated with the dependent variable, the indirect effect of the independent variable on the dependent variable is estimated in the presence of the direct effect of the independent variable on the dependent variable. The indirect effect can be computed by multiplying the path coefficients for all paths that are present in the mediational chain or pathway connecting the two latent variables. If there is more than one mediational pathway linking the two variables, as is true of the current model, the products of the path coefficients for each mediational pathway can be summed to obtain the total indirect effect (Bollen, 1989). To determine the proportion of the effect that is mediated through the proposed intervening variables, a ratio of the total indirect effects to the total effect is computed, where the total effect of one latent variable on another is the sum of the total indirect effect and the direct effect (Bollen, 1989). This proportion was calculated in the current study to ascertain how effectively the proposed mediational model in its entirety accounted for the relationship between ethnicity and body mass.

Individual mediational pathways (i.e., specific indirect effects) that were comprised uniformly of significant path coefficients, thereby satisfying Steps 2 and 3 of the prerequisites for mediation, were then scrutinized in greater detail to ascertain their contribution to the total indirect effect. To this end, for each of the specific indirect effects that satisfied this criterion, a ratio of the specific indirect effect to the total indirect effect was computed. The significance of the specific indirect effects that satisfied the criteria for mediation were also evaluated using the Sobel test (Sobel, 1982). The Sobel test generates a Z statistic based on the unstandardized path coefficients and standard errors for each of the paths that comprise the mediational pathway. The Z statistic indicates the significance of the indirect effect of the independent variable on the dependent variable ($Z > 1.96$ is significant at $p < .05$). When using the Sobel test to evaluate the significance of the indirect effects in structural equation modeling, it is necessary to establish the independence of the parameters (i.e., path coefficients) that comprise the indirect effect under scrutiny (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). To justify use of the Sobel test in the current set of analyses, the independence of the parameters was assessed by examining the parameter correlations produced by LISREL.

Construct Validity of RAT

Overview

To assess the construct validity of RAT, a confirmatory factor analysis in LISREL was conducted on the items from the RAT, SATAQ, IBIS, and PSPS. The purpose of this CFA was two-fold: 1) to demonstrate that the RAT, a newly designed measure, constitutes a scale that is distinct from other extant scales measuring similar constructs, and 2) to determine whether the assumption of measurement invariance is satisfied for the RAT across ethnic groups. Confirmatory factor analysis was chosen over exploratory factor analysis because a factor structure for each of the measures has already been hypothesized, and the goal of the current analysis is to examine the validity of this proposed factor structure. Exploratory factor analysis, in contrast, serves to reveal the factor structure in the absence of a preconceived theory specifying the nature of the factors.

Normality Assessment

Prior to conducting a CFA on the RAT, SATAQ, IBIS, and PSPS, it was necessary to assess univariate and multivariate normality. Normality was examined separately within each ethnic group. The magnitude of the univariate skewness and kurtosis coefficients was evaluated based on the recommendations of Curran et al. (1996) to estimate the degree of nonnormality inherent in the item distributions. Among Caucasians, univariate skewness coefficients in absolute value ranged from 0.04 to 1.02, and univariate kurtosis coefficients in absolute value ranged from 0.004 to 1.56, thus suggesting that all of the item distributions should be categorized as normal according to the prescriptions of Curran et al. (1996). Mardia's coefficient for the multivariate skewness value in the Caucasian group was 115.24 ($Z = 47.98$, $p = 0.00$), and the multivariate kurtosis value for this group was 1211.76 ($Z = 25.71$, $p = 0.00$). Among African Americans, univariate skewness coefficients in absolute value ranged from 0.014 to 1.50, while univariate kurtosis coefficients in absolute value ranged from 0.008 to 1.63, again indicating that all of the item distributions are most aptly characterized as normal. Mardia's coefficient for the multivariate skewness value in the African American group was 341.74 ($Z = 8.88$, $p = 0.00$), and the multivariate kurtosis value for this group was 1067.08 ($Z = 5.39$, $p = 0.00$). Based on the univariate normal distributions suggested by the categorization scheme offered by Curran et al. (1996), then, the data for both groups are suitable for SEM.

Factorial and Convergent Validity of RAT

To demonstrate the empirical distinctiveness of the RAT relative to the SATAQ-3, IBIS-R, and PSPS, CFA was used to evaluate a four-factor model separately within each ethnic group using a maximum likelihood method of estimation. The model did not fit the data as well as was anticipated; the model was rejected in both groups (Caucasians: $\chi^2 = 3835.94$, 428 *df*, $p = 0.0$; African Americans: $\chi^2 = 1163.15$, 428 *df*, $p = 0.0$), and other fit indices less sensitive to sample size were similarly suggestive of a fit that was less than optimal in both groups (Caucasians: RMSEA = 0.11, CFI = 0.91, standardized

RMR = 0.08, GFI = 0.72; African Americans: RMSEA = 0.13, CFI = 0.86, standardized RMR = 0.11, GFI = 0.59).

To identify potential sources of model misfit, modification indices were inspected. The modification indices revealed that allowing the error variances for several items within the IBIS, SATAQ, and PSPS to correlate would produce a dramatic improvement in the estimate of χ^2; of note, modification indices for the RAT did not indicate any problems, suggesting that no modifications were warranted. Examining the items in question on the IBIS, SATAQ, and PSPS revealed that the pairs of items were very similarly worded; for example, one such pair of items on the IBIS read "Slim women are more attractive" and "Slender women are more attractive." Thus, given the remarkable similarity in wording of the items, it is not surprising that the items share common sources of nonrandom error orthogonal to the variance common to all IBIS items.

Based on the areas of improvement identified by the modification indices, the model was then respecified to allow correlations between the error variances for the similarly worded pairs of items on the IBIS, SATAQ, and PSPS. Correlated error variances were specified for eight pairs of items on the IBIS, four pairs of items on the SATAQ, and seven pairs of items on the PSPS. The model continued to be rejected within each group (Caucasians: χ^2 = 1177.93, 409 *df*; *p* = 0.0; African Americans: χ^2 = 653.04, 409 *df*, *p* = 0.00), but χ^2 decreased substantially in both groups, and other fit indices similarly suggested a marked degree of improvement in the fit of the model as a result of these modifications (Caucasians: RMSEA = 0.05, CFI = 0.98, standardized RMR = 0.05, GFI = 0.90; African Americans: RMSEA = 0.07, CFI = 0.95, standardized RMR = 0.08, GFI = 0.74). The fit indices other than χ^2 conveyed that the model fit the data fairly well among Caucasians, but the model appeared to fit the data less well among African Americans. Within-group and common metric standardized factor loadings (λ_x) for both groups are displayed in Table 2, and factor correlations or standardized covariances (ϕ) for both groups are displayed in Table 3. Of note, λ_x coefficients were uniformly high in both groups on the SATAQ, whereas the IBIS evidenced several items with λ_x coefficients less than .40 in both groups, suggesting that its factorial validity is less sound than that of the SATAQ.

Table 2

Within-group Standardized Factor Loadings for the IBIS, SATAQ, PSPS, and RAT by Ethnicity

	Within-Group Standardized Factor Loadings		Common Metric Standardized Factor Loadings	
Ethnicity	C	AA	C	AA
Factor/Item		IBIS		
IBIS1	0.80_{b}*	0.55_{b}*	0.79	0.60
IBIS2	$0.33_{a,b}$*	$0.52_{a,b}$*	0.32	0.58
IBIS3	$0.46_{a,b}$*	$0.60_{a,b}$*	0.43	0.78
IBIS4[c]	0.81_{b}	0.69_{b}	0.79	0.79
IBIS5	$0.46_{a,b}$*	$0.66_{a,b}$*	0.42	0.97
IBIS6	0.83*	0.68*	0.81	0.77
IBIS7	$0.39_{a,b}$*	$0.78_{a,b}$*	0.38	0.92
IBIS8	$-0.19_{a,b}$*	$0.39_{a,b}$*	-0.18	0.45
IBIS9	$-0.31_{a,b}$*	$0.15_{a,b}$	-0.30	0.17
IBIS10	$0.26_{a,b}$*	$0.49_{a,b}$*	0.26	0.51
		SATAQ		
SATAQ1	0.85*	0.83*	0.83	0.93
SATAQ2[c]	0.87	0.82	0.86	0.86
SATAQ3	0.85_{b}*	0.81_{b}*	0.85	0.81
SATAQ4	0.89*	0.85*	0.89	0.88

Table 2 (Continued)

	Within-Group Standardized Factor Loadings		Common Metric Standardized Factor Loadings	
Ethnicity	C	AA	C	AA
Factor/Item		SATAQ		
SATAQ5	0.88*	0.91*	0.87	0.99
SATAQ6	0.89*	0.84*	0.89	0.85
SATAQ7	0.86_{b}*	0.83_{b}*	0.85	0.91
SATAQ8	0.89*	0.80*	0.89	0.78
SATAQ9	0.76*	0.75*	0.77	0.67
		PSPS		
PSPS1[c]	0.73	0.56	0.71	0.71
PSPS2	0.74*	0.60*	0.72	0.83
PSPS3	$0.67_{a,b}$*	$0.72_{a,b}$*	0.64	1.13
PSPS4	0.67_{b}*	0.67_{b}*	0.64	0.99
PSPS5	0.69*	0.68*	0.67	0.94
PSPS6	0.69*	0.56*	0.67	0.77
PSPS7	$0.63_{a,b}$*	$0.68_{a,b}$*	0.60	1.05
PSPS8	$0.42_{a,b}$*	$0.44_{a,b}$*	0.39	0.78
		RAT		
RAT1[c]	0.82_{b}	0.89_{b}	0.83	0.83
RAT2	0.66*	0.68*	0.66	0.70

Table 2 (Continued)

	Within-Group Standardized Factor Loadings		Common Metric Standardized Factor Loadings	
Ethnicity	C	AA	C	AA
Factor/Item			RAT	
RAT3	0.89*	0.89*	0.90	0.84
RAT4	0.84*	0.84*	0.86	0.80

Note. C = Caucasian, AA = African American. IBIS = Ideal Body Stereotype Scale, SATAQ = Sociocultural Attitudes Toward Appearance Questionnaire, PSPS = Perceived Sociocultural Pressure Scale, RAT = romantic appeal of thinness.

[a]λ_x was noninvariant across ethnic groups.

[b]τ_x was noninvariant across ethnic groups.

[c]Scale was set to 1.

*p < .01 for test that λ_x was significantly different from 0.

Table 3

Within-Group Standardized Covariances among IBIS, SATAQ, PSPS, and RAT by Ethnicity

Factor	IBIS		SATAQ		PSPS		RAT	
Ethnicity	C	AA	C	AA	C	AA	C	AA
IBIS	--	--						
SATAQ	0.54**	0.43**	--	--				
PSPS	0.27**	0.27*	0.50**	0.44**	--	--		
RAT	0.58**	0.39**	0.59**	0.41**	0.50**	0.39**	--	--

Note. C = Caucasian, AA = African American. IBIS = Ideal Body Stereotype Scale, SATAQ = Sociocultural Attitudes Toward Appearance Questionnaire, PSPS = Perceived Sociocultural Pressure Scale, RAT = romantic appeal of thinness.

* $p < .05$, ** $p < .01$.

With regard to the factorial validity of the RAT, the items of the RAT had high factor loadings in both groups, suggesting that all items loaded on this factor as expected. Of import to the construct validity of RAT, the results of this CFA suggest that the RAT demonstrated convergent validity, as evidenced by its significant, positive correlations with the IBIS, SATAQ, and PSPS. In addition, this CFA provides evidence that the RAT represents a construct that is distinct from those captured by the IBIS, SATAQ, and PSPS. To examine the distinctiveness of the RAT relative to the other three constructs included in the confirmatory factor analysis (e.g., IBIS, PSPS, and SATAQ), the modification indices for the lambda matrix, which indicate how much the chi-square statistic would improve (i.e., decrease) if the item were permitted to load on any of the other three factors, were inspected. The modification indices for factor loadings of the

RAT were uniformly low in both groups (Caucasians: 0.00-7.39; African Americans: 0.00-8.09), thereby confirming the simple factor structure (i.e., an absence of items that cross-loaded) specified in the proposed model and buttressing the construct validity of the RAT.

Measurement Invariance of RAT

Based on the results of the CFA described above, the correlated error variances specified in the aforementioned model were retained in the evaluation of the assumption of measurement invariance of the IBIS, SATAQ, PSPS, and RAT across groups. Following the procedure delineated above, configural, metric, and scalar invariance were assessed for the IBIS, SATAQ, PSPS, and RAT. Fit indices for the series of models estimated to evaluate configural, metric, and scalar invariance are presented in Table 4.

Table 4

Test of Measurement Invariance of the IBIS, SATAQ, PSPS, and RAT across Ethnic Groups: Summary of Fit Statistics for Stacked Measurement Models

Model: Equality Constraints Imposed	χ^2	*df*	$\Delta\chi^2$	Δdf	CFI	RMSEA
1. None	1830.97*	818	--	--	0.98	0.06
2. Λ_x	1917.37*	845	86.40*	27	0.98	0.06
3. Metric invariant λ_x and corresponding τ_x	2007.30*	856	--	--	0.97	0.06
4. Metric invariant λ_x	1855.84*	835	151.46*	21	0.98	0.06

To assess configural invariance, i.e., the consistency of the hypothesized factor structure across groups, CFA was used to estimate a stacked model (Model 1) in which all parameters were freely estimated. Although Model 1 was statistically significant and therefore rejected, other fit indices less influenced by sample size suggested more than adequate consistency of the factor structure across groups, thus upholding the assumption of configural invariance. Model 1 served as a baseline for evaluating metric invariance, or consistency of factor loadings, across groups.

To assess metric invariance across groups, Model 2 was estimated with the Λ_x matrix constrained to be equal across groups, and the change in χ^2 from Model 1 was examined for significance. Simultaneously constraining the Λ_x matrix to be equal across groups produced a significant deterioration in the fit of the model (see Table 4), thus precluding metric invariance across groups. To identify the λ_x coefficients that differed significantly between the two groups, each individual λ_x coefficient was constrained to be equal across groups one at a time while allowing the remainder of the parameters to be freely estimated, and the change in χ^2 produced by constraining each λ_x coefficient to be equal across groups was examined for significance. Although several pairwise contrasts were performed with an alpha level of .05 for each comparison, thereby indicating that the familywise Type 1 error rate was inflated above .05, no modifications (e.g., modified Bonferroni) were made to control for Type 1 error because the greater concern in the assessment of metric invariance is that of a Type II error. The items whose λ_x coefficients differed significantly across groups are marked in Table 2. All λ_x coefficients for the items on the RAT and SATAQ were invariant across groups, and all but three of the items on the PSPS were invariant. The IBIS, however, demonstrated varying λ_x coefficients across groups for all but three items, thus suggesting that the majority of items on this measure are not assessing the construct in the same way across ethnic groups. Thus, full metric invariance applies to the RAT and SATAQ, and partial metric invariance applies to the IBIS and PSPS.

Because the assumption of metric invariance was not completely supported in all scales, it was impossible for the assumption of scalar invariance to obtain full support. Therefore, rather than testing for scalar invariance in the usual way by constraining the entire T_x matrix to be equal across groups, only the τ_x intercepts of those indicators whose λ_x coefficients had been invariant across groups were constrained to be equal across groups; the τ_x intercepts of indicators with noninvariant λ_x coefficients were freely estimated in both groups, as the invariance of their intercepts was precluded by the multigroup noninvariance of their λ_x coefficients . Prior to assessing the invariance of the τ_x elements, it was necessary to establish a baseline model, Model 3. Given that 10 of the 31 λ_x coefficients failed to demonstrate metric invariance across groups, Model 3 was estimated with all λ_x coefficients but the 10 λ_x coefficients that were not metric invariant constrained to be equal in both groups; all τ_x elements but the 10 that corresponded to indicators with metric noninvariance were constrained to be equal across groups, and the K matrices were fixed at zero in both groups. Fit indices for Model 3 are presented in Table 3. Next, Model 4 was estimated with the equality constraints removed for the entire T_x matrix (i.e., the T_x matrix was freely estimated) while continuing to constrain the 21 invariant elements of the Λ_x matrix to be equal across groups; the K matrix remained fixed at zero. In this way, it was possible to determine whether relaxing all of the constraints on the T_x matrix would significantly improve the fit of the model, suggesting that additional elements of the T_x matrix lack invariance and should be freely estimated across groups. Removing all of the equality constraints significantly improved the fit of the model, suggesting that at least one of the 21 τ_x elements under scrutiny was noninvariant across groups. To identify which of the 21 τ_x elements differed significantly across groups, each item intercept whose invariance was in question was freed one at a time while constraining all other potentially invariant items in the T_x matrices to be equal to determine if relaxing its equality constraint improved the fit of the model. Among the 21 items that were metric invariant and individually assessed for scalar invariance, six were found to violate the assumption of scalar invariance. These items are denoted in Table 2. Including the items for which scalar invariance was precluded by the absence of metric invariance, scalar noninvariance was demonstrated by nine items on the IBIS, two items on the SATAQ, four items on the PSPS, and one item on the RAT.

Although both the IBIS and the SATAQ failed to evidence complete measurement invariance, the IBIS is notable for several metric and scalar noninvariant items, whereas the SATAQ, in contrast, exhibited complete metric invariance and only two scalar noninvariant items. Thus, given the greater pervasiveness of measurement noninvariance in the items contained in the IBIS relative to those that comprise the SATAQ, it seems that the IBIS may be less suitable than the SATAQ for comparing ethnic groups on the construct of internalization of the thin ideal. Therefore, the SATAQ, which has been shown in previous research to capture internalization of the thin ideal (Thompson et al., 2004) and demonstrated metric invariance across groups in the current analysis, will be used in place of the IBIS to assess this construct in all subsequent analyses.

Summary

In conclusion, the results of this series of CFAs provide evidence that the RAT represents a construct that is distinct from other, similar constructs and has full metric invariance across groups. Although the RAT contains one scalar noninvariant item, the other three items are scalar invariant, indicating that the assumption of partial scalar invariance has been satisfied. Overall, the results of this CFA support the construct validity of RAT and confirm its appropriateness for inclusion in the structural model.

In addition, the results of this CFA suggest that the IBIS, which was originally intended for inclusion in the structural model as a measure of internalization of the thin ideal, is notable for numerous differences in factor loadings and item intercepts across ethnic groups. The SATAQ, in contrast, demonstrated metric invariance and contained only two items that were scalar noninvariant across ethnic groups, thereby attesting to its superiority over the IBIS in the evaluation of ethnic differences. Thus, the SATAQ will supplant the IBIS as a measure of internalization of the thin ideal in subsequent analyses.

Hypothesis Testing

General Preliminary Analyses

Prior to evaluating the measurement and structural models within groups based on ethnicity and constitutional thinness, univariate and bivariate distributions for each of the four grouping schemes (Caucasian vs. African American, lacking in constitutional thinness vs. constitutionally thin) were examined. Bivariate relations among the observed variables were examined with scatterplots in SPSS to ascertain whether the relationships among the variables were adequately captured by a linear effect alone, or if higher order terms warranted inclusion to describe the shape of the relationship. Of note, the shape of the relationship between dietary restriction and body mass index was curvilinear, possibly implying that a higher-order term of the second degree, or quadratic effect, for dietary restriction should be included in the model to improve the prediction of body mass index.

To conduct a statistical test of the enhancement of the prediction of body mass index produced by adding a quadratic term for dietary restriction to all of the proposed proximal predictors of body mass index (e.g., the linear effect of dietary restriction, physical activity, the product term representing the interaction between dietary restriction and physical activity), a regression equation was estimated in which body mass index was regressed on all of these predictors in SPSS. The product term for the interaction between dietary restriction and physical activity was created by centering each of the main effects variables and computing the product of these values; the quadratic term for dietary restriction was created by squaring the centered variant of dietary restriction. Centering the main effects prior to forming interaction and quadratic terms reduces multicollinearity among the predictor variables (Aiken & West, 1991). In the regression analysis, the centered variants of dietary restriction and physical activity were entered first, followed by the addition of the product term representing the interaction between dietary restriction and physical activity, which was then followed by the addition of the quadratic effect of dietary restriction; body mass index served as the dependent variable. This analysis was conducted in each of the four groups and in the overall sample, and in every case, the amount of variance accounted for in BMI significantly increased with the addition of the quadratic effect, with the incremental variance in BMI produced by the addition of the quadratic term ranging from 3% to 7%. The standardized regression coefficients for dietary restriction, physical activity, the interaction between dietary restriction and physical activity, and the quadratic effect of dietary restriction as predictors of body mass index are presented in Table 5 below.

This exploratory regression analysis also revealed that the regression coefficient for the interaction between dietary restriction and physical activity was nonsignificant in the presence of the other predictors, as demonstrated in Table 5 below. Thus, given that the interaction effect was not included in the originally hypothesized theoretical model and failed to enhance the prediction of body mass index, the interaction between dietary restriction and physical activity was dropped from all subsequent analyses.

Table 5

Standardized Regression Coefficients for the Regression of Body Mass Index on Dietary Restriction, Physical Activity, the Interaction between Dietary Restriction and Physical Activity, and the Quadratic Effect of Dietary Restriction

Variable	C (*n* = 633)	AA (*n* = 113)	NCT (*n* = 476)	CT (*n* = 270)	Entire Sample (*N* = 746)
Dietary Restriction	.22*	.53*	.03	.40*	.24*
Physical Activity	-.04	-.09	-.11*	.07	-.05
Diet. Restr. x Phys. Act.	-.04	-.02	-.01	-.01	-.03
Dietary Restriction Squared	-.25*	-.25*	-.18*	-.28*	-.27*

Note. C = Caucasians, AA = African Americans, NCT = not constitutionally thin, CT = constitutionally thin. Diet. Restr. = Dietary Restriction, Phys. Act. = Physical Activity

*p < .05.

Univariate distributions were assessed for the observed variables within each of the ethnic and constitutionally thin subgroups to determine whether the majority of univariate distributions approximate the normal distribution according to the thresholds prescribed by Curran et al. (1996). Univariate distributions for the African American group evidenced skewness and kurtosis values that were within the range for normality suggested by Curran et al., with the sole exception of one indicator for ethnic identity, which demonstrated a skewness of -2.14. Within the Caucasian group and the group that was not constitutionally thin (NCT), skewness coefficients for all variables but one, that of the product term SATAQNFI, were less than two in absolute value; the skewness values for SATAQNFI in these groups were 2.38 and 2.25, respectively, indicating moderate skewness. Regarding kurtosis values, SATAQNFI was again the lone variable that defied the limits for acceptable kurtosis in each of these groups, evidencing kurtosis values of 18.28 and 15.05, which would be categorized as moderate kurtosis by Curran et al.'s (1996) standards; all other indicators demonstrated kurtosis values in the normal range. Within the constitutionally thin (CT) group, the distributions for SATAQNFI, DIETSQ, and ETHNIC were characterized by moderate nonnormality; SATAQNFI and DIETSQ evidenced kurtosis values of 10.59 and 10.64, respectively, and DIETSQ and ETHNIC demonstrated skewness values of 2.74 and 2.91 respectively. Mardia's coefficients for multivariate skewness and kurtosis values are presented below in Table 6. Given the large body of literature supporting the robustness of ML under conditions of nonnormality, particularly when the vast majority of observed variables are characterized by univariate normal distributions, the use of ML was considered tenable and appropriate, and the analysis proceeded.

Table 6

Mardia's Coefficients for Multivariate Skewness and Kurtosis

Type of Coefficient	C (n = 633)	AA (n = 113)	NCT (n = 476)	CT (n = 270)
Skewness Coefficient	60.31*	128.49*	73.44*	86.98*
Kurtosis Coefficient	551.00*	507.55*	600.40*	573.31*

Note. C = Caucasian, AA = African American, NCT = not constitutionally thin, CT = constitutionally thin.

*$p < .05$.

To estimate the error variance for the quadratic indicator for $DIET^2$, Ping's (1998) method for estimating the error variance of a product indicator x_1x_1 of the latent quadratic variable XX was used. The formula for the error variance (ε_{x1x1}) is:

$$\varepsilon_{x1x1} = 4[(\lambda_{x1} + \lambda_{x2} + \lambda_{x3})/3]^2 Var(X)\ [(Var(\varepsilon_{x1}) + Var(\varepsilon_{x2}) + Var(\varepsilon_{x3}))/3^2] + 2[(Var(\varepsilon_{x1}) + Var(\varepsilon_{x2}) + Var(\varepsilon_{x3}))/3^2]^2$$

where X is the linear latent variable and x_1, x_2, x_3 are the indicators for the linear latent variable. Based on this formula, the resultant error variances for the product indicator of $DIET^2$ were the following: Caucasian = .07, African American = .06, NCT = .06, CT = .06. Consistent with the approach outlined above in the treatment of the product indicator for the latent interaction effect NXS, the factor loading for the product term of $DIET^2$ and variance for the latent variable $DIET^2$ were also calculated and fixed in the estimation of the structural model. The formula used to estimate the factor loading for a product indicator (λ_{xx}) is:

$$\lambda_{xx} = [(\lambda_{x1} + \lambda_{x2} + \lambda_{x3})/3]^2$$

The factor loadings for the product indicator were as follows: Caucasians = 1.06, African Americans = 1.03, NCT = 1.03, CT = 1.01. The formula used to estimate the variance (Var(XX)) for a latent quadratic effect is:

$$\text{Var}(XX) = 2\text{Var}(X)^2$$

The variances for the latent quadratic effect DIET^2 were as follows: Caucasians = 1.31, African Americans = 1.19, NCT = .82, CT = 2.00. As previously described in reference to the computation of these parameters for NXS, a two-step estimation technique was used to generate the values necessary to calculate parameter estimates for the quadratic latent variable DIET^2 (Ping, 1998). Relevant parameter estimates for the linear latent variable DIET and its indicators were obtained by estimating the measurement model with all variables except the quadratic and interaction effects (DIET^2 and NXS). The parameter estimates for DIET^2 were then calculated using the formulas above, and the resultant values were fixed in the estimation of the structural models.

Ethnicity as Grouping Variable

Measurement Model

Before testing the structural model, it is necessary to demonstrate that the measurement model is satisfactory, both in terms of its fit to the data and its measurement invariance across ethnic groups. First, the fit of the model was evaluated separately within each ethnic group, and then a series of nested models were estimated to test the assumption of measurement invariance of the measurement model across ethnic groups.

When the model was evaluated separately within each group with no constraints, the model was rejected in the Caucasian group [χ^2 = 190.71, 120 *df*, *p* = .00] but not in the African American group [χ^2 = 128.39, 120 *df*, *p* = 0.28]; however, other fit indices less influenced by sample size indicated that the model fit the data very well in both groups [Caucasians: RMSEA = 0.03, CFI = 0.99, standardized RMR = 0.02, GFI = 0.97; African Americans: RMSEA = 0.00, CFI = .99, standardized RMR = 0.03, GFI = 0.90], tentatively suggesting that the rejection of the model for the Caucasian but not the African American group is primarily attributable to the larger sample size of the Caucasian group.

To test the assumption of measurement invariance of the measurement model across ethnic groups, a stacked model in which all parameters were freely estimated (i.e., no equality constraints imposed) was estimated first to test for configural invariance. The stacked model was statistically significant [χ^2 = 319.10, 240 *df*, *p* = 0.000], but other fit indices less sensitive to sample size indicated that the stacked model fit the data fairly well [RMSEA = 0.03, CFI = 0.99], indicating that the hypothesized factor structure for the measurement model applies comparably across groups. This model served as the baseline model for evaluation of metric invariance.

To assess metric invariance, a model was estimated in which the Λ_x matrices were constrained to be equal across groups, and the degradation of the fit of the model was examined to determine if imposing these constraints significantly degraded the fit of the model relative to the baseline model in which parameters were freely estimated. When the Λ_x matrices were constrained to be equal, the new value of χ^2 increased as expected [χ^2 = 334.28, 250 *df*, *p* = 0.000], but the change in χ^2 was not statistically significant [$\Delta\chi^{2 =}$ 15.18, Δ*df* = 10, *ns*], indicating that the Λ_x matrix was invariant across groups. The RMSEA and CFI for the model estimated with the Λ_x matrices constrained to be equal did not change at all [RMSEA = 0.03, CFI = 0.99], further underscoring the equivalence of the Λ_x matrix across groups and validating the assumption of metric invariance. Scalar invariance was not assessed because latent means were not the focus of the proposed structural model, and thus the issue of scalar invariance is irrelevant to the current set of analyses.

Factor loadings or λ_x coefficients for each group are displayed below in Table 7. All λ_x coefficients were .70 or above, indicating that all indicators loaded highly on their respective latent factors in both groups.

Table 7

Measurement Model: Completely Standardized Within-group λ_x Coefficients for Ethnic Groups

Indicator	Latent Variable	
	λ_x—Caucasians	λ_x --African Americans
	CSE	
CSE1[a]	0.86	0.89
CSE2	0.84*	0.90*
CSE3	0.71*	0.73*
	PAROCC	
PAROCC1	0.97	0.97
	PAREDU	
PAREDU1	0.97	0.97
	NFI	
NFI1[a]	0.96	0.97
NFI2	0.96*	0.98*
NFI3	0.96*	0.97*
	SATAQ	
SATAQ1[a]	0.97	0.96
SATAQ2	0.98*	0.97*
SATAQ3	0.95*	0.92*

Table 7 (Continued)

Indicator	Latent Variable	
	λ_x—Caucasians	λ_x --African Americans
	RAT	
RAT1[a]	0.80	0.86
RAT2	0.90*	0.89*
RAT3	0.85*	0.85*
	DIET	
DIET1[a]	0.96	0.96
DIET2	0.97*	0.97*
DIET3	0.97*	0.97*
	PHYS	
PHYS1	0.87	0.87
	BMI	
BMI	0.98	0.98

Note. CSE = ethnic identity, PAROCC = parent occupational status, PAREDU = parent educational attainment, NFI = valuation of romantic need fulfillment, SATAQ = thin-ideal internalization, RAT = perceived romantic appeal of thinness, DIET = dietary restriction, PHYS = physical activity, BMI = body mass.

[a]Scale was set to 1 on this indicator.

*$p < .01$ for the test of the hypothesis that $\lambda_x = 0$.

Reliability of the Latent Factors

To assess how satisfactorily the latent construct is measured by its set of indicators, Cronbach's alpha and construct reliabilities were calculated for each latent factor with multiple indicators. Cronbach's alpha assesses the extent to which the indicators for the latent construct are assessing the same construct; an alpha higher than .70 has typically been considered indicative of good reliability for the latent construct. The construct reliability of a latent factor is a function of the standardized factor loadings for the indicators and their corresponding estimates of measurement error (Diamantopoulos & Siguaw, 2000). According to convention, construct reliability is deemed adequate if it exceeds .70. Construct reliability is computed using the following formula, where the λ coefficients for each of the factor's indicators and the corresponding estimates of measurement error for the indicators are included:

$$\text{Construct reliability} = (\sum \lambda)^2/((\sum \lambda)^2 + \sum \delta)$$

Cronbach's alpha and construct reliability coefficients for the entire sample are presented in Table 8. Because factor loadings were invariant across groups, the two groups were combined to determine the reliability of each latent factor for the entire sample. To derive construct reliability coefficients for the whole sample using the standardized factor loadings reported above for each ethnic group, the standardized factor loadings for each group were weighted by their respective sample sizes and then divided by the total sample size. For all latent factors, both Cronbach's alpha and construct reliability coefficients were well above .70, suggesting that the latent factors were characterized by excellent reliability.

Table 8

Cronbach's Alpha and Construct Reliabilities for Latent Factors (N = 746)

Latent Construct	Cronbach's Alpha	Construct Reliability
CSE	0.86	0.85
NFI	0.97	0.97
SATAQ	0.98	0.98
RAT	0.89	0.89
DIET	0.98	0.98

Note. CSE = ethnic identity, NFI = valuation of romantic need fulfillment, SATAQ = thin-ideal internalization, RAT = perceived romantic appeal of thinness, DIET = dietary restriction.

Interrelations Among Latent Factors

Standardized covariances among latent variables for Caucasians and African Americans are presented below in Table 9.

Table 9

Standardized Covariances among Latent Variables in Caucasians (n = 633) and African Americans (n = 113)

Variable	CSE		PAROCC		PAREDU		NFI		SATAQ	
	C	AA	C	AA	C	AA	C	AA	C	AA
CSE	--	--								
PAROCC	-.01	-.10	--	--						
PAREDU	-.12**	-.17	.45**	.64**	--	--				
NFI	.04	.22*	-.03	-.01	-.03	-.03	--	--		
SATAQ	.03	-.15	.03	.14	.00	.06	.21**	.16	--	--
RAT	.02	-.24*	.03	-.07	.05	.07	.12**	-.10	.58**	.44**
DIET	.01	.00	.04	.02	.04	.08	.05	.02	.46**	.23*
PHYS	-.06	-.20	.09*	.08	.09	.09	-.02	-.25*	.02	-.26*
BMI	.04	.14	-.01	-.07	-.04	-.02	-.07	.03	.01	-.03
Variable	RAT		DIET		PHYS		BMI			
	C	AA	C	AA	C	AA	C	AA		
RAT	--	--								
DIET	.46**	.31**	--	--						
PHYS	.04	.10	.14**	.07	--	--				
BMI	.10*	.06	.19**	.49**	-.05	-.08	--	--	--	--

Note. C = Caucasian, AA = African American. CSE = ethnic identity, PAROCC = parent occupational status, PAREDU = parent educational attainment, NFI = valuation of romantic need fulfillment, SATAQ = thin-ideal internalization, RAT = perceived romantic appeal of thinness, DIET = dietary restriction, PHYS = physical activity, BMI = body mass.

*$p < .05$, **$p < .01$.

Structural Model

To assess whether the proposed structural model fit equally well across ethnic groups, a stacked model was estimated in which the global fit of the model across groups was directly evaluated, followed by a series of stacked models in which the path coefficients of the structural model were directly compared across groups to determine if the local fit indices varied as a function of ethnicity. Prior to estimating the stacked models, the structural model was evaluated separately within each group as a preliminary step to identify specification errors within each group and to ascertain whether the model fit reasonably well across groups to justify comparing the model fit across groups in a stacked model (i.e., if the model fit very well in one group but very poorly in the other, estimation of the stacked model would be superfluous). Covariances and variances of the manifest variables (i.e., indicators) in the model for the Caucasian and African American groups are contained in Appendices M and N, respectively, and means and standard deviations of the manifest variables for the Caucasian and African American groups are contained in Appendix O. The structural models estimated separately in the Caucasian and African American groups are presented below in Figures 2 and 3, respectively. The figures contain the within-group standardized path coefficients and disturbances, which communicate the proportion of variance unexplained ($1 - R^2$) in the endogenous variables or sources of influences on the endogenous variables not depicted in the model.

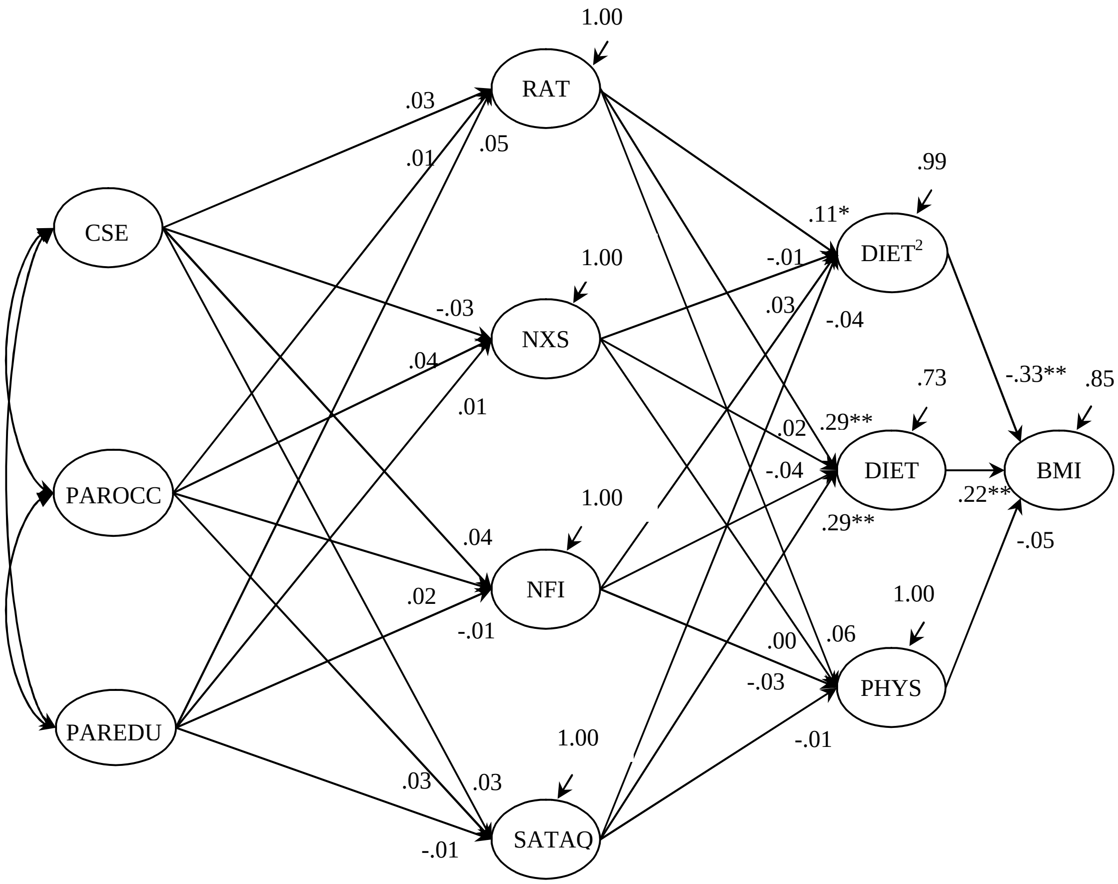

Figure 2. Path diagram depicting the structural relations for the hypothesized model in Caucasians (*n* = 633). CSE = ethnic identity, PAROCC = parent occupational status, PAREDU = parent educational attainment, RAT = perceived romantic appeal of thinness, NXS = interaction between valuation of romantic need fulfillment and thin-ideal internalization, NFI = valuation of romantic need fulfillment, SATAQ = thin-ideal internalization, $DIET^2$ = quadratic component of dietary restriction, DIET = linear component of dietary restriction, PHYS = physical activity, BMI = body mass. Disturbances of the endogenous variables convey the proportion of variance that is not accounted for by influences depicted in the model. Correlations among the exogenous variables are in Table 9.

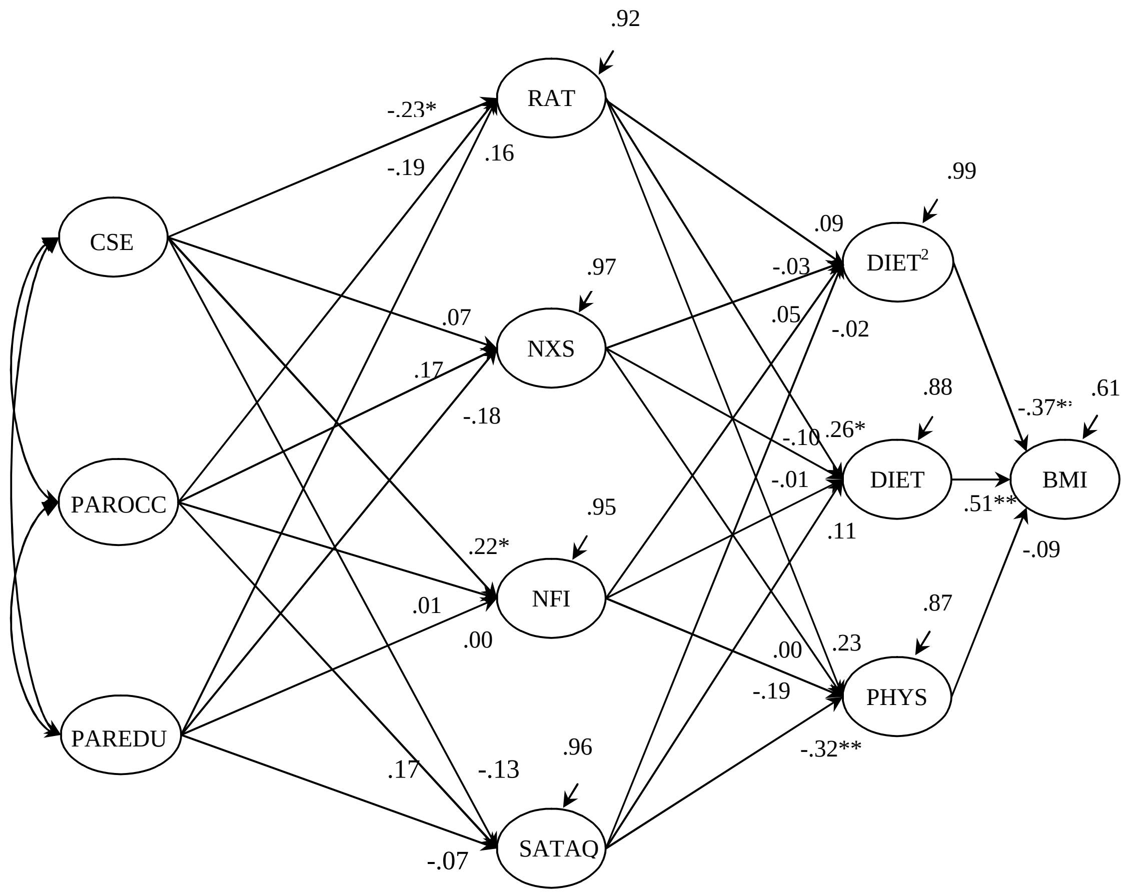

Figure 3. Path diagram depicting the structural relations for the hypothesized model in African Americans (n = 113). CSE = ethnic identity, PAROCC = parent occupational status, PAREDU = parent educational attainment, RAT = perceived romantic appeal of thinness, NXS = interaction between valuation of romantic need fulfillment and thin-ideal internalization, NFI = valuation of romantic need fulfillment, SATAQ = thin-ideal internalization, $DIET^2$ = quadratic component of dietary restriction, DIET = linear component of dietary restriction, PHYS = physical activity, BMI = body mass. Disturbances of the endogenous variables convey the proportion of variance that is not accounted for by influences depicted in the model. Correlations among the exogenous variables are in Table 9.

The structural model was rejected in the Caucasian group [χ^2 = 605.70, 167 *df*, *p* = .00]; however, other fit indices suggested that the model adequately fit the data [RMSEA = 0.06, CFI = 0.96, standardized RMR = 0.12, GFI = 0.92]. The structural model was also rejected in the African American group [χ^2 = 237.34, 167 *df*, *p* = .00], but other fit indices, with the sole exception of the GFI, indicated that the model fit the data adequately [RMSEA = 0.04, CFI = 0.96, standardized RMR = 0.11, GFI = 0.85].

Because the model fit was not as optimal as had been anticipated in either group, modification indices were inspected to identify potential sources of model misfit. Of note, this inspection revealed that allowing the disturbances of the RAT and SATAQ variables to correlate would reduce χ^2 by approximately 184.17 in the Caucasian group and 19.25 in the African American group. Given the similar nature of the RAT and SATAQ constructs, it is not surprising that they share nonrandom sources of error, and thus allowing their disturbances to correlate was justified by both theoretical and empirical considerations. The structural models were estimated again in both groups with the additional specification of a correlation between the disturbances for RAT and SATAQ. As expected, adding this specification to the model improved the fit of the model in the Caucasian group [χ^2 = 387.22, 166 *df*, *p* = .00; RMSEA = 0.04, CFI = 0.98, standardized RMR = 0.07, GFI = 0.95] and the African American group [χ^2 = 216.00, 166 *df*, *p* = .01; RMSEA = 0.03, CFI = 0.97, standardized RMR = 0.08, GFI = 0.86]. With the exception of the GFI value for model fit in the African American group, the fit indices suggested that the model fit the data reasonably well in both groups, albeit demonstrating a slightly better fit in the Caucasian group relative to the African American group.

To obtain a more precise assessment of the extent to which the model applies to both groups, a series of stacked models was estimated to compare the fit of the model across groups. Fit indices for the series of stacked models are summarized in Table 10.

Table 10

Summary of Fit Indices for Tests of Multigroup Structural Invariance by Ethnicity

Model No.	Equality Constraints Imposed	χ^2	*df*	$\Delta\chi^2$	Δdf	CFI	RMSEA
1	Λ_x, Λ_y	618.38*	342	--	--	0.98	0.04
2	$\Lambda_{x,}$ $\Lambda_{y,}$ Γ	634.87*	354	16.49	12	0.98	0.04
3	$\Lambda_{x,}$ $\Lambda_{y,}$ Γ, B	671.40*	369	36.53*	15	0.97	0.04

*$p < .05$.

In the first stacked model (Model 1), the Λ_x and Λ_y matrices were constrained to be equal across groups in light of the demonstration of metric invariance in the aforementioned analyses. All other parameters were freely estimated in both groups. Although this stacked model was rejected on the basis of χ^2, the CFI and RMSEA yielded a more favorable assessment of the comparability of the model's fit across groups.

Model 1 then served as the baseline model against which to evaluate the invariance of the hypothesized structural relations among the latent variables across groups. In addition to the equality constraints imposed on the Λ_x and Λ_y matrices, equality constraints were imposed on the Γ matrices in the estimation of Model 2 to determine whether the path coefficients represented in this matrix were invariant across groups. Constraining the Γ matrices to be equal across groups failed to produce a significant deterioration in the fit of the model, indicating invariance of the Γ matrix across groups and hence, an absence of differences in the path coefficients connecting exogenous to endogenous latent variables.

The path coefficients that remained to be evaluated for invariance across groups were contained in the B matrix, and thus the next model estimated in the series, Model 3, was characterized by an additional equality constraint imposed on the B matrices. Constraining the B matrix to be equal across groups resulted in a significant degradation of the fit of the model, suggesting that at least one of the parameters in the B matrix was notable for significant differences across ethnic groups. To identify the sources of noninvariance in the B matrices, each of the parameters in the B matrix was constrained to be equal across groups one at a time, and the resultant change in χ^2 was examined for significance to ascertain whether the parameter in question differed significantly across groups. Because multiple pairwise comparisons were conducted, thereby inflating the familywise Type 1 error rate, Holm's (1979) modified Bonferroni procedure, which is recommended by Jaccard and Wan (1996) to control for Type 1 error when conducting multiple pairwise contrasts, was used to maintain a familywise Type 1 error rate of .05. Only one of the path coefficients in the B matrix evidenced significant differences across groups: In both groups, the linear and quadratic effects of dietary restriction on body mass were significant while controlling for physical activity, but the linear trend was of a larger magnitude in the African American group relative to the Caucasian group [$\Delta\chi^2 = 18.21$, $\Delta df = 1$, $p = .00$].

Among the African American group only, as expected, higher levels of ethnic identity predicted lower perceived romantic appeal of thinness while controlling for parent occupational status and parent educational attainment. Contrary to expectation, ethnic identity did not significantly predict thin-ideal internalization in African American participants. As expected, in the Caucasian group, ethnic identity failed to predict any of the motivational factors posited to inspire weight management behavior.

It was hypothesized that parent occupational status and educational attainment would be significant, positive predictors of weight-related attitudes in the African American group but not the Caucasian group, but this hypothesis was not supported: Parent occupational status and educational attainment failed to predict thin-ideal internalization and the perceived romantic appeal of thinness in either group.

In both groups, consistent with the hypothesized model, the perceived romantic appeal of thinness significantly and positively predicted dietary restriction in the presence of thin-ideal internalization, valuation of the fulfillment of romantic needs, and the interaction between the two latter variables. Contradictory to the hypothesized structural model, the perceived romantic appeal of thinness did not significantly predict physical activity in either group; given that the magnitude of this path coefficient was .23 for the African American group, a post-hoc power analysis recommended by Diamantopoulos and Siguaw (2000) was conducted to ascertain whether the lack of significance was attributable to a lack of power to detect the effect. With an alpha of .05, power to detect this effect was estimated to be .43, indicating that insufficient power was responsible for the nonsignificant finding in the African American group.

Among Caucasians only, thin-ideal internalization continued to predict dietary restriction in the presence of the valuation of romantic need fulfillment, perceived romantic appeal of thinness, and the interaction between thin-ideal internalization and the valuation of romantic need fulfillment; the significant correlation observed between thin-ideal internalization and dietary restriction in African Americans decreased to nonsignificance in the presence of the three aforementioned variables, suggesting that the association between thin-ideal internalization and dietary restriction was better accounted for by variance that each of them shared with one of the other three variables that were controlled for in the model. Of particular interest was the unexpected, counterintuitive finding that higher thin-ideal internalization was predictive of lower levels of physical activity only among the African American group in the presence of the valuation of romantic need fulfillment, perceived romantic appeal of thinness, and the interaction between thin-ideal internalization and the valuation of romantic need fulfillment. Also inconsistent with the hypothesized structural model, the interaction between thin-ideal internalization and the valuation of romantic need fulfillment failed to predict dietary restriction and body mass in both groups in the presence of the main effects and the perceived romantic appeal of thinness.

Of note, the linear and quadratic effects of dietary restriction on body mass were both significant in the presence of physical activity in both groups. The proportion of variance (R^2) accounted for by the proximal predictors of body mass in the structural model increased from 4.63% to 15.46% in the Caucasian group and from 25.32% to 39.22% in the African American group with the addition of the quadratic component of dietary restriction to the model, suggesting that inclusion of the quadratic effect of dietary restriction greatly enhanced the explanatory power of the structural model.

To enhance understanding of the nature of the relationship between dietary restriction and body mass, the quadratic effect was further explored in each of the groups per recommendations of Aiken and West (1991). The negative path coefficient for the quadratic effect suggests that the relationship between dietary restriction and body mass is captured by a concave downward curve. This relationship was then more precisely evaluated by examining the standardized simple slopes for the relationship between dietary restriction and body mass at different points on the curve: one standard deviation below the mean of dietary restriction, the mean of dietary restriction, one standard deviation above the mean of dietary restriction, and two standard deviations above the mean on dietary restriction. The standardized simple slopes for each of these points on the curve were calculated using the following formula given by Aiken and West (1991): $\beta_1 + 2\beta_2 X$ where β_1 = the standardized regression coefficient for the linear component of dietary restriction, β_2 = the standardized regression coefficient for the quadratic component of dietary restriction, and $X = -1$ (1 standard deviation below the mean), 0 (the mean), 1 (1 standard deviation above the mean), or 2 (2 standard deviations above the mean).

To determine the point of inflection, i.e., the point on the curve at which the slope equals zero (also the maximum point of a concave downward curve), thus signifying a change in the direction of the slope of the curve (Aiken & West, 1991), the unstandardized regression coefficients for the linear (b_1) and quadratic (b_2) effects for dietary restriction were substituted into the following equations (Zar, 1999) to obtain the values of the abscissa (*X*) and ordinate (*Y*) of the point of inflection: $X = - b_1/2b_2$ and $Y = \alpha - b_1^2/4b_2$, where α is the intercept for the latent variable body mass.

The standardized simple slopes at the mean, one standard deviation below the mean, and one and two standard deviations above the mean, the corresponding values of *X* and *Y* (e.g., coordinates) for each of these points, and the coordinates of the points of inflection for both groups are displayed below in Table 11. Line graphs depicting the curvilinear relationship between dietary restriction and body mass for the Caucasian and African American groups are contained in Figures 4 and 5, respectively. Inspection of the standardized simple slopes and line graphs revealed a similar pattern across groups at lower and moderate levels of dietary restriction, whereby dietary restriction and body mass are positively related to each other. However, at higher levels of dietary restriction, the relationship between dietary restriction and body mass reverses direction and becomes negative such that higher levels of dietary restriction are predictive of lower levels of body mass. The negative relationship between dietary restriction and body mass was significant in the Caucasian group at one standard deviation above the mean of dietary restriction and beyond. Although the simple slope in the African American group was also negative at one standard deviation above the mean, it was not significant at this point on the curve; however, at two standard deviations above the mean, the negative relationship between dietary restriction and body mass had become increasingly steep and attained significance.

Table 11

Standardized Simple Slopes and Point Coordinates to Describe the Curvilinear Relationship between Dietary Restriction and Body Mass in the Caucasian (n = 633) and African American Groups (n = 113)

Point on the curve	Standardized Simple Slope		*X* and *Y* Coordinates	
	Caucasians	African Americans	Caucasians	African Americans
1 *SD* below the mean	.88**	1.25**	(1.68, 19.83)	(1.31,15.16)
Mean	.22**	.51**	(2.58, 21.87)	(2.19, 20.19)
Point of inflection	0	0	(2.99, 22.09)	(3.06, 21.83)
1 *SD* above the mean	-.45**	-.22	(3.49, 21.78)	(3.07, 21.83)
2 *SD* above the mean	-1.11**	-.95*	(4.39, 19.56)	(3.95, 20.10)

Note. Dietary restriction was measured on a rating scale ranging from 1 to 5, where the highest score indicates the highest level of dietary restriction.

*p < .05, **p < 01.

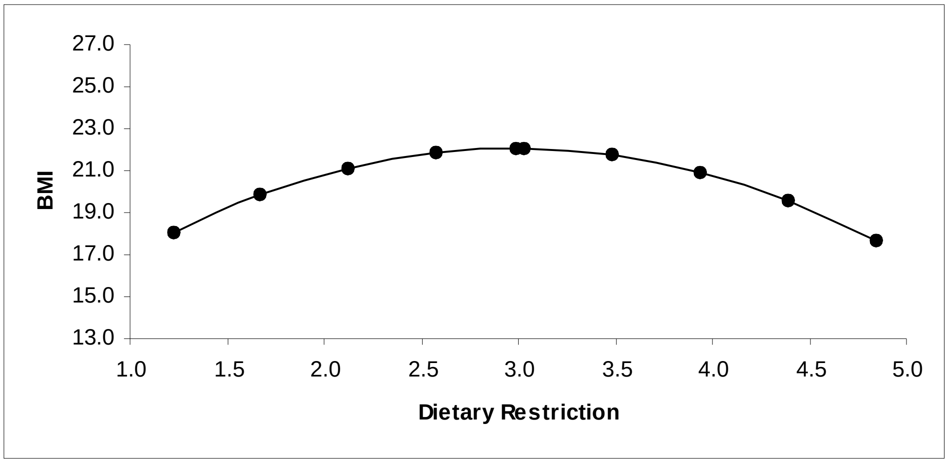

Figure 4. Line graph depicting the curvilinear relationship between dietary restriction and body mass in the Caucasian group. At lower and moderate levels of dietary restriction, dietary restriction is positively related to body mass, but at higher levels of dietary restriction, dietary restriction is negatively related to body mass.

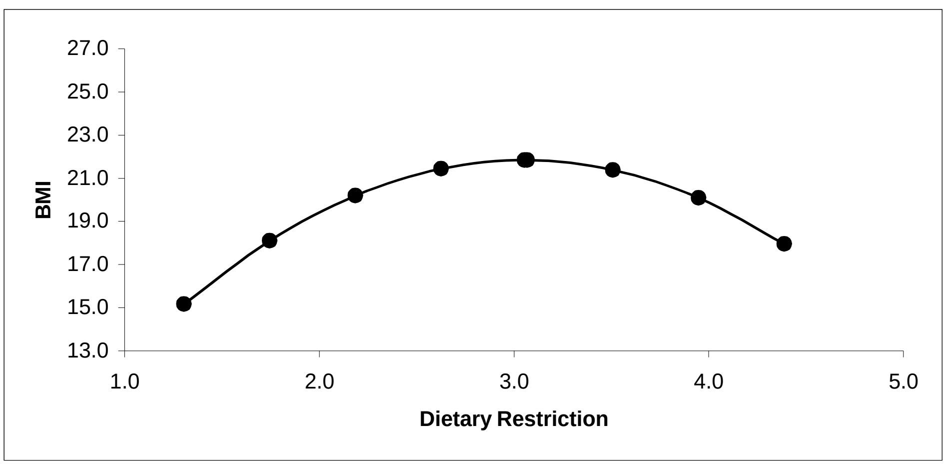

Figure 5. Line graph depicting the curvilinear relationship between dietary restriction and body mass in the African American group. At lower and moderate levels of dietary restriction, dietary restriction is positively related to body mass, but at higher levels of dietary restriction, dietary restriction is negatively related to body mass.

Summary

The measurement model demonstrated an excellent fit in both the Caucasian and African American groups, and the assumption of multigroup metric invariance was satisfied. As expected, the global fit of the hypothesized structural model was also very good in both groups, although it appeared to be slightly better in the Caucasian group relative to the African American group. Inspection of local fit indices (i.e., path coefficients) revealed that several of the hypothesized paths were not significant in either group, suggesting that they do not contribute adequately to the explanation of individual variation in body mass among Caucasian and African American females in young adulthood.

Despite the nonsignificant path coefficients, however, some pathways did appear to play an important role in the model. In the Caucasian group, thin-ideal internalization and the perceived romantic appeal of thinness were both significantly and positively predictive of dietary restriction, which was in turn related to body mass in a curvilinear fashion; these were the sole components of the model that evidenced importance in the explanation of body mass. In the African American group, as expected, lower levels of ethnic identity were significantly associated with the perceived romantic appeal of thinness, which was in turn predictive of higher levels of dietary restriction. Similar to its relationship in the Caucasian group, dietary restriction and body mass demonstrated a concave downward curvilinear relationship in the African American group. Thus, the principal pathway leading to body mass that was connected by statistically significant paths was comparable across African Americans and Caucasians. In addition, only one path evidenced significant differences across groups, thereby indicating that the structural relations in the two groups were characterized by more similarities than differences. Thus, although the structural model did not reveal an identical set of relationships across ethnic groups, it appeared to be more similar than different across groups.

Constitutional Thinness as Grouping Variable

Measurement Model

When CFA was used to evaluate the model separately within each group, the model was rejected in the NCT group [χ^2 = 206.68, 130 *df*, *p* = 0.00] but not in the CT group [χ^2 = 155.57, 130 *df*, *p* = 0.06]; however, other fit indices less influenced by sample size indicated that the model fit the data very well in both groups [NCT: RMSEA = 0.03, CFI = 0.99, standardized RMR = 0.02, GFI = 0.96; CT: RMSEA = 0.03, CFI = 0.99, standardized RMR = 0.02, GFI = 0.95], tentatively suggesting that the rejection of the model for the NCT but not the CT group is primarily attributable to the larger sample size of the NCT group.

To assess the equivalence of the measurement model across the NCT and CT groups, measurement invariance across the two groups was assessed. To evaluate configural invariance of the measurement model, a model in which the two groups were stacked was estimated with no constraints. The model was rejected [χ^2 = 362.25, 260 *df*, *p* = 0.00], but other fit indices less influenced by sample size suggested that the factor structure applied comparably well across the two groups [RMSEA = 0.03, CFI = 0.99], thereby attesting to the configural invariance of the model across the NCT and CT groups. This model served as the baseline model for the evaluation of metric invariance across groups.

To assess metric invariance of the measurement model across the two groups, the Λ_x matrices were constrained to be equal in both groups, and the resultant change in the χ^2

was examined for significance relative to the χ^2 for the baseline model estimated above. The χ^2 that resulted from constraining the Λ_x matrices to be equal across groups [χ^2 = 376.79, 270 *df*, *p* = 0.00] did not represent a significant degradation of the fit of the model, as evidenced by the nonsignificant change in χ^2 relative to the baseline model [$\Delta\chi^2$ = 14.54, Δ*df* = 10, *ns*]. Other fit indices for the stacked model in which the Λ_x matrices were constrained to be equal across groups similarly suggested that the fit of the model was unchanged by the equality constraints imposed on the factor loadings [RMSEA = 0.03, CFI = 0.99], thereby underscoring the consistency of factor loadings across the NCT and CT groups and validating the assumption of metric invariance.

Standardized λ_x coefficients or factor loadings for each group were very comparable to the factor loadings obtained in the Caucasian and African American groups; given the high degree of similarity of factor loadings across all four groups, factor loadings for the NCT and CT groups have not been reproduced here. Consistent with the results of the CFA conducted on the measurement models for the Caucasian and African American groups, all standardized factor loadings for the NCT and CT groups were above .70, indicating that all indicators loaded highly on their respective latent factors.

Interrelations among the Latent Factors

Standardized covariances among the latent factors in the NCT and CT groups are presented below in Table 12. In both groups, as hypothesized, ethnicity was significantly correlated with thin-ideal internalization and dietary restriction such that Caucasians were higher on both of these variables than African Americans. Consistent with expectation, ethnicity was significantly correlated with body mass index in the NCT group such that African Americans had greater levels of body mass index than Caucasians; however, this correlation failed to emerge in the CT group, most likely because of a range restriction in body mass index in this group (due to the fact that, by definition, constitutionally thin individuals had a body mass index lower than 23). Contrary to prediction, ethnic differences in physical activity were not apparent in either group.

Table 12

Standardized Covariances among Latent Variables in NCT (n = 476) and CT (n = 270) Groups

Variable	ETHNIC		CSE		PAROCC		PAREDU		NFI	
	NCT	CT	NCT	CT	NCT	CT	NCT	CT	NCT	CT
ETHNIC	--	--								
CSE	-.33**	-.21**	--	--						
PAROCC	.11*	.10	-.12*	.08	--	--				
PAREDU	.09	.13*	-.16**	-.13	.56**	.37**	--	--		
NFI	-.08	.05	.08	.09	.01	-.11	.01	-.13*	--	--
SATAQ	.22**	.24**	-.09	.01	.11*	-.02	.06	-.01	.17**	.21**
RAT	.25**	.27**	-.13*	-.02	.06	-.03	.07	.09	.02	.18**
DIET	.16**	.28**	-.06	.01	.06	.01	.05	.12	.09	.00
PHYS	.04	-.03	-.08	-.09	.04	.19**	.10	.08	-.13*	.08
BMI	-.20**	.04	.17**	.01	-.09	-.06	-.04	.00	.00	-.01
Variable	SATAQ		RAT		DIET		PHYS		BMI	
	NCT	CT	NCT	CT	NCT	CT	NCT	CT	NCT	CT
RAT	.58**	.57**	--	--						
DIET	.41**	.53**	.46**	.47**	--	--				
PHYS	-.03	-.03	.06	.06	.12*	.13	--	--		
BMI	-.10*	.15*	.03	.08	.02	.27**	-.14**	.09	--	--

Note. NCT = not constitutionally thin, CT = constitutionally thin. ETHNIC = ethnicity (Caucasian = 1, African American = 0), CSE = ethnic identity, PAROCC = parent occupational status, PAREDU = parent educational attainment, NFI = valuation of romantic need fulfillment, SATAQ = thin-ideal internalization, RAT = perceived romantic appeal of thinness, DIET = dietary restriction, PHYS = physical activity, BMI = body mass.

*$p < .05$, **$p < .01$.

Structural Model

To assess the comparability of the fit of the proposed structural model across the constitutionally thin (CT) and not constitutionally thin (NCT) groups, a stacked model was estimated in which the global fit of the model across groups was directly evaluated, followed by a series of stacked models in which the path coefficients of the structural model were directly compared across groups to determine if the local fit indices varied as a function of ethnicity. Prior to estimating the stacked models, the structural model was evaluated separately within each group as a preliminary step to identify specification errors within each group and to ascertain whether the model fit reasonably well across groups to justify comparing the model fit across groups in a stacked model (i.e., if the model fit very well in one group but very poorly in the other, estimation of the stacked model would be superfluous). Covariances and variances of the manifest variables (i.e., indicators) in the model for the NCT and CT groups are contained in Appendices P and Q, respectively, and means and standard deviations of the manifest variables for the NCT and CT groups are contained in Appendix R. The structural models estimated separately in the NCT and CT groups are presented below in Figures 6 and 7, respectively. The figures contain the within-group standardized path coefficients and disturbances, which communicate the proportion of variance unexplained ($1 - R^2$) in the endogenous variables or sources of influences on the endogenous variables not depicted in the model.

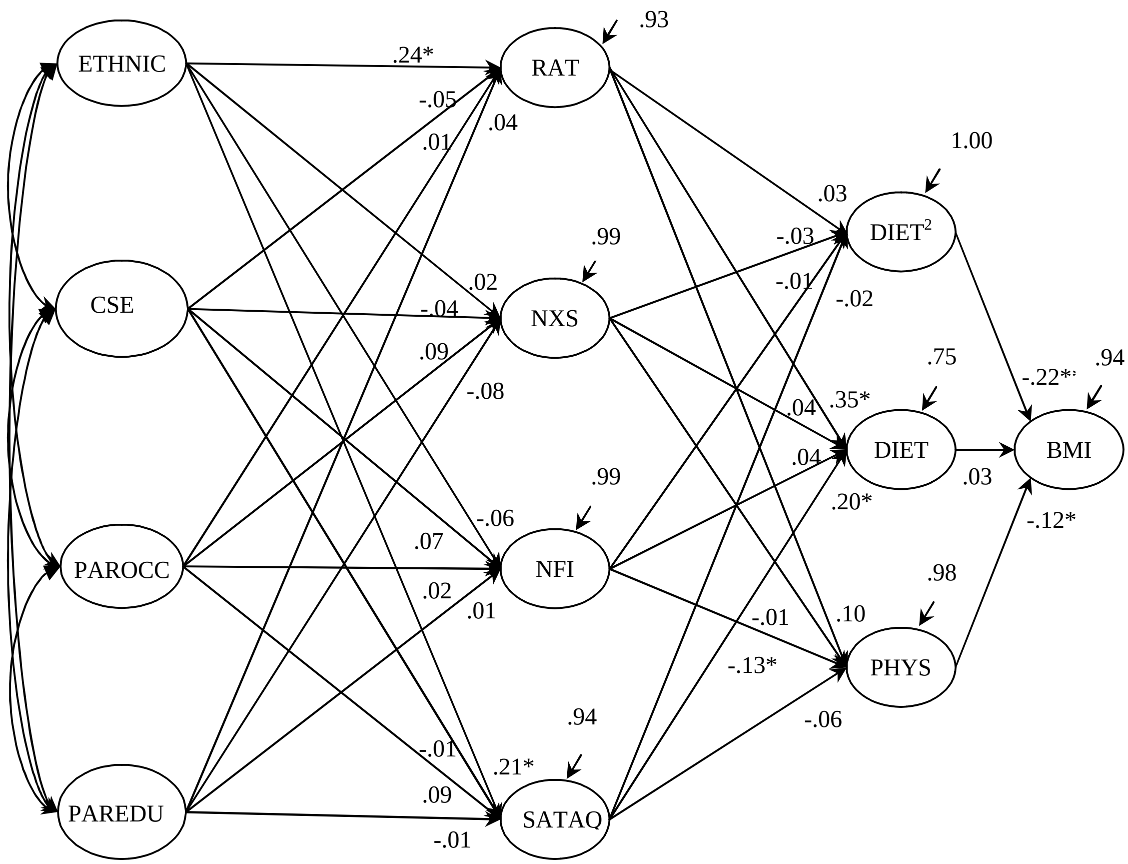

Figure 6. Path diagram depicting the structural relations for the hypothesized model in the NCT group (*n* = 476). ETHNIC = ethnicity (Caucasian = 1, African American = 0), CSE = ethnic identity, PAROCC = parent occupational status, PAREDU = parent educational attainment, RAT = perceived romantic appeal of thinness, NXS = interaction between valuation of romantic need fulfillment and thin-ideal internalization, NFI = valuation of romantic need fulfillment, SATAQ = thin-ideal internalization, $DIET^2$ = quadratic component of dietary restriction, DIET = linear component of dietary restriction, PHYS = physical activity, BMI = body mass. Disturbances of the endogenous variables convey the proportion of variance that is not accounted for by influences depicted in the model. Correlations among the exogenous variables are in Table 12.

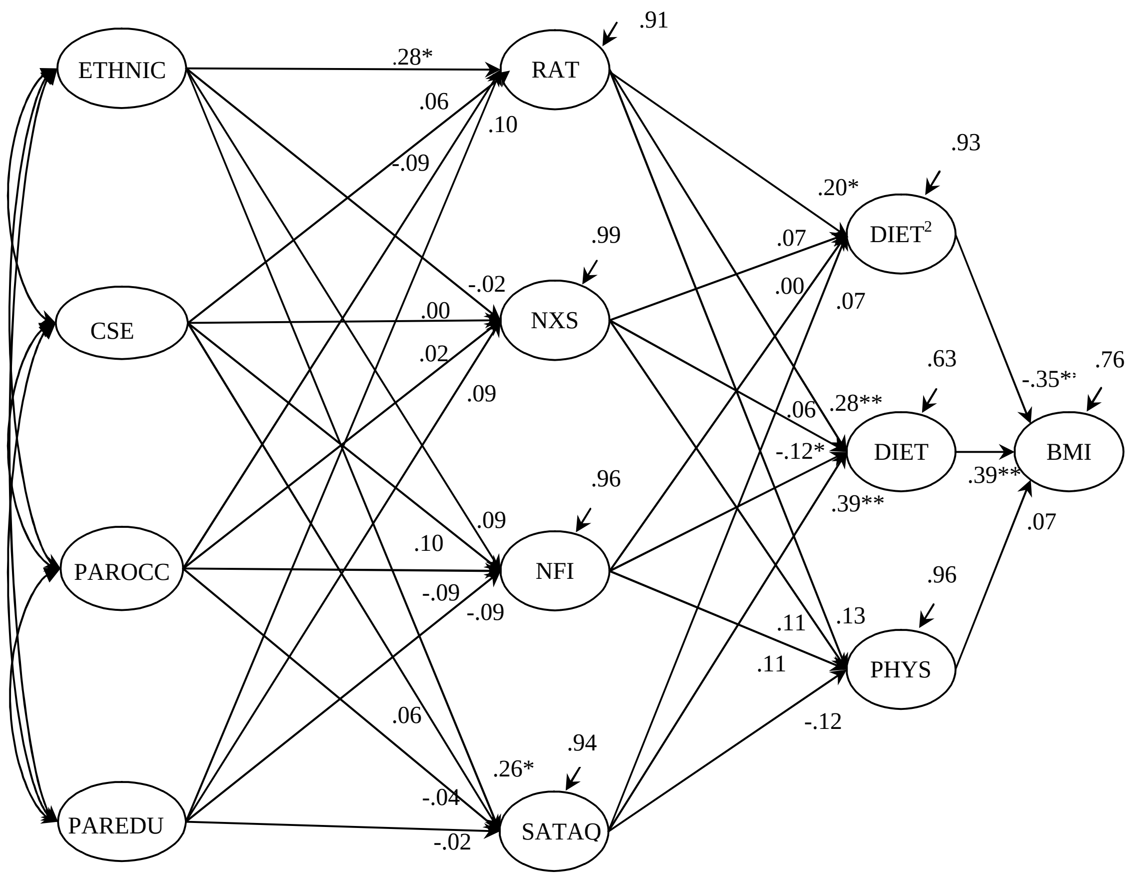

Figure 7. Path diagram depicting the structural relations for the hypothesized model in the CT group (*n* = 270). ETHNIC = ethnicity (Caucasian = 1, African American = 0), CSE = ethnic identity, PAROCC = parent occupational status, PAREDU = parent educational attainment, RAT = perceived romantic appeal of thinness, NXS = interaction between valuation of romantic need fulfillment and thin-ideal internalization, NFI = valuation of romantic need fulfillment, SATAQ = thin-ideal internalization, $DIET^2$ = quadratic component of dietary restriction, DIET = linear component of dietary restriction, PHYS = physical activity, BMI = body mass. Correlations among the exogenous variables are in Table 12.

The structural model was rejected in the NCT group [χ^2 = 515.34, 181 *df*, *p* = .00]; however, other fit indices suggested that the model adequately fit the data [RMSEA = 0.06, CFI = 0.96, standardized RMR = 0.11, GFI = 0.92]. The structural model was also rejected in the CT group [χ^2 = 418.14, 181 *df*, *p* = .00], but other fit indices, with the sole exception of the GFI, indicated that the model fit the data adequately [RMSEA = 0.06, CFI = 0.95, standardized RMR = 0.12, GFI = 0.89].

Because the model fit was not as optimal as had been anticipated in either group, modification indices were inspected to identify potential sources of model misfit. Consistent with the analyses in which ethnicity was the grouping variable, this inspection revealed that allowing the disturbances of the RAT and SATAQ variables to correlate would reduce the chi-square statistic by approximately 128.15 in the NCT group and 67.79 in the CT group. Given the similar nature of the RAT and SATAQ constructs, it is not surprising that they share nonrandom sources of error, and thus allowing their disturbances to correlate was justified by both theoretical and empirical considerations. The structural models were estimated again in both groups with the additional specification of a correlation between the disturbances for RAT and SATAQ. As expected, adding this specification to the model improved the fit of the model in the NCT group [χ^2 = 365.85, 180 *df*, *p* = .00; RMSEA = 0.05, CFI = 0.98, standardized RMR = 0.06, GFI = 0.93] and the CT group [χ^2 = 339.94, 180 *df*, *p* = .00; RMSEA = 0.05, CFI = 0.97, standardized RMR = 0.07, GFI = 0.91]. Thus, the fit indices converged in suggesting that the model fit the data very well in both groups.

To obtain a more precise assessment of the extent to which the model applies to both groups, a series of stacked models was estimated to compare the fit of the model across groups. Fit indices for the series of stacked models are summarized in Table 13.

Table 13

Summary of Fit Indices for Tests of Multigroup Structural Invariance by Constitutional Thinness

Model No.	Equality Constraints Imposed	χ^2	*df*	$\Delta\chi^2$	Δ*df*	CFI	RMSEA
1	Λ_x, Λ_y	720.32*	370	--	--	0.97	0.05
2	Λ_x, Λ_y, Γ	737.66*	386	17.34	16	0.97	0.05
3	Λ_x, Λ_y, Γ, B	799.63*	401	61.97*	15	0.97	0.05

$*p < .05$.

In the first stacked model (Model 1), the Λ_x and Λ_y matrices were constrained to be equal across groups in light of the demonstration of metric invariance in the aforementioned analyses. All other parameters were freely estimated in both groups. Although this stacked model was rejected on the basis of χ^2, the CFI and RMSEA yielded a more favorable assessment of the comparability of the model's fit across groups.

Model 1 then served as the baseline model against which to evaluate the invariance of the hypothesized structural relations among the latent variables across groups. In addition to the equality constraints imposed on the Λ_x and Λ_y matrices, equality constraints were imposed on the Γ matrices in the estimation of Model 2 to determine whether the path coefficients represented in this matrix were invariant across groups.

Constraining the Γ matrices to be equal across groups failed to produce a significant deterioration in the fit of the model, indicating that the path coefficients represented by elements in the Γ matrix did not vary significantly across groups.

The path coefficients that remained to be evaluated for invariance across groups were contained in the B matrix, and thus the next model estimated in the series, Model 3, was characterized by an additional equality constraint imposed on the B matrices. Constraining the B matrix to be equal across groups resulted in a significant degradation of the fit of the model, suggesting that at least one of the parameters in the B matrix was notable for significant differences across groups. To identify the sources of noninvariance in the B matrices, each of the parameters in the B matrix was constrained to be equal across groups one at a time, and the resultant change in χ^2 was examined for significance to ascertain whether the parameter in question differed significantly across groups. Because multiple pairwise comparisons were conducted, thereby inflating the familywise Type 1 error rate, Holm’s (1979) modified Bonferroni procedure, which is recommended by Jaccard and Wan (1996) when conducting multiple pairwise contrasts, was used to maintain a familywise Type 1 error rate of .05.

Path coefficients in the B matrix that evidenced significant differences across groups included the following: SATAQ-DIET, NFI-DIET, NFI-PHYS, PHYS-BMI, and DIET^2-BMI. Because the path coefficients for NFI-DIET and NFI-PHYS were not key aspects of the hypothesized model and were of little practical significance (i.e., small effect size) in both groups and were, they were not interpreted further. In both groups, thin-ideal internalization was significantly and positively predictive of higher levels of dietary restriction while controlling for the perceived romantic appeal of thinness, perceived importance of the fulfillment of romantic needs, and the interaction between thin-ideal internalization and perceived importance of the fulfillment of romantic needs; however, this relationship was significantly stronger in the CT group relative to the NCT group [$\Delta\chi^2 = 9.84$, $\Delta df = 1$, $p = .002$]. Higher levels of physical activity were significantly predictive of body mass while controlling for the linear and quadratic effects of dietary restriction in the NCT group, while the CT group failed to evidence a significant effect of physical activity on body mass, and the magnitude of this relationship differed significantly across groups [$\Delta\chi^2 = 6.33$, $\Delta df = 1$, $p = .01$]. In addition, the quadratic trend of the relationship between dietary restriction and body mass was significantly larger in the CT group relative to the NCT group [$\Delta\chi^2 = 7.31$, $\Delta df = 1$, $p = .007$].

In both groups, ethnicity evidenced a significant, positive relationship with both thin-ideal internalization and the perceived romantic appeal of thinness in the presence of ethnic identity, parent occupational status, and parent educational attainment; thus, consistent with expectation, Caucasian females were significantly higher than their African American counterparts on both thin-ideal internalization and the perceived romantic appeal of thinness.

In both groups, consistent with the hypothesized model, the perceived romantic appeal of thinness significantly and positively predicted dietary restriction in the presence of thin-ideal internalization, valuation of the fulfillment of romantic needs, and the interaction between the two latter variables. However, contradictory to the hypothesized structural model, the perceived romantic appeal of thinness did not significantly predict physical activity in either group.

In both groups, as hypothesized, greater thin-ideal internalization predicted greater dietary restriction in the presence of the romantic appeal of thinness, valuation of romantic need fulfillment, and the interaction between thin-ideal internalization and the valuation of romantic need fulfillment. In both groups, contrary to the hypothesized structural model, the interaction between thin-ideal internalization and the valuation of romantic need fulfillment failed to make a significant contribution to either dietary restriction or physical activity in the presence of the main effects and the belief that thinness increases one's romantic appeal to men.

As hypothesized, physical activity manifested a significant, negative association with body mass while controlling for dietary restriction; however, this effect was of a small magnitude (Cohen, 1992) and has little practical significance. Contrary to prediction, physical activity failed to predict body mass in the CT group.

It was also hypothesized that the linear effect of dietary restriction would evidence a significant, negative relationship in the NCT group, while the relationship between these variables would be nonsignificant in the CT group. However, neither of these predictions was supported by the data; rather, the relationship between dietary restriction and body mass was unexpectedly curvilinear, as evidenced by the significant quadratic effect of dietary restriction in both groups. Including the quadratic component of dietary restriction in the model increased the amount of variance in body mass explained by its proximal predictors from 2.12 % to 6.18% in the NCT group and 7.27% to 24.15% in the CT group.

To better understand the nature of the relationship between dietary restriction and body mass, the quadratic effect was further explored in each of the groups per recommendations of Aiken and West (1991). The negative path coefficient for the quadratic effect of dietary restriction suggests that the shape of the relationship is concave downward. The relationship between dietary restriction and body mass was more precisely evaluated by examining the standardized simple slopes for the relationship between dietary restriction and body mass at one standard deviation below the mean of dietary restriction, the mean of dietary restriction, and one and two standard deviations above the mean of dietary restriction. The point of inflection of the curve, or maximum point on the curve at which the slope changes direction, was also calculated using the intercept for the latent variable body mass and the unstandardized linear and quadratic coefficients for dietary restriction. The standardized simple slopes at these points along the curve and corresponding coordinates for these points are displayed below in Table 14. Line graphs depicting the curvilinear relationship between dietary restriction and body mass for the NCT and CT groups are contained below in Figures 8 and 9, respectively.

As demonstrated in the line graphs in Figures 8 and 9, the nature of the relationship between dietary restriction and body mass, while concave downward in both groups, is slightly different. Inspection of the standardized simple slopes for the NCT group revealed that the relationship between dietary restriction and body mass was significant and positive at one standard deviation below the mean of dietary restriction, but at the mean of dietary restriction, the slope was not significant, indicating that dietary restriction was not predictive of body mass at this location on the curve. At one standard deviation above the mean of dietary restriction and beyond, the simple slope was again significant, but the direction of the relationship between dietary restriction and body mass was negative such that higher levels of dietary restriction were associated with lower levels of body mass.

In contrast, the standardized simple slopes for the CT group were significant and positive for values of dietary restriction that ranged from one standard deviation below the mean of dietary restriction to the mean of dietary restriction, suggesting that greater levels of dietary restriction were associated with greater levels of body mass along this portion of the curve. At one standard deviation above the mean of dietary restriction, the slope did not differ significantly from zero, indicating that dietary restriction had ceased to predict body mass at this location on the curve. However, the negative slope became increasingly steep as values of dietary restriction increased, and the slope attained significance at two standard deviations above the mean of dietary restriction.

Thus, although a curvilinear relationship between dietary restriction and body mass was not a priori hypothesized, the hypothesis that dietary restriction and body mass would evidence a negative relationship in the NCT group and a nonsignificant relationship in the CT group was supported for the subset of participants who reported a level of dietary restriction that was one standard deviation above the mean. The relationship between dietary restriction and body mass eventually became significant at two standard deviations above the mean in the CT group, but the negative relationship between dietary restriction and body mass is relevant to a smaller subset of participants in this group relative to the NCT group, for which this relationship was apparent at one standard deviation above the mean.

Table 14

Standardized Simple Slopes and Point Coordinates to Describe the Curvilinear Relationship between Dietary Restriction and Body Mass in the NCT (n = 476) and CT groups (n = 270)

Point on the curve	Standardized Simple Slope		*X* and *Y* Coordinates	
	NCT	CT	NCT	CT
1 *SD* below the mean	.46*	1.10*	(1.91, 25.87)	(1.26, 18.02)
Mean	.03	.39*	(2.71, 26.73)	(2.19, 18.84)
Point of inflection	0	0	(2.79, 26.74)	(2.99, 19.06)
1 *SD* above the mean	-.40*	-.32	(3.51, 26.16)	(3.20, 19.05)
2 *SD* above the mean	-.83*	-1.03*	(4.30, 24.16)	(4.22, 18.54)

Note. Dietary restriction was measured on a rating scale ranging from 1 to 5, where the highest score indicates the highest level of dietary restriction.

*$p < .001$.

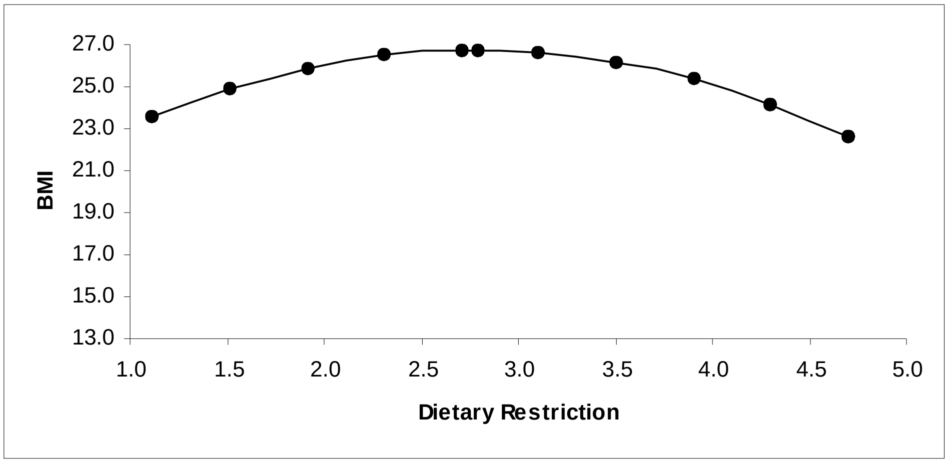

Figure 8. Line graph depicting the curvilinear relationship between dietary restriction and body mass in the NCT group. At lower levels of dietary restriction, dietary restriction and body mass are positively related to each other, but dietary restriction ceases to predict body mass at moderate levels of dietary restriction. However, at higher levels of dietary restriction (i.e., 1 *SD* above the mean and beyond), dietary restriction again predicts body mass, but the direction of the relationship has reversed and become negative.

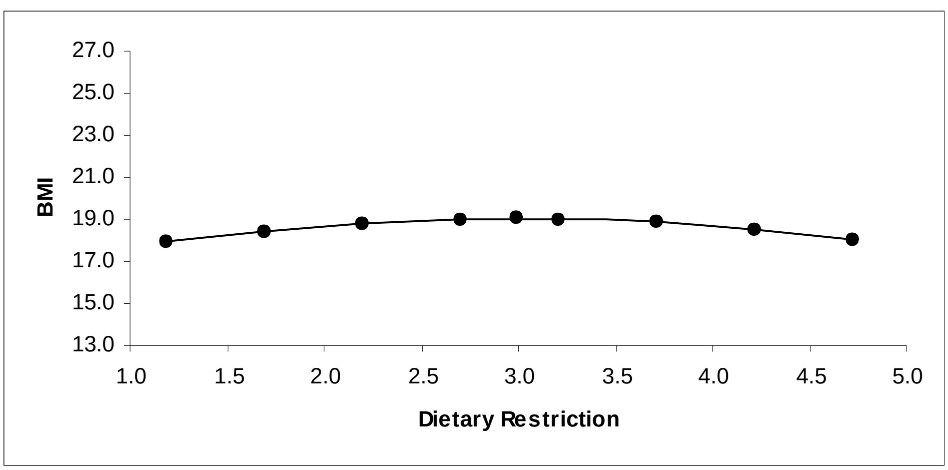

Figure 9. Line graph depicting the curvilinear relationship between dietary restriction and body mass in the CT group. Dietary restriction is positively related to body mass at

lower and moderate levels of dietary restriction, but at two standard deviations above the mean of dietary restriction, the relationship between dietary restriction and body mass becomes negative.

Mediational Analyses

The correlation between ethnicity and body mass index was significant at $p < .05$ in the NCT group ($\phi = -.20$), and thus the hypothesis that this relationship was mediated by the proposed chain of intervening variables in the structural model was further explored. A direct effect of ethnicity on body mass was added to the hypothesized structural model to examine the indirect effect of ethnicity on body mass index in the presence of the direct effect. Because ethnic identity was significantly correlated with both ethnicity and body mass, a path from ethnic identity to body mass was also estimated to control for the effect of ethnic identity. Adding the direct effect of ethnicity on body mass slightly changed the path coefficients from the linear and quadratic components of dietary restriction to body mass and physical activity to body mass; the standardized and unstandardized path coefficients and standard errors for these paths are presented below in Table 15.

Because a fundamental assumption of mediational analysis is that of linearity of the variables involved, inclusion of the quadratic component of dietary restriction of body mass in its extant state appeared to be inappropriate. Thus, to conduct the mediational analysis while satisfying the assumption of linearity, mediation of the effect of ethnicity on body mass was evaluated at three different levels of the relationship between dietary restriction and body mass: the mean of dietary restriction and one standard deviation above and below the mean of dietary restriction. The standardized simple slopes of the relationship between dietary restriction and body mass at each of these levels of dietary restriction served as standardized path coefficients for the relationship between dietary restriction and body mass. As the simple slopes for the relationship between dietary restriction and body mass were slightly altered by the addition of the direct effect from ethnicity to body mass, the altered simple slopes in both standardized and unstandardized form, as well as their standard errors, at the mean and one standard deviation above and below the mean of dietary restriction are displayed below in Table 16.

Table 15

Relevant Parameters for the Direct Effects of Ethnicity, the Linear and Quadratic Components of Dietary Restriction, and Physical Activity on Body Mass for the NCT Group (n = 476)

Parameter	Ethnicity	Linear Component of Dietary Restriction	Quadratic Component of Dietary Restriction	Physical Activity
Standardized Path Coefficient	-.17*	.06	-.22*	-.11*
Unstandardized Path Coefficient	-2.17	.38	-1.15	-.01
Standard Error	.61	.27	.24	.00

Note. Ethnicity was coded such that Caucasian = 1, African American = 0.

*p < .05.

Table 16

Standardized and Unstandardized Simple Slopes and Standard Errors for the Relationship Between Dietary Restriction and Body Mass in the NCT Group (n = 476)

Parameter	1 *SD* below the mean of dietary restriction	Mean of dietary restriction	1 *SD* above the mean of dietary restriction
Standardized Simple Slope	.50*	.06	-.37*
Unstandardized Simple Slope	2.26	.38	-1.50
Standard Error	.48	.27	.47

*$p < .01$.

To evaluate the hypothesis that the observed relationship between ethnicity and body mass in the NCT group was mediated by the proposed intervening variables, the direct effect of ethnicity on body mass index that was estimated in the presence of the indirect effects was compared to the observed correlation between ethnicity and body mass index to determine whether the direct effect of ethnicity on body mass index had decreased in the presence of the indirect effect. The observed relationship between ethnicity and body mass (ϕ = -.20) decreased in the presence of the indirect effects (γ = -.17), but the direct effect remained significant in the presence of the indirect effects, thereby demonstrating partial mediation (Kenny, Kashy, & Bolger, 1998).

To obtain a more precise estimate of the amount of mediation evidenced by the proposed model, the ratio of total indirect effects to total effects, i.e., the sum of direct and indirect effects, was computed to ascertain the proportion of the relationship between ethnicity and body mass that was mediated by the proposed intervening variables. Because some of the specific indirect effects that were summed together to compute the total indirect effects were of opposite signs (e.g., positive and negative), it was possible that the total indirect effect would be cancelled out when the positive and negative products were summed, thereby yielding a spuriously low total indirect effect that failed to represent adequately the magnitude of total indirect effects and total effects. Thus, the total indirect effects and total effects were computed by summing the absolute values of the products of the original standardized path coefficients to circumvent the problem of underestimation of the total indirect and total effects. The strategy of computing the proportion of mediation with the absolute values of all effects has been endorsed by others (e.g., Alwin & Hauser, 1975). The standardized total indirect effects, standardized total effects, and the ratio of the former to the latter (i.e., proportion of the effect of mediation) are presented below in Table 17. As demonstrated in the table, a notable proportion of the effect is not mediated by the hypothesized intervening variables, thus indicating that much of the relationship between ethnicity and body mass remains unexplained by the hypothesized structural model.

Table 17

Standardized Total Indirect Effects, Standardized Total Effects, and the Proportion of the Mediated Effect in the NCT Group (n = 476)

Level of Dietary Restriction	Standardized Total Indirect Effects	Standardized Total Effects	Proportion of Mediation
1 SD < Mean of Dietary Restriction	.07	.24	.28
Mean of Dietary Restriction	.01	.19	.07
1 SD > Mean of Dietary Restriction	.05	.23	.23

Although the proposed mediational model failed to account for a substantial portion of the total effect of ethnicity on body mass, some of the effect was nonetheless mediated by the intervening variables. To further decompose the total indirect effects to ascertain which of the pathways were primarily responsible for the mediation of the relationship between ethnicity and body mass, specific indirect effects of the mediational pathways whose intervening variables were significantly related to each other were calculated by computing the product of the standardized path coefficients for each of the constituent linkages in the pathway. Inspection of the standardized path coefficients revealed that only two of the eight mediational pathways connecting ethnicity to body mass were comprised of uniformly significant linkages: the path comprised of the intervening variables perceived romantic appeal of thinness and dietary restriction (i.e., ETHNIC-

RAT-DIET-BMI) and the path comprised of thin-ideal internalization and dietary restriction (i.e., ETHNIC-SATAQ-DIET-BMI). Thus, mediational analyses were focused on analyzing the specific indirect effects represented by these pathways.

Of note, the relationship between dietary restriction and body mass was significant only at one standard deviation above and below the mean, and therefore specific indirect effects were planned for these two levels of dietary restriction only. However, it was first necessary to confirm that ethnic differences in body mass index existed at these two ranges of dietary restriction to establish that there was an effect to be mediated at these levels of dietary restriction. Thus, the NCT group was divided into tertiles (i.e., thirds) based on dietary restriction, and mean levels of body mass index for Caucasians and African Americans were subsequently compared at the lowest and highest tertiles of dietary restriction. The results of this analysis revealed that, as expected, African Americans' body mass index [$M = 30.13$, $SD = 4.16$] was greater than that of Caucasians [$M = 24.99$, $SD = 4.16$] at higher levels of dietary restriction [$t(21.75) = 2.90$, $p = .01$]; however, at lower levels of dietary restriction, the ethnic groups did not differ on body mass index [$t(155) = 1.47$, $p = .15$; African Americans: $M = 26.14$ ($SD = 3.98$), Caucasians: $M = 25.04$ ($SD = 4.17$)].

Given that there was no ethnic difference in body mass to be mediated at lower levels of dietary restriction, then, the mediational analysis was focused on the pathways ETHNIC-RAT-DIET-BMI and ETHNIC-SATAQ-DIET-BMI at higher levels of dietary restriction only. The proportions of the total indirect effects accounted for by each of the specific indirect effects of the two aforementioned mediational pathways (i.e., a ratio of each specific indirect effect to the total indirect effects) at higher levels of dietary restriction are presented below in Table 18.

In addition, the significance of each of these specific indirect effects was evaluated using the Sobel test (Sobel, 1982). As noted earlier in the text, it is necessary to establish the independence of the path coefficients that comprise each pathway prior to applying the Sobel test to indirect effects in structural equation modeling. To test the independence of the path coefficients that comprised each pathway, the correlations of the parameters were obtained from LISREL output. For ETHNIC-RAT-DIET-BMI, the correlations of the pathways ranged from .000-.002 in absolute value, indicating that the constituent parameters of this specific indirect effect satisfy the prerequisite of independence for the Sobel test. Similarly, the correlations of the parameters that comprise the specific indirect effect ETHNIC-SATAQ-DIET-BMI ranged from .000 to .006 in absolute value, thereby demonstrating independence and validating the appropriateness of the Sobel test for evaluating the significance of this indirect effect.

As demonstrated in Table 18 below, both of the specific indirect effects evidenced significant mediation of the effect of ethnicity on body mass at one standard deviation above the mean of dietary restriction. The value of the Z-statistic for the pathway ETHNIC-RAT-DIET-BMI was –2.40 at one standard deviation above the mean of dietary restriction. The value of the Z-statistic for the pathway ETHNIC-SATAQ-DIET-BMI was –2.11 at one standard deviation above the mean of dietary restriction.

Table 18

Standardized Specific Indirect Effects, Standardized Total Indirect Effects, and the Proportion of the Mediated Effect in the NCT Group (n = 476)

Dietary Restriction Level	Standardized Specific Indirect Effects		Proportion of Total Indirect Effect Mediated by Specific Indirect Effect	
	ETHNIC-RAT-DIET-BMI	ETHNIC-SATAQ-DIET-BMI	ETHNIC-RAT-DIET-BMI	ETHNIC-SATAQ-DIET-BMI
1 *SD* > *M*	.03*	-.05*	.59	.30

*$p < .05$.

The correlation between ethnicity and body mass index was not significant in the CT group (ϕ = .04), thereby failing to satisfy a basic prerequisite for mediation (Baron & Kenny, 1986) and precluding mediation.

Summary

The measurement model demonstrated an excellent fit in both the NCT and CT groups, and the assumption of multigroup metric invariance was satisfied. Although it was hypothesized that the structural model would evidence a superior fit in the NCT group relative to the CT group, this prediction was not supported: The structural model was characterized by an excellent fit in both groups. The two groups were also marked by more similarities than differences in terms of the pathways to body mass that consisted of the strongest linkages. For both groups, ethnicity significantly predicted both thin-ideal internalization and the perceived romantic appeal of thinness independently of the contributions of ethnic identity, parent occupational status, and parent educational attainment. Thin-ideal internalization and the perceived romantic appeal of thinness, in turn, were significantly and positively predictive of dietary restriction, which evidenced a curvilinear relationship with body mass.

The curvilinear relationship between dietary restriction and body mass is suggestive of a more complex relationship between these two variables than was hypothesized. The direction of the relationship between dietary restriction and body mass varied depending on the level of dietary restriction in the NCT group: Dietary restriction was positively related to body mass at lower values of dietary restriction, not related to body mass at moderate levels of dietary restriction, and negatively related to body mass at higher values of dietary restriction. In the CT group, dietary restriction was positively related to body mass at lower and moderate values of dietary restriction and negatively related to body mass at higher values of dietary restriction. Thus, the hypothesis of a negative relationship between dietary restriction and body mass was supported in both groups, but only at higher levels of dietary restriction. Of note, the negative relationship between dietary restriction and body mass observed at higher levels of dietary restriction was relevant to a larger proportion of participants in the NCT group than the CT group, as this relationship was significant in the NCT group at one standard deviation above the mean of dietary restriction and beyond, but significant in the CT group only at two standard deviations above the mean of dietary restriction and beyond.

With regard to the hypothesis that the relationship between ethnicity and body mass index would be mediated by the proposed intervening variables in the NCT group but not the CT group, this prediction was supported. Because ethnicity was not significantly related to body mass in the CT group, there was no relationship to be explained by intervening variables. In the NCT group, the specific indirect effects represented by the pathways ETHNIC-RAT-DIET-BMI and ETHNIC-SATAQ-DIET-BMI were statistically significant at one standard deviation above the mean of dietary restriction, thereby providing partial support for the mediational framework proposed in the current study. However, based on the proportion of the total effect of ethnicity on body mass that was left unexplained by the total indirect effect of ethnicity on body mass index, it appears that the relationship between ethnicity and body mass cannot be wholly accounted for by the hypothesized structural model.

Discussion

Primary Aims

Replication of Ethnic Differences

One principal aim of this study was to replicate previous findings of ethnic differences in internalization of the thin ideal, weight management behaviors, and body mass index. Consistent with previous research on ethnic differences in thin-ideal internalization (Perez & Joiner, 2003; Powell & Kahn, 1995), Caucasian females in the current study evidenced greater subscription to the thin ideal than their African American peers. In addition, findings from the current study converged with past research demonstrating that Caucasian females are characterized by greater levels of dietary restriction (e.g., Akan & Grilo, 1995; Gluck & Geliebter, 2002) and lower levels of body mass index (Burke & Bild, 1996) than African American females.

Given that ethnic differences in physical activity have been reliably documented among adult women in previous research (Eyler et al., 2002), the lack of ethnic differences in physical activity was surprising. One possible explanation for this finding concerns the validity of the self-report measure of physical activity used in the current study. Participants may have been unable to provide a precise estimate of the amount of time spent engaging in the different types of physical activity assessed; indeed, concerns about the validity of self-report measures of physical activity have inspired greater use of instruments that record daily steps in the moment, such as pedometers and accelerometers, in the measurement of physical activity (Bennett, Wolin, Puleo, & Emmons, 2006). Moreover, the challenges imposed by typical self-report assessments were likely amplified in the current study by modifications made to the questionnaire to accommodate the limitations of the online data collection system Experimentrak. Participants were required to complete several questions, rather than the usual, single question on the original questionnaire, to report the number of hours and minutes spent engaging in physical activity on a given day of the week. This alteration of the original questionnaire likely increased the occurrence of errors in data completion, despite efforts to preclude the inclusion of such errors in analyses by excluding out-of-range and clearly implausible values. The plausibility of this explanation for the lack of ethnic differences in physical activity is enhanced by the failure of physical activity to evidence significant relationships with the majority of variables to which it was expected to relate.

An alternative explanation for the absence of ethnic differences in physical activity pertains to the limited variability of socioeconomic status in the current sample. That is, the ethnic differences in physical activity that have been identified in previous research may be ascribable to socioeconomic status, which is confounded with ethnicity. For example, one study of a nationally representative sample of middle-aged adults found that education was a far more powerful predictor of leisure-time physical activity than ethnicity (He & Baker, 2005), thereby implying that socioeconomic status accounts for ethnic differences in physical activity. In addition, ethnic differences in physical activity were absent in studies that, similar to the current one, utilized samples comprised predominantly of lower socioeconomic status participants (Bennett et al., 2006) or higher socioeconomic status (e.g., college students) participants (Suminski, Petosa, Utter, &

Zhang, 2002). Alternatively, it is possible that the absence of ethnic differences in physical activity accurately reflects commensurate levels of physical activity practiced by African American and Caucasian females.

Integrative Model

A second primary aim of this study was to extend past findings of ethnic differences in thin-ideal internalization, weight management behavior, and body mass index by evaluating these variables in the context of an integrative model that may help to explain ethnic differences in body mass index. Evaluation of the integrative model revealed that key components of the proposed model partly explained ethnic differences in body mass index at higher levels of dietary restriction in participants lacking in constitutional thinness. Results of the current study are consistent with the hypothesis that one possible pathway through which Caucasian females may attain and maintain lower body mass relative to African American females is by way of their greater subscription to the thin ideal, which may then inspire greater dietary restriction, which, at higher levels, may produce lower body mass. It should be noted that the proposed mediators left much of the relationship between ethnicity and body mass unexplained, thereby indicating that the contribution of other factors, such as genetics, to the explanation of ethnic differences in body mass should be evaluated further. However, this study nonetheless contributes to the literature by illustrating the potential for ethnic differences in sociocultural beliefs about appearance to influence ethnic disparities in physical health, of which body mass is a marker.

Thin-Ideal Internalization and Weight Control Behavior

With regard to specific hypothesized pathways within the integrative model, the primary pathways that conformed to expectation, as noted above, were the pathways from thin-ideal internalization to dietary restriction, which then predicted body mass. Similar to previous research (Stice, 2002), thin-ideal internalization was positively associated with dietary restriction in all subgroup analyses, and this relationship was maintained in the structural models for the Caucasian, NCT, and CT subgroups. However, this relationship unexpectedly did not hold in the structural model estimated in the African American group, for which the correlation between thin-ideal internalization and dietary restriction diminished to nonsignificance in the presence of other variables in the structural model. The degradation of this relationship in the structural model is likely attributable to the presence of perceived romantic appeal of thinness, which is strongly related to both thin-ideal internalization and dietary restriction; thus, the perceived romantic appeal of thinness appears to be the more important predictor of dietary restriction in African Americans.

It was hypothesized that thin-ideal internalization would positively predict physical activity in all subgroups. However, thin-ideal internalization demonstrated an unexpected relationship with physical activity in the African American group, whereby greater levels of thin-ideal internalization were associated with lower, rather than higher, levels of physical activity. One possible explanation of this finding pertains to the measure of thin-ideal internalization used in the current study, the SATAQ. This measure assesses the desire to emulate the physical appearance of popular media figures, with the assumption that the thin ideal is very pervasive in the media, and therefore admission of the desire to resemble popular media images is tantamount to desiring to be thin. However, the media images that target African American women typically include larger, more voluptuous bodies than those that target Caucasian women, and therefore it may be that the desire to resemble media icons is not commensurate with the desire to have a thin body type among African American women. Thus, African American women who harbor a strong desire to resemble popular media icons may engage in lower levels of physical activity for fear that physical activity would negatively distort some of the physical attributes that are positively portrayed in media images aimed at African American women. Although not significant due to a lack of power, the relationship between the perceived romantic appeal of thinness and physical activity among African American women was positive.

An alternative interpretation of the unanticipated negative relationship between thin-ideal internalization and physical activity in the African American group is that both of these variables may be influenced by a common third variable such as media exposure; that is, frequently viewing television may cause African American women to desire to emulate the appearance of popular media icons and result in less time spent engaging in physical activity. However, it is not clear why this would be true for African American but not Caucasian women, a group that failed to evidence a relationship between thin-ideal internalization and physical activity.

Contrary to prediction, thin-ideal internalization also failed to predict physical activity in the subgroups categorized by constitutional thinness. If this finding is construed as a veridical representation of the relationship between thin-ideal internalization and physical activity, then it would seem that physical activity is not a commonly employed method of weight control for women who seek to attain the thin ideal. However, as previously noted, the validity of the self-report measure of physical activity utilized in the current study is suspect, and therefore conclusions about the relationship between thin-ideal internalization and physical activity remain ambiguous.

An interaction between thin-ideal internalization and the valuation of romantic need fulfillment was hypothesized in the current study, such that thin-ideal internalization was expected to evidence a stronger relationship with weight control behavior at higher levels of the valuation of romantic need fulfillment. However, this interaction failed to account for a significant amount of variance in weight control behavior in any subgroup analyses. Given that the valuation of romantic need fulfillment was uniformly high among participants, one compelling interpretation of this nonsignificant interaction is that the lack of variability in the valuation of romantic need fulfillment precluded differentiation of participants' weight control behavior on the basis of this variable. In light of the salience of dating and sexuality to females in late adolescence and young adulthood, it is not terribly surprising that romantic needs were overwhelmingly considered important by the current sample.

Weight Control Behavior and Body Mass

The hypothesis that greater levels of physical activity would predict lower levels of body mass was supported only in the group of participants lacking in constitutional thinness, and this effect was of a small magnitude (Cohen, 1992). The failure of physical activity to predict body mass in the other groups is likely attributable to the compromised validity of the measure of physical activity (as described above), which probably attenuated many of the structural relations between physical activity and other variables in the model. One study in which physical activity was assessed with a pedometer found that greater levels of physical activity (i.e., more daily steps) were associated with lower body mass index, as expected (Bennett et al., 2006), suggesting that a more ecologically valid method of measurement may have yielded a pattern of results more consistent with the theoretical model proposed in the current study.

A third primary aim of the current study was to make sense of the counterintuitive finding from previous research that dietary restriction is predictive of an increase in body mass (e.g., French et al., 1994; Klesges, Klem, & Bene, 1989; Klesges, Isbell, & Klesges, 1992; Stice, Cameron, Killen, Hayward, & Taylor, 1999; Stice, Presnell, Shaw, & Rohde, 2005). This pattern of results has been ascribed to binge eating, which is associated with dietary restriction and may be responsible for weight gain, or increased metabolic efficiency that results from repeated attempts at dieting (Polivy & Herman, 1985). In the current study, an alternative explanation for this curious finding was explored by examining the utility of constitutional thinness as a moderator of this relationship. It was expected that the relationship between dietary restriction and body mass would be negative among individuals classified as lacking in constitutional thinness. Among constitutionally thin individuals, for whom weight control is theoretically accomplished relatively effortlessly, it was expected that dietary restriction would not be related to body mass. However, an unexpected pattern of results emerged in the current study: The relationship between dietary restriction and body mass manifested a quadratic component in all subgroup analyses, indicating a curvilinear relationship between these two variables.

The quadratic effect of dietary restriction on body mass identified here echoes the findings from a prospective, longitudinal study of dietary restriction and weight change in a community sample of adolescents (Stice, 1998). Similar to the pattern of results that emerged in the current study, at lower to moderate levels of dietary restriction, dietary restriction was positively related to body mass, but at higher levels of dietary restriction, dietary restriction was negatively related to body mass. In the current study, dietary restriction and body mass were characterized by a positive relationship at lower and moderate levels of dietary restriction in the African American, Caucasian, and CT subgroups; the NCT subgroup, in contrast, was characterized by a positive relationship between dietary restriction and body mass at lower levels of dietary restriction, but at moderate levels, the relationship between dietary restriction and body mass was nonsignificant. The negative relationship between dietary restriction and body mass observed at higher levels of dietary restriction was obtained in all subgroups.

Although the cross-sectional design of the current study precludes inferences of causation or directionality, consistent with Stice's interpretation of the curvilinear relationship between dietary restriction and body mass, the current findings tentatively suggest that dietary restriction may be effective at producing its intended result, lower body weight, only at higher levels of dietary restriction. The significant, negative relationship between dietary restriction and body mass observed at higher levels of dietary restriction was apparent in the Caucasian and NCT groups at one standard deviation above the mean on dietary restriction, but this relationship, although negative, was not significant in the African American and CT groups at one standard deviation above the mean on dietary restriction. However, at two standard deviations above the mean on dietary restriction, the slope grew steeper and attained significance in the African American and CT groups. This pattern of findings may have emerged because the value of dietary restriction that characterized the African American and CT groups at one standard deviation above the mean on dietary restriction was lower than that which characterized the Caucasian and NCT groups at the same point in their own distributions; that the relationship between dietary restriction and body mass became sufficiently steep to attain significance in the African American and CT groups as dietary restriction increased suggests that there may be a certain threshold of dietary restriction that must be attained for it to produce or maintain lower body mass.

Individuals at lower levels of dietary restriction, who are generally characterized by lower body mass, may not restrict dietary intake for weight control purposes because their weight is successfully controlled without having to make conscious effort to restrict dietary intake; that is, they consume an amount of food that is within the limits of caloric intake necessary to maintain a low body weight without consciously restraining themselves from consuming more. These individuals would thus appear to share the key theoretical feature of constitutionally thin individuals, that of weight control being relatively effortless. As a positive relationship between dietary restriction and body mass characterized individuals at the lowest levels of dietary restriction in both the CT and NCT groups, then, it would appear that the current operational definition of constitutional thinness may lack sensitivity, as the individuals in the NCT group who reported lower levels of dietary restriction are apparently able to maintain a lower body mass without exerting much effort to do so. Alternatively, the individuals who have a low body weight while engaging in low levels of dietary restriction may rely on an alternative weight control strategy, such as physical activity. For example, athletic females who participate regularly in sports that demand a high level of aerobic activity may consume large quantities of food while maintaining a low body weight because of the high level of calories expended through physical activity. An attempt to test the hypothesis implicit in this explanation was made by investigating the possibility of an interaction effect between dietary restriction and physical activity on body mass, but the interaction was nonsignificant, possibly because of problems with the method of measuring physical activity employed in the current study.

That body mass increases as dietary restriction increases at lower levels of dietary restriction and, in all subgroups but the NCT group, at moderate levels of dietary restriction as well may be a consequence of greater binge eating that theoretically occurs among unsuccessful dieters (Polivy & Herman, 1985). That is, according to the dietary restraint model, dietary restriction may inadvertently result in weight gain through excessive reliance on cognitive, rather than physiological, cues to regulate food consumption, thereby increasing the likelihood that overeating will occur when attention is diverted from the goal of restricting food intake (Polivy & Herman, 1985). The endorsement of dietary restriction some but not all of the time (i.e., moderate level of dietary restriction) would seem to imply that individuals are attempting to restrict dietary intake for the purpose of weight control but not succeeding much of the time. Thus, they may be overeating despite their desire and intention not to do so, and the consequence of this behavior is greater body mass. Based on the dietary restraint model, it might be expected that, contrary to the current pattern of results, the highest levels of body mass should be observed at the highest levels of dietary restriction; however, the results of the current study suggest that some people are able to utilize dietary restriction effectively over a protracted period of time to achieve its intended purpose, that of lower body weight. These individuals appear to be very effective at regulating their eating behavior, demonstrating the ability to subvert the tendency to abandon restraint and overeat.

That the results from the current study converged with those of Stice's (1998) study and diverged from those of the aforementioned studies that implicated dietary restriction in weight gain may be accounted for by differences in the measures of dietary restriction used in these studies: The current study and Stice's (1998) study used the Dutch Eating Behavior Questionnaire (van Strien et al., 1986) and the Dietary Intent Scale (Stice, 1998) to assess dietary restriction, whereas the other studies used a categorical, yes-no measure of dieting (e.g., "Are you on a diet?") or other continuous measure of dietary restriction (e.g., Restraint Scale; Polivy, Herman, & Warsh, 1978). Of note, a recent study on the validity of various dietary restriction measures examined in a wide variety of settings found that the Dietary Intent Scale was the scale that, of five dietary restraint scales, was the only one to correlate significantly and negatively with both caloric intake and fat gram intake, thereby suggesting that it evidenced psychometric properties superior to those demonstrated by other measures of dieting (Stice, Fisher, & Lowe, 2004). To the extent that the DIS has greater validity than other measures of dieting, then, it may be better suited to provide information about the relationships between dietary restriction and other variables, such as body mass. Thus, the use of the DIS in the current study and Stice's (1998) study may lend more credibility to the finding of a curvilinear relationship between dietary restriction and body mass relative to other studies whose measures of dietary restriction failed to evidence a relationship with actual dietary intake.

Secondary Aims

Romantic Appeal of Thinness

The belief that thinness increases one's romantic appeal to men, or the perceived romantic appeal of thinness, is a construct for which a novel measure was created in the current study. The convergent and factorial validity of this construct were established via confirmatory factor analysis.

Consistent with expectation, greater endorsement of the belief that thinness increases one's romantic appeal to males was predictive of greater dietary restriction in all subgroups. The size of this effect was medium in the NCT group and approached medium in the other three subgroups (Cohen, 1992). It is noteworthy that the perceived romantic appeal of thinness made a significant contribution to the explanation of variance in dietary restriction in the presence of thin-ideal internalization, further suggesting that the perceived romantic appeal of thinness is not redundant with thin-ideal internalization. Indeed, the perceived romantic appeal of thinness outperformed thin-ideal internalization as a predictor of dietary restriction in the African American subgroup, with the correlation between thin-ideal internalization and dietary restriction reduced to nonsignificance after controlling for the perceived romantic appeal of thinness.

Contrary to the expectation that the perceived romantic appeal of thinness would significantly predict physical activity, the relationship between these variables was nonsignificant in all four subgroups. However, the significant relationship between the perceived romantic appeal of thinness and dietary restriction nonetheless underscores the potential for the belief that thinness enhances one's romantic desirability to function as a motivator of weight control behavior.

Socioeconomic Status

Socioeconomic status, which was measured by parent occupational status and educational attainment, was included as a covariate in the models estimated in the NCT and CT groups because of its previously documented associations with both weight-related attitudes (Wardle et al., 2004) and ethnicity. In addition, the possibility that socioeconomic status would differentially predict weight-related attitudes as a function of ethnicity was explored. Parental educational attainment and occupational status failed to contribute to the explanation of ethnic differences in body mass, as evidenced by the nonsignificant associations between these variables and weight-related attitudes in the structural models estimated in all subgroup analyses. Caucasians were characterized by higher parental occupational status than African Americans in the NCT group and higher parental educational attainment in the CT group, but both of these effects were of a small magnitude (Cohen, 1992). In addition, parent occupational status was significantly and positively related to thin-ideal internalization in the NCT group, but this effect was of a small magnitude and became nonsignificant when controlling for ethnicity. Evaluation of the contribution of socioeconomic status to ethnic differences in body mass was likely limited in the current sample due to the lack of variation in socioeconomic status: Both parent occupational status and parent educational attainment were characterized by low variability, with the majority of participants classifying themselves at the upper end of the scale on these variables.

A more representative, community sample with greater variation in socioeconomic status may prove more informative in the elucidation of the role of socioeconomic status in ethnic differences in body mass. In one study of a nationally representative, ethnically diverse sample of adolescents, equating ethnic groups on socioeconomic status (i.e., family income and parental education) failed to eliminate the disparity in body mass (Gordon-Larsen, Adair, & Popkin, 2003), thereby suggesting that other factors, such as sociocultural, biological, or environmental factors, may be more fruitful in the explanation of ethnic differences in body mass.

Ethnic Identity

Ethnic identity was included as a covariate in the models estimated in the NCT and CT subgroups to evaluate the hypothesis that the relationship between ethnicity and weight-related attitudes would be accounted for by ethnic identity. In addition, it was expected that ethnic identity would be negatively related to thin-ideal internalization and the perceived romantic appeal of thinness in the African American group while evidencing no relationship with weight-related attitudes in the Caucasian group. Contrary to prediction, ethnic identity failed to evidence significant relationships with weight-related attitudes in the presence of ethnicity, despite the fact that African Americans reported greater identification with their ethnic group than Caucasians and ethnic identity was significantly related to the perceived romantic appeal of thinness in the group lacking in constitutional thinness. Consistent with previous research (Akan & Grilo, 1995; Aruguete, Nickleberry, & Yates, 2004), then, findings from the current study suggest that ethnic identity does not explain ethnic differences in weight-related attitudes.

However, although unable to account for between-group variation in weight-related attitudes, ethnic identity accounted for a significant proportion of the within-group variation in the perceived romantic appeal of thinness in the African American group, with African Americans who expressed greater identification with their ethnic group less likely to perceive that thinness increases one's romantic appeal to males. Thus, results from the current study are consistent with the notion that, for African American females, greater identification with their ethnic group may deflate a source of motivation to control weight, that of increasing one's desirability to prospective or extant mates.

Implications for Intervention

The current study has implications for addressing motivation to control body weight and methods of weight control utilized by women in late adolescence and young adulthood. Given that African Americans who identify more strongly with their ethnic group are less likely to perceive that thinness enhances their attractiveness to males, thereby diminishing the potency of one incentive to control body weight, weight loss interventions may be more effective if they emphasize other benefits, such as improved health, of attaining and maintaining a healthy body weight for African Americans who identify strongly with their ethnic group. Some have advocated a community psychology approach to the improvement of weight control among African Americans (Ruiz et al., 2004), and in keeping with this recommendation, attempts to recreate a set of social norms within the African American community in which a healthy lifestyle and body weight are valued by the larger group may produce the greatest impact on health outcomes for this group.

Although the current study indicated that believing that thinness enhances one's romantic desirability may be a powerful source of motivation to engage in weight control behavior, it is important not to lose sight of the potential for this belief to motivate unhealthy weight control behavior and bulimic pathology. While the prospect of attaining a thin body type to attract a mate may be adaptive insofar as it motivates healthy weight control behavior, overvaluation of one's physical appearance may place one at increased risk of developing an internalizing disorder such as depression or an eating disorder (Fredrickson & Roberts, 1997). Thus, overweight prevention and intervention programs should be mindful of this possibility, imparting appropriate, healthy methods of weight loss and maintenance to participants and apprising them of the dangers of overvaluing one's physical appearance and engaging in unhealthy weight behaviors.

The current study tentatively suggests that dietary restriction produces the intended effect on body mass only at higher levels of dietary restriction, which indicates that women's efforts at weight loss and maintenance may be enhanced by the acquisition of strategies designed to increase the extent or consistency of dietary restriction necessary to achieve and/or maintain the desired results. Some weight management programs, such as the LEARN program (Brownell, 2003), include education about the importance of modifying one's lifestyle so that one consistently restricts dietary intake to keep daily caloric intake within the limit prescribed by the program (based on their caloric needs and current weight). LEARN participants are apprised that, although effective weight management does not require depriving oneself of one's favorite foods forever, one must never revert back to former habits of overeating and exceeding the recommended limit on daily caloric intake. Strategies for preventing overeating by increasing attention to internal cues of satiety (e.g., chewing slowly, eating in the absence of other activities or stimuli that distract from satiety cues) and measuring portion sizes prior to eating a meal, which are also featured in the LEARN protocol, would appear to be particularly crucial components of weight management interventions insofar as they target the ability to regulate dietary intake with maximal consistency.

Limitations

Conclusions drawn from the current study are limited by its cross-sectional design, which precludes inferences of causation. Thus, the results can only be said to be consistent with, rather than confirmation of, the proposed temporal order of relationships in the structural model. In addition, exclusive reliance on self-report measures may have depicted the relationships among variables in a different manner than they would have been portrayed had multiple methods of assessment been employed. Some of the observed relationships may have been inflated due to common method variance, and some data may have been systematically distorted because of social desirability biases. In the current study, the latter concern is probably most relevant to weight, which tends to be underreported (Cash, Grant, Shovlin, & Lewis, 1992). Self-report data may also be less accurate when individuals are required to recall a behavior that they performed in the past; in the current study, for example, individuals may have had difficulty recalling how much time they had spent engaging in various types of physical activity.

Another limitation of the current study is the low sample size in the African American group, and thus findings obtained on this group should be interpreted with caution.

Finally, the external validity of the current study is a weakness. The sample was comprised solely of college students between the ages of 18 and 30. College students are unrepresentative of the general population in terms of their higher socioeconomic status relative to the average person and their younger age relative to the adult population. In addition, there was a relatively high rate of attrition in the current study due to flawed data, particularly in the African American group, thereby further restricting the generalizability of the findings from the current study. However, it is worth mentioning that the African American participants who provided completely viable data differed significantly from those who provided invalid responses only on the valuation of romantic need fulfillment, and this unintuitive finding may be most parsimoniously explained as a Type 1 error. Also of note, despite the high rate of attrition and the unrepresentative college student sample, the average body mass index reported by the Caucasian and African American subgroups very closely resembled those reported by a larger, more representative sample of women in the same age range (Burke & Bild, 1996), potentially indicating that the sample is not as different from the population of women between the ages of 18 and 30 as would be expected.

The limited age range sampled in the current study casts doubt on the extent to which the current findings may generalize to women at different ages across the life span. It stands to reason that the appearance-related motivations for weight control examined in the current study are particularly salient to women between the ages of 18 and 30 because this is an age range in which many women are dating and forming long-term relationships with males; these motivations may be less relevant to middle-aged and older women who have been in a relationship with the same mate for an extended period of time and/or are not actively attempting to elicit romantic interest in a mating partner.

Directions for Future Research

Although the proposed model did not completely account for ethnic differences in body mass index, it appears that different sociocultural standards of appearance at least partly explain Caucasian women's greater engagement in dietary restriction and, putatively as a result, lower body mass index relative to African American females. Thus, an important priority for future research is to identify sources of motivation for weight management that are relevant to African American women as a first step towards eliminating ethnic disparities in body mass and health outcomes. Research has demonstrated that social support is positively associated with levels of physical activity among African American women (Eyler et al., 2002), thus implicating social support as one potential factor that may inspire greater efforts at weight control. Experimental studies in which different hypothetical sources of motivation are manipulated to ascertain their effect on weight control practices may prove especially fruitful in the illumination of sources of motivation that should be targeted to improve weight management among African Americans. Prospective, longitudinal studies on ethnic differences in weight management motivation, weight management behavior, and body mass would also contribute to the elucidation of the temporal relationships among these variables.

Future research on weight management behavior and its effect on body mass would benefit from the use of measurement methods that have greater validity. For example, rather than assessing participants' perceptions of dietary restriction, dietary behavior may be more validly assessed by recording caloric intake in a diary in propinquity to the time of food consumption to minimize concerns about the accuracy of recall. In addition, physical activity may be more validly assessed with a pedometer that records the number of steps taken; this method of assessment would obviate concerns about recall and social desirability biases. Ideally, constitutional thinness would be prospectively assessed by following people from childhood through adulthood and recording their weight at regular intervals; however, given practical constraints, it is unlikely that this would be a feasible method of assessment for most psychological studies. Thus, in the absence of the prospective assessment of constitutional thinness, this construct may be more validly assessed retrospectively by using silhouettes of figures and asking participants to indicate their size in childhood, adolescence, and at present, which is the method of measuring constitutional thinness that has been used by other researchers (e.g., Slof et al., 2003). Finally, an important goal for future research is replication of the current findings in a nationally representative sample of women who span a wider age range to ascertain the generalizability of the current findings.

Conclusion

This study demonstrated one possible pathway through which Caucasian women may attain and maintain lower body mass relative to their African American peers. Results were consistent with the proposition that Caucasian women’s greater subscription to the thin ideal and the belief that thinness enhances one’s desirability to males independently contribute to greater levels of dietary restriction, which then produces lower body mass at higher levels of dietary restriction. Additional research is needed to examine the temporal order and causality of the relationships observed in the current study, as well as to ascertain the generalizability of the current pattern of relationships to individuals of lower socioeconomic status and older age.

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Appendices

Appendix A: Demographics

DIRECTIONS: The following items ask about basic background information. For every item, please select the category that best describes you.

Gender: M F

My age is (years old)…

18 19 20 21 22 23 24 25 26 27 28 29 30 31-35 36-40 41 and over

Please choose the one category that best describes your ethnic background.

1. African American
2. Asian
3. Caucasian
4. Hispanic/Non-white
5. Native American
6. Pacific Islander
7. Other_______________

Please select the one category that best describes your sexual orientation.

1. Bisexual
2. Heterosexual
3. Lesbian
4. Other________________

Please select the one category that best describes your current relationship status.

1. Single—not currently involved in an exclusive dating commitment **and** have not been on a date in the last six months.
2. Dating—not currently involved in an exclusive dating commitment but have been on at least one date in the last six months.
3. Dating—involved in an exclusive dating commitment but not engaged or cohabiting.
4. Cohabiting—living with current dating partner.
5. Engaged to be married.
6. Married.
7. Divorced.

Do you have any children?

1. Yes
2. No

Please select the one category that best describes your current class standing.

1. Freshman
2. Sophomore
3. Junior
4. Senior
5. Non-degree seeking student

Appendix B: Father and Mother Occupation and Educational Attainment

Please indicate which of the following categories best describes the occupation of the adult male caregiver (father, stepfather, grandfather) who has been your primary father figure. If there has been more than one figure, please respond only for the one you feel has had the greatest influence, whether good or bad, on your life (if no father figure has ever been present, please select #11). Select only one category.

1. Higher executive of large company, proprietor, or major professional
2. Business manager, proprietor of medium-sized business, or lesser professional
3. Administrative personnel, owner of small business, or minor professional
4. Clerical and sales worker, technician, or owner of little business
5. Skilled manual employee
6. Machine operator or semiskilled employee
7. Unskilled employee
8. Unemployed and receiving public assistance
9. Unemployed and not receiving public assistance
10. Unknown
11. Not applicable—no father figure was present

Please indicate which of the following categories best describes the highest level of education attained by the father figure you referred to in the previous question (if no father figure has ever been present, please select #9):

1. Professional (MA, MS, ME, MD, PhD, LLD, and the like)
2. Four-year college graduate (BA, BS)
3. One to three years of college (also business schools)
4. High school graduate
5. Ten to 11 years of school (part high school)
6. Seven to nine years of school
7. Less than seven years of school
8. Unknown
9. Not applicable—no father figure was present

Please indicate which of the following categories best describes the occupation of the adult female caregiver (mother, stepmother, grandmother) who has been your primary mother figure. If there has been more than one mother figure, please respond only for the one you feel has had the greatest influence, whether good or bad, on your life (if no mother figure has ever been present, please select #11). Select only one category.

1. Higher executive of large company, proprietor, or major professional
2. Business manager, proprietor of medium-sized business, or lesser professional
3. Administrative personnel, owner of small business, or minor professional
4. Clerical and sales worker, technician, or owner of little business
5. Skilled manual employee
6. Machine operator or semiskilled employee
7. Unskilled employee
8. Unemployed and receiving public assistance
9. Unemployed and not receiving public assistance
10. Unknown
11. Not applicable—no mother figure was present

Please indicate which of the following categories best describes the highest level of education attained by the mother figure you referred to in the previous question (if no mother figure has ever been present, please select #9).

1. Professional (MA, MS, ME, MD, PhD, LLD, JD, and the like)
2. Four-year college graduate (BA, BS)
3. One to three years of college (also business schools)
4. High school graduate
5. Ten to 11 years of school (part high school)
6. Seven to nine years of school
7. Less than seven years of school
8. Unknown
9. Not applicable—no mother figure was present

Appendix C: Height and Weight History

Directions: Please indicate your current weight in pounds (lbs) by entering each digit of your weight in the next three questions (items 1-3).

1. Please enter the first digit of your current weight. For example, if you currently weigh 165 lbs, you would select the number "1."

0 1 2 3 4

2. Please enter the second digit of your current weight. For example, if you currently weigh 165 lbs, you would select the number "6."

0 1 2 3 4 5 6 7 8 9

3. Please enter the third digit of your current weight. For example, if you currently weigh 165 lbs, you would select the number "5."

0 1 2 3 4 5 6 7 8 9

Directions: In the next three questions (4-6), please indicate your current height in feet and inches as directed.

4. Select the number of feet that you stand tall. For example, if you are 5 feet and 4 inches tall, you would enter the number "5."
4 5 6 7

5. Select the remaining number of inches that you stand tall. For example, if you are 5 feet 4 inches tall, you would enter the number "4." If the remaining number of inches is greater than 5 inches (for example, if you are 5 feet 7 inches tall), select the response option N/A for this item and enter the remaining number of inches below in the next question, #6.

0 1 2 3 4 5 N/A—the remaining number of inches is greater than 5"

6. If the remaining number of inches that you stand tall is greater than 5 inches, please choose from the options below to indicate the remaining number of inches you stand tall. If you have already entered the remaining number of inches in the previous question (#5), please select N/A.

6 7 8 9 10 11 N/A—the remaining number of inches is less than 6" and so has already been entered in the previous question

Directions: We would like to know the following: Since you reached your current height, what is the most you have weighed? Please enter this number in pounds (lbs) in the next three questions (7-9) as directed.

7. Please enter the first digit of your highest weight since you reached your current height. For example, if the most you have weighed since you reached your current height was 165 lbs, you would select the number "1."

0 1 2 3 4

8. Please enter the second digit of your highest weight since you reached your current height. For example, if the most you have weighed since you reached your current height was 165 lbs, you would select the number "6."

0 1 2 3 4 5 6 7 8 9

9. Please enter the third digit of your highest weight since you reached your current height. For example, if the most you have weighed since you reached your current height was 165 lbs, you would select the number "5."

0 1 2 3 4 5 6 7 8 9

Appendix D: Need Fulfillment Inventory (NFI)

Instructions: People have a number of needs, many of which are listed below. For each need, rate how important the need is to you. Important needs are those that you care about or would cause distress if they were unfulfilled. Using the scale below, write one number in each blank that best indicates your feelings.

Importance
5 - Extremely important—I really care about this
4 - Very important—I care about this quite a bit
3 - Somewhat important—I care about this somewhat
2 - Not very important—I care a little about this
1 - Not at all important—I don't care about this at all

Love and affection factor

Importance
________ 1…the need to receive affection from a romantic partner
________ 2…the need to be loved by a romantic partner
________ 3…the need for tenderness and warmth from a romantic partner
________ 4…the need for a romantic partner to care about you
________ 5…the need to feel cherished and special by a romantic partner

Sexual fulfillment factor

Importance
________ 1…the need to kiss or tenderly touch someone that you find physically attractive
________ 2…the need for sexual excitement
________ 3…the need for sexual gratification
________ 4…the need for caressing and sensual contact.
________ 5…the need for sexual stimulation and fulfillment

Intimacy factor

Importance
________ 1…the need to comfortably share feelings and thoughts with a romantic partner
________ 2…the need for your private thoughts to be listened to and really understood by a romantic partner
________ 3…the need to let down your defenses and express how you really feel to a romantic partner
________ 4…the need for a feeling of "complete togetherness" with a romantic partner
________ 5…the need to share your meaningful experiences with a romantic partner

Appendix D (Continued)

Nurturance

Importance

________ 1…the need for emotional support from a romantic partner when you’re feeling down

________ 2…the need to cry on the shoulder of a romantic partner

________ 3…the need for comfort and help from a romantic partner when you’re having problems

________ 4…the need for encouragement and sympathy from a romantic partner when you’re upset

________ 5…the need for advice and guidance from a romantic partner when you’re stuck

Fun and enjoyment factor

Importance

________ 1…the need for fun and enjoyment with a romantic partner

________ 2…the need to have fun for its own sake with a romantic partner

________ 3…the need to be absorbed in pleasurable activities with a romantic partner

________ 4…the need for excitement and amusement with a romantic partner

________ 5…the need to laugh and have a good time with a romantic partner

Appendix E: Ideal Body Stereotype Scale-Revised (IBIS-R)

We want to know what you think attractive women look like. How much do you agree with these statements?

Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
1	2	3	4	5

1. Thin women are more attractive. ____
2. Tall women are more attractive. ____
3. Women with toned bodies are more attractive. ____
4. Slim women are more attractive. ____
5. Women who are in shape are more attractive. ____
6. Slender women are more attractive. ____
7. Women with long legs are more attractive. ____
8. Curvy women are more attractive. ____
9. Shapely women are more attractive. ____
10. Women who are taller are more attractive. ____

Appendix F: General Internalization (SATAQ)

Directions: Please indicate how much you agree with each of the following statements using the scale below.

Definitely disagree	Mostly disagree	Neither agree nor disagree	Mostly agree	Definitely agree
1	2	3	4	5

1. I would like my body to look like the bodies of people who are on TV.

2. I compare my body to the bodies of TV and movie stars.

3. I would like my body to look like the bodies of people who appear in magazines.

4. I compare my appearance to the appearance of TV and movie stars.

5. I would like my body to look like the bodies of people who are in the movies.

6. I compare my body to the bodies of people who appear in magazines.

7. I wish I looked like the models in music videos.

8. I compare my appearance to the appearance of people in magazines.

9. I try to look like the people on TV.

Appendix G: Perceived Sociocultural Pressure Scale (PSPS)

Directions: Please select the response that best captures your own experience using the scale below.

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

1. I’ve felt pressure from my friends to lose weight.

2. I’ve noticed a strong message from my friends to have a thin body.

3. I’ve felt pressure from my family to lose weight.

4. I’ve noticed a strong message from my family to have a thin body.

5. I’ve felt pressure from people I’ve dated to lose weight.

6. I’ve noticed a strong message from people I have dated to have a thin body.

7. I’ve felt pressure from the media (e.g., TV, magazines) to lose weight.

8. I’ve noticed a strong message from the media to have a thin body.

Appendix H: Romantic Appeal of Thinness (RAT)

Directions: For each of the following items, please indicate how much you agree with each statement using the scale below.

Definitely disagree	Mostly disagree	Neither agree nor disagree	Mostly agree	Definitely agree
1	2	3	4	5

1. How thin I am affects how desirable I am to men.

2. How toned my body is influences how attractive I am to men.

3. How slim I am determines my likelihood of getting dates.

4. How slender I am determines my likelihood of being sought out by a man to have a romantic relationship.

Appendix I: Dutch Eating Behavior Questionnaire—Restraint subscale (DEBQ-R)

Directions: For each item, please use the following scale to describe your behavior over the **last 6 months**.

Never	Seldom	Sometimes	Often	Always
1	2	3	4	5

1. If you put on weight, did you eat less than you normally would?

2. Did you try to eat less at mealtimes than you would like to eat?

3. How often did you refuse food or drink because you were concerned about your weight?

4. Did you watch exactly what you ate?

5. Did you deliberately eat foods that were slimming?

6. When you ate too much, did you eat less than usual the next day?

7. Did you deliberately eat less in order not to become heavier?

8. How often did you try not to eat between meals because you were watching your weight?

9. How often in the evenings did you try not to eat because you were watching your weight?

10. Did you take into account your weight in deciding what to eat?

Appendix J: Dietary Intent Scale (DIS)

Please indicate which response best describes your eating behavior **over the past 6 months**. Use the following scale to make your ratings:

Never	Seldom	Sometimes	Often	Always
1	2	3	4	5

1. I take small helpings in an effort to control my weight. ____
2. I hold back at meals in an attempt to prevent weight gain. ____
3. I limit the amount of food I eat in an effort to control my weight. ____
4. I sometimes avoid eating in an attempt to control my weight. ____
5. I skip meals in an effort to control my weight. ____
6. I sometimes eat only one or two meals a day to try to limit my weight. ____
7. I eat diet foods in an effort to control my weight. ____
8. I count calories to try to prevent weight gain. ____
9. I eat low-calorie foods in an effort to avoid weight gain. ____

Appendix K: International Physical Activity Questionnaire (IPAQ)

Directions: We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. Items 1-9 will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise, or sport.

Directions: For items 1-4, think about all of the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

0 1 2 3 4 5 6 7

How much time did you usually spend doing **vigorous** physical activities on those days? Please think of the number of hours and minutes you usually spent doing vigorous physical activities on those days and enter the number of hours in question #2 and the remaining number of minutes in question #3. For example, if you usually spent 2 hours and 20 minutes doing vigorous physical activities, you would enter the number “2” in #2 and the number “20” in #3. Round to the nearest 10-minute increment—for example, if you spent 48 minutes doing vigorous physical activities, you would enter 0 hours for question #2 and 50 minutes for question #3.

2. Please enter the number of hours you usually spent doing vigorous physical activities on those days. For example, if you usually spent 30 minutes doing vigorous physical activities, you would select the number “0.” If you spent 1 hour and 40 minutes doing vigorous physical activities, you would select the number “1.”

0 1 2 3 4 5 6 7 8 9 10

3. Please enter the remaining number of minutes you usually spent doing vigorous physical activities on those days. For example, if you usually spent 1 hour and 40 minutes doing vigorous physical activities, you would select the number “40” (the number “1” should have been selected for the previous item #2). Please round to the nearest 10-minute increment in providing your response.

0 = 0 minutes
1 = 10 minutes
2 = 20 minutes
3 = 30 minutes
4 = 40 minutes
5 = 50 minutes

Directions: For items 4-6, think about all of the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

4. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

0 1 2 3 4 5 6 7

How much time did you usually spend doing **moderate** physical activities on those days? Please think of the number of hours and minutes you usually spent doing moderate physical activities on those days and enter the number of hours in question #5 and the remaining number of minutes in question #6. For example, if you usually spent 2 hours and 20 minutes doing moderate physical activities, you would enter the number “2” in #5 and the number “20” in #6. Round to the nearest 10-minute increment in providing your response—for example, if you spent 48 minutes doing moderate physical activities, you would enter 0 hours for question #5 and 50 minutes for question #6.

5. Please enter the number of hours you usually spent doing moderate physical activities on those days. For example, if you usually spent 30 minutes doing moderate physical activities, you would select the number “0.” If you spent 1 hour and 40 minutes doing moderate physical activities, you would select the number “1.”

0 1 2 3 4 5 6 7 8 9 10

6. Please enter the remaining number of minutes you usually spent doing moderate physical activities on those days. For example, if you usually spent 1 hour and 40 minutes doing moderate physical activities, you would select the number “40” (the number “1” should have been selected for the previous item #5). Please round to the nearest 10-minute increment in providing your response.

0 = 0 minutes
1 = 10 minutes
2 = 20 minutes
3 = 30 minutes
4 = 40 minutes
5 = 50 minutes

Directions: To answer questions 7-9, think about the time you spent **walking** in the **last 7 days**. This includes walking at work and at home, walking to travel from place to place (e.g., to classes), and any other walking that you might do solely for recreation, sport, exercise, or leisure.

7. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

0 1 2 3 4 5 6 7

How much time did you usually spend walking on those days? Please think of the number of hours and minutes you usually spent walking on those days and enter the number of hours in question #8 and the remaining number of minutes in question #9. For example, if you usually spent 2 hours and 20 minutes walking, you would enter the number “2” in #8 and the number “20” in #9. Round to the nearest 10-minute increment—for example, if you spent 48 minutes walking, you would enter 0 hours for question #8 and 50 minutes for question #9.

8. For this item, please enter the number of hours you usually spent walking on those days. For example, if you usually spent 30 minutes walking, you would select the number “0.” If you spent 1 hour and 40 minutes walking, you would select the number “1.”

0 1 2 3 4 5 6 7 8 9 10

9. For this item, please enter the remaining number of minutes you spent walking on those days. For example, if you spent 1 hour and 40 minutes walking, you would select the number “40” (the number “1” should have been selected for the previous item #8). Please round to the nearest 10-minute increment in providing your response.

0 = 0 minutes
1 = 10 minutes
2 = 20 minutes
3 = 30 minutes
4 = 40 minutes
5 = 50 minutes

Appendix L: Collective Self Esteem Scale (CES)

Directions: We are all members of certain social groups or social categories. Some of such social groups pertain to gender, race, religion, nationality, ethnicity, and socioeconomic class. We would like you to consider your membership in your ETHNIC GROUP and respond to the following statements on the basis of how you feel about your ETHNIC GROUP and your membership in it. There are no right or wrong answers to any of these statements; we are interested in your honest reactions and opinions. Please read each statement carefully, and respond by using the following scale.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Disagree Somewhat	Neutral	Agree Somewhat	Agree	Strongly Agree

Private Esteem Subscale

1. I often regret that I belong to the ethnic group that I do.
2. In general, I'm glad to be a member of my ethnic group.
3. Overall, I often feel that being a member of my ethnic group is not worthwhile.
4. I feel good about my ethnic group.

Ethnic Identity Subscale

1. Overall, my ethnic group has very little to do with how I feel about myself.
2. My ethnic group is an important reflection of who I am.
3. My ethnic group is unimportant to my sense of what kind of a person I am.
4. In general, belonging to my ethnic group is an important part of my self image.

Appendix M: Variances and Covariances for Caucasians (*n* = 633)

Variable	RAT1	RAT2	RAT3	SATAQ1	SATAQ2	SATAQ3	NFI1
RAT1	.7592						
RAT2	.6579	1.1283					
RAT3	.6064	.8606	1.0897				
SATAQ1	.4904	.5799	.5260	1.2220			
SATAQ2	.4901	.6028	.5393	1.2156	1.3349		
SATAQ3	.4857	.5839	.5331	1.1073	1.1664	1.1776	
NFI1	.0526	.0712	.0602	.1395	.1477	.1370	.3779
NFI2	.0468	.0667	.0664	.1330	.1463	.1282	.3845
NFI3	.0513	.0821	.0727	.1365	.1453	.1332	.3716
SATAQNFI	-.0204	-.0417	-.0419	-.0413	-.0435	-.0340	-.0914
DIET1	.3198	.3807	.3507	.4408	.4367	.4584	.0211
DIET2	.3371	.3923	.3662	.4693	.4709	.4772	.0224
DIET3	.3463	.4053	.3630	.4607	.4655	.4720	.0408
PHYS1	4.3141	1.6985	2.3363	1.2668	.2378	2.6861	-.2559
$DIET^2$	.0729	.1091	.1160	.0301	.0331	.0586	.0273
BMI	.2166	.3798	.5232	.0853	-.0025	.1227	-.2450
CSE1	.0204	.0269	.0343	.0190	.0335	.0708	.0106
CSE2	-.0234	-.0176	-.0190	.0108	-.0010	.0505	.0360
CSE3	.0263	.0687	.0823	.0390	.0624	.0971	.0306
PAROCC1	.0187	.0906	-.0312	.0439	.0372	.0435	-.0125
PAREDU1	.0461	.0451	.0241	.0030	-.0046	.0117	-.0044

Variable	NFI2	NFI3	SATAQNFI	DIET1	DIET2	DIET3	PHYS1
NFI2	.4580						
NFI3	.4090	.4320					
SATAQNFI	-.0916	-.0790	.6056				

Appendix M (Continued)

Variable	NFI2	NFI3	SATAQNFI	DIET1	DIET2	DIET3	PHYS1
DIET1	.0255	.0247	-.0087	.8799			
DIET2	.0238	.0255	.0114	.8355	.9089		
DIET3	.0417	.0460	-.0010	.8604	.8837	.9757	
PHYS1	-1.4243	-1.0730	.3580	7.7244	8.0027	8.8339	5667.1830
$DIET^2$	.0262	.0300	-.0195	.0704	.0997	.0433	7.4196
BMI	-.1583	-.1327	.1858	.7205	.7965	.8459	-15.5744
CSE1	.0212	.0064	-.0274	.0058	-.0193	.0062	-3.9103
CSE2	.0370	.0218	-.0166	.0214	.0020	.0031	-2.4452
CSE3	.0444	.0340	.0046	.0411	.0396	.0483	-5.0648
PAROCC1	-.0477	-.0120	.0452	.0410	.0670	.0506	8.6481
PAREDU1	-.0293	-.0158	.0210	.0297	.0436	.0352	5.5071

Variable	$DIET^2$	BMI	CSE1	CSE2	CSE3	PAROCC1	PAREDU1
$DIET^2$	.9956						
BMI	-1.1057	19.9897					
CSE1	-.0564	.2102	1.1184				
CSE2	-.0113	.0955	.8040	1.1172			
CSE3	-.0637	.0671	.7327	.7067	1.2659		
PAROCC1	.0472	-.0513	-.0682	.0473	-.0104	2.0645	
PAREDU1	.0615	-.1462	-.1014	-.1095	-.0765	.6005	.9451

Appendix N: Covariances for African Americans (*n* = 113)

Variable	RAT1	RAT2	RAT3	SATAQ1	SATAQ2	SATAQ3	NFI1
RAT1	1.1580						
RAT2	.9950	1.5220					
RAT3	.9575	1.1612	1.4994				
SATAQ1	.5698	.5991	.5207	1.4535			
SATAQ2	.5162	.5402	.4425	1.3293	1.4044		
SATAQ3	.4124	.4774	.3645	1.1559	1.1667	1.1905	
NFI1	-.0510	-.0760	-.1126	.1303	.1392	.0926	.5370
NFI2	-.0508	-.0637	-.0925	.1213	.1420	.0845	.5109
NFI3	-.0458	-.0629	-.1211	.1499	.1659	.1123	.5370
SATAQNFI	.0989	.0391	.0279	.0200	-.0083	.0351	-.1787
DIET1	.2388	.2843	.2682	.2665	.2070	.2372	.0158
DIET2	.2730	.3028	.2650	.2953	.2240	.2264	-.0059
DIET3	.2947	.2876	.3109	.2748	.1766	.1842	.0287
PHYS1	8.5953	8.0642	6.1403	-17.9987	-24.2817	-20.6210	-11.2041
$DIET^2$	.1249	.1056	.0289	.0175	.0473	.0014	.0460
BMI	.2384	.4157	.4004	-.2183	-.2093	-.3426	.0509
CSE1	-.2326	-.2464	-.1685	-.2029	-.2118	-.1446	.1423
CSE2	-.2255	-.2822	-.1476	-.0818	-.1030	-.0575	.1541
CSE3	-.2261	-.2776	-.1040	-.2441	-.2489	-.2016	.0661
PAROCC1	-.1951	-.1225	-.0212	.2873	.1906	.3414	-.0395
PAREDU1	.0378	.0905	.1248	.0552	.0788	.1312	-.0262

Variable	NFI2	NFI3	SATAQNFI	DIET1	DIET2	DIET3	PHYS1
NFI2	.5371						
NFI3	.5377	.6063					

Appendix N (Continued)

Variable	NFI2	NFI3	SATAQNFI	DIET1	DIET2	DIET3	PHYS1
SATAQNFI	-.1779	-.1756	.7970				
DIET1	.0107	.0189	-.0725	.8319			
DIET2	-.0116	.0014	-.0711	.7741	.8181		
DIET3	.0242	.0400	-.0626	.8103	.8109	.9094	
PHYS1	-13.8102	-17.1619	4.1375	1.8357	5.0453	6.2511	7543.0117
$DIET^2$	.0388	.0407	-.0426	.1377	.1171	.0896	1.8308
BMI	.0959	.3280	-.2398	2.5670	2.6020	2.8699	-36.2720
CSE1	.1331	.1792	.0949	-.0010	-.0522	.0061	-11.9916
CSE2	.1652	.2012	.0463	.0272	-.0014	.0217	-17.0253
CSE3	.0688	.1013	.0998	.0197	-.0111	.0019	-5.8501
PAROCC1	.0226	-.0393	.0697	.0484	.0190	.0290	9.5007
PAREDU1	-.0094	-.0453	-.0756	.1170	.0731	.0564	7.5625

Variable	$DIET^2$	BMI	CSE1	CSE2	CSE3	PAROCC1	PAREDU1
$DIET^2$	.5890						
BMI	-.7836	38.3886					
CSE1	.0378	.6810	1.1052				
CSE2	.0685	.8836	.8550	1.0339			
CSE3	.0380	.8922	.8547	.8457	1.5646		
PAROCC1	-.0477	-.7060	-.2509	-.1082	.0386	2.7103	
PAREDU1	.0430	-.1187	-.2575	-.1451	-.0507	1.2010	1.4176

Appendix O: Means and Standard Deviations for Caucasians and African Americans

Variable	Caucasians (*n* = 633)		African Americans (*n* = 113)	
	M	*SD*	*M*	*SD*
RAT1	3.7291	.8713	3.0221	1.0761
RAT2	3.4566	1.0622	2.8230	1.2337
RAT3	3.4502	1.0439	2.9027	1.2245
SATAQ1	3.5692	1.1055	2.9381	1.2056
SATAQ2	3.4766	1.1554	2.8083	1.1851
SATAQ3	3.3828	1.0852	2.5900	1.0911
NFI1	4.1734	.6147	4.1967	.7328
NFI2	4.0470	.6768	4.1493	.7329
NFI3	3.9502	.6573	4.0288	.7787
SATAQNFI	.1383	.7782	.1253	.8927
DIET1	2.5919	.9381	2.2006	.9121
DIET2	2.4997	.9534	2.1372	.9045
DIET3	2.6346	.9878	2.2819	.9536
PHYS1	79.2955	75.2807	77.0178	86.8505
$DIET^2$	.8790	.9978	.8094	.7674
BMI	23.1963	4.4710	25.9906	6.1959
CSE1	5.1730	1.0575	5.9204	1.0513
CSE2	5.4387	1.0570	6.1032	1.0168
CSE3	4.2338	1.1251	5.0619	1.2508

Appendix O (Continued)

Variable	Caucasians		African Americans	
	M	*SD*	*M*	*SD*
PAROCC1	6.6288	1.4368	6.2389	1.6463
PAREDU1	5.1904	.9722	4.9071	1.1906

Appendix P: Variances and Covariances for NCT Group (*n* = 476)

Variable	RAT1	RAT2	RAT3	SATAQ1	SATAQ2	SATAQ3	NFI1
RAT1	.9599						
RAT2	.8356	1.3139					
RAT3	.7668	.9959	1.2538				
SATAQ1	.6104	.6650	.6040	1.3888			
SATAQ2	.6047	.6882	.6139	1.3659	1.4792		
SATAQ3	.5852	.6545	.5968	1.2378	1.2854	1.3052	
NFI1	.0178	.0152	.0149	.1429	.1437	.1329	.4498
NFI2	.0001	.0006	.0008	.1234	.1322	.1131	.4437
NFI3	.0087	.0185	.0141	.1405	.1432	.1318	.4413
SATAQNFI	.0351	.0216	.0235	-.0299	-.0332	-.0092	-.1424
DIET1	.3242	.3533	.3224	.3768	.3585	.3863	.0423
DIET2	.3552	.3846	.3524	.4140	.4027	.4088	.0400
DIET3	.3684	.3940	.3621	.3963	.3772	.3876	.0656
PHYS1	6.3247	1.6817	3.6769	-2.3711	-3.3206	.4346	-4.3278
$DIET^2$	.0157	.0276	.0183	-.0125	.0054	.0174	.0061
BMI	-.1363	.1692	.2933	-.5777	-.5646	-.5038	-.1056
ETHNIC	.1039	.0913	.0778	.0905	.0968	.1170	-.0133
CSE1	-.1117	-.1104	-.0841	-.0812	-.0946	-.0712	.0335
CSE2	-.1565	-.1491	-.1288	-.1008	-.1302	-.0869	.0596
CSE3	-.1296	-.0996	-.0285	-.1076	-.0986	-.0893	.0385
PAROCC1	.0102	.1514	.0545	.1825	.1743	.1872	.0186
PAREDU1	.0491	.0816	.0665	.0596	.0651	.0889	.0160

Variable	NFI2	NFI3	SATAQNFI	DIET1	DIET2	DIET3	PHYS1
NFI2	.4972						

Appendix P (Continued)

Variable	NFI2	NFI3	SATAQNFI	DIET1	DIET2	DIET3	PHYS1
NFI3	.4660	.4981					
SATAQNFI	-.1349	-.1212	.8110				
DIET1	.0449	.0484	-.0391	.7043			
DIET2	.0402	.0472	-.0246	.6571	.7346		
DIET3	.0650	.0774	-.0395	.6724	.6919	.7819	
PHYS1	-7.2028	-7.1118	1.2507	5.7597	6.5527	7.1629	6268.3681
$DIET^2$	-.0096	-.0048	-.0217	.0047	.0247	-.0229	7.1157
BMI	.0139	.0671	.0700	.0391	.0910	.0977	-46.3469
ETHNIC	-.0244	-.0234	.0117	.0525	.0493	.0466	.9764
CSE1	.0533	.0425	-.0494	-.0428	-.0733	-.0389	-5.8466
CSE2	.0683	.0574	-.0382	-.0344	-.0534	-.0516	-5.8271
CSE3	.0627	.0503	.0100	-.0237	-.0262	-.0136	-2.9923
PAROCC1	-.0001	.0171	.0591	.0678	.0735	.0925	4.1212
PAREDU1	-.0022	.0008	-.0146	.0422	.0495	.0356	6.8554

Variable	$DIET^2$	BMI	ETHNIC	CSE1	CSE2	CSE3	PAROCC1
$DIET^2$	.7748						
BMI	-.8238	23.1277					
ETHNIC	-.0078	-.3591	.1523				
CSE1	-.0319	.8639	-.1202	1.2919			
CSE2	-.0056	.7565	-.1094	.9423	1.2771		
CSE3	-.0086	.6751	-.1338	.8683	.8474	1.4533	
PAROCC1	.0101	-.6310	.0617	-.2358	-.1058	-.1179	2.2515
PAREDU1	.0657	-.2146	.0361	-.1790	-.1663	-.0980	.8368

Variable	PAREDU1
PAREDU1	1.1004

Appendix Q: Variances and Covariances for CT Group (*n* = 270)

Variable	RAT1	RAT2	RAT3	SATAQ1	SATAQ2	SATAQ3	NFI1
RAT1	.7489						
RAT2	.6441	1.1073					
RAT3	.6073	.8701	1.0742				
SATAQ1	.4707	.5798	.5063	1.1631			
SATAQ2	.4670	.5766	.4973	1.1476	1.2683		
SATAQ3	.4793	.5940	.5048	1.0754	1.1453	1.1816	
NFI1	.0650	.1040	.0676	.1282	.1461	.1195	.3125
NFI2	.0628	.1064	.0992	.1250	.1454	.1081	.3296
NFI3	.0663	.1165	.0823	.1195	.1392	.1050	.3151
SATAQNFI	-.0196	-.0629	-.0662	.0010	-.0114	-.0063	-.0699
DIET1	.3769	.4747	.4197	.5476	.5699	.6026	.0069
DIET2	.3699	.4476	.3945	.5528	.5721	.5942	.0071
DIET3	.3747	.4530	.3850	.5510	.5824	.5989	.0222
PHYS1	3.1214	4.8665	1.7612	-.0425	-3.1711	-2.4168	2.6504
$DIET^2$	.2235	.3312	.3250	.2673	.2873	.3111	.0271
BMI	.1462	.1053	.0615	.2438	.2084	.2246	-.0080
ETHNIC	.0685	.0652	.0622	.0694	.0677	.0764	.0096
CSE1	-.0399	-.0132	.0131	-.0647	-.0206	.0207	.0310
CSE2	-.0400	-.0455	-.0070	.0210	.0263	.0605	.0473
CSE3	-.0122	.0346	.0372	-.0078	.0197	.0676	.0403
PAROCC1	.0430	-.0179	-.1072	-.0165	-.0489	.0234	-.0756
PAREDU1	.1088	.0638	.0499	-.0081	-.0253	.0053	-.0562

Variable	NFI2	NFI3	SATAQNFI	DIET1	DIET2	DIET3	PHYS1
NFI2	.4226						
NFI3	.3626	.3885					

Appendix Q (Continued)

Variable	NFI2	NFI3	SATAQNFI	DIET1	DIET2	DIET3	PHYS1
SATAQNFI	-.0746	-.0779	.4508				
DIET1	-.0072	-.0142	.0147	1.0589			
DIET2	-.0096	-.0157	.0429	.9985	1.0367		
DIET3	.0058	-.0031	.0371	1.0287	1.0326	1.1122	
PHYS1	3.7650	2.9947	3.2657	7.3582	7.8092	9.0253	5371.0115
$DIET^2$	.0457	.0383	.0490	.6078	.6321	.5913	9.1149
BMI	.0045	-.0239	.0080	.3504	.3478	.3977	7.8383
ETHNIC	.0024	.0102	-.0014	.0787	.0763	.0805	-.5843
CSE1	.0384	.0357	.0084	-.0150	-.0339	-.0076	-4.4583
CSE2	.0580	.0514	-.0062	.0392	.0229	.0348	-2.9855
CSE3	.0540	.0575	-.0010	.0197	.0155	.0212	-9.8403
PAROCC1	-.1118	-.0820	.0476	.0146	.0470	-.0256	16.9383
PAREDU1	-.0826	-.0678	.0552	.1083	.1086	.1077	4.4680

Variable	$DIET^2$	BMI	ETHNIC	CSE1	CSE2	CSE3	PAROCC1
$DIET^2$	1.3909						
BMI	-.1195	1.8964					
ETHNIC	-.0014	.0145	.0813				
CSE1	-.0276	.0013	-.0543	1.0056			
CSE2	.0633	.0308	-.0456	.7581	.9572		
CSE3	-.0637	.0282	-.0567	.7647	.7129	1.3032	
PAROCC1	.0593	-.1188	.0370	.0479	.1627	.0824	2.0493
PAREDU1	.0573	-.0023	.0324	-.1049	-.0926	-.1098	.4781

Variable	PAREDU1
PAREDU1	.8926

Appendix R: Means and Standard Deviations for NCT and CT Groups

Variable	NCT Group (*n* = 476)		CT Group (*n* = 270)	
	M	*SD*	*M*	*SD*
RAT1	3.6218	.9797	3.6222	.8654
RAT2	3.3634	1.1463	3.3556	1.0523
RAT3	3.3929	1.1197	3.3222	1.0365
SATAQ1	3.4979	1.1785	3.4309	1.0785
SATAQ2	3.3782	1.2162	3.3704	1.1262
SATAQ3	3.2647	1.1425	3.2593	1.0870
NFI1	4.1452	.6707	4.2329	.5590
NFI2	4.0381	.7051	4.1056	.6501
NFI3	3.9441	.7058	3.9940	.6233
SATAQNFI	.1335	.9006	.1258	.6714
DIET1	2.7167	.8392	2.2080	1.0290
DIET2	2.6415	.8571	2.0981	1.0182
DIET3	2.7944	.8843	2.2053	1.0546
PHYS1	80.8404	79.1730	75.6187	73.2872
$DIET^2$	.6945	.8803	1.0326	1.1794
BMI	25.7883	4.8091	19.7961	1.3771
CSE1	5.2857	1.1366	5.2870	1.0028
CSE2	5.5287	1.1301	5.5580	.9784
CSE3	4.3718	1.2055	4.3370	1.1416

Appendix R (Continued)

Variable	NCT Group		CT Group	
	M	*SD*	*M*	*SD*
PAROCC1	6.6103	1.5005	6.4981	1.4315
PAREDU1	5.1197	1.0490	5.1963	.9448
ETHNIC	.8100	.3900	.9100	.2850

About the Author

Christine Vaughan received a Bachelor's Degree in Psychology from the University of Florida in 1999. In the Fall of 2000, she entered the University of South Florida's doctoral program in clinical psychology as a recipient of a Foundation Doctoral Fellowship. Dr.. Vaughan completed her M.A. in Psychology at USF in August 2003. She completed a clinical psychology internship at the Durham V.A. Medical Center in July 2006. Dr. Vaughan has accepted a postdoctoral research fellowship at the Center for Developmental Science at the University of North Carolina--Chapel Hill.