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Controlling Parental Feeding Practices and Child Body Composition in Ethnically and Economically Diverse Preschool Children

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Introduction

Widely recognized as a serious public health concern, the problem of childhood overweight/obesity has been linked to long-term health risks (Cruz et al., 2005), with obesity being classified as a disease in 2013 by the American Medical Association. Importantly, many child eating behaviors and habits are learned and developed in the context of a family environment shaped largely by parents (Birch & Fisher, 1998). Thus, parent attitudes and behaviors related to food and child feeding could be important factors to target to promote children's healthy eating and to prevent childhood obesity (Birch & Davison, 2001; Faith, Scanlon, Birch, Francis, & Sherry, 2004). Various parental feeding practices are used to manage the amount and type of food that children eat (Ventura & Birch, 2008). In particular, emerging studies suggest that parental control in child feeding has a negative impact on child weight, particularly for young girls (Carper, Fisher, & Birch, 2000).

Children's self-regulation in eating is believed to play a key role in children's weight status (Tan &Holub, 2011), and researchers have hypothesized that overly controlling parental feeding practices are associated with childhood overweight because such intrusive feeding practices may disrupt children's development of self-regulation of eating (Costanzo & Woody, 1985; Farrow & Blissett, 2008). Two commonly studied controlling feeding practices include pressuring a child to eat and restricting unhealthy or snack foods (e.g.,

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Ventura & Birch, 2008; Birch, Fisher, & Davison, 2003; Farrow & Blissett, 2008; Fisher & Birch, 1999; Jansen, Mulkens, & Jansen, 2007). Parental pressure to eat is defined as pressuring a child to either consume more healthy foods or increase overall food consumption, where as restriction is focused on reducing a child's in take of unhealthy or snack foods (Faith, Scanlon, et al., 2004). One problem with previous studies on parental control in child feeding is viewing pressure and restriction as a single construct of "controlling parental feeding" (Murashima, Hoerr, Hughes, &Kaplowitz, 2012). Although pressure or force feeding and restriction of unhealthy or snack foods are both controlling forms of parental feeding, they may have differential or unique contributions to child weight status. Importantly, longitudinal data suggests that controlling feeding practices can be causal in predicting child weight (Farrow & Blissett, 2008). Thus, the present study examines the unique or joint effects of these two forms of controlling parental feeding practices on child body composition.

Parental Control in Child Feeding

A growing body of research supports a linkage between controlling parental feeding practices and child body composition (e.g., BMI or overweight status). In a recent review of 31 studies (majority were cross-sectional designs), the most frequent finding was that restricting a child from eating unhealthy or snack foods was related to higher BMI/ overweight, where as pressuring a child to eat during feeding was related to lower BMI/ weight gain (Hurley, Cross, & Hughes, 2011). However, an examination of inconsistent findings across studies suggests that research on the linkages between feeding practices and child body composition needs to take in to account demographic variables, including child age (Campbell et al., 2010), family SES (Cardel et al., 2012), and country/region of study (Musher-Eizenman et al., 2009). Further more, within this literature, parent perceptions of child weight (e.g., as measured by parental concern of child weight) may partly explain differences in parental feeding practices (Gregory, Paxton, and Brozovic, 2010; Webber, Hill, Cooke, Carnell, & Wardle,2010). For example, in a study of Australian children aged 2 to 4 years, maternal pressure and restriction were associated with maternal concern about child weight and child eating behaviors, but child BMI did not independently predict maternal feeding practices (Gregory et al.,2010). In middle childhood, child BMI was linked to lower pressure to eat and higher restriction in a sample of American children ages 7 to 9 years (Webber et al., 2010). In addition, the association between child BMI and restrictive feeding was fully mediated by maternal concern about weight. Higher levels of pressuring child to eat were associated with lower perceived child weight, but perceived weight did not mediate the relationship between child weight status and pressuring child to eat. Webber and colleagues (2010) concluded that restriction is more likely to be a consequence of maternal concern about their child becoming overweight rather than a cause of higher child weight or weight gain, and pressure to eat is likely influenced by parental concern that the child consumes healthy foods, eats enough, and maintains the appropriate weight.

With regard to directionality of influence between parental feeding and child body composition, limited longitudinal studies exist on controlling feeding practices; however, Faith, Berkwowitz, and colleagues (2004) found that parental restriction of unhealthy or snack foods at child age 5 years predicted higher BMI 2 years later. In contrast, Campbell et al. (2010) utilized a larger sample and found higher restrictive feeding with children ages 5–6 years predicted lower BMI 3 years later, though no such relationship was found at follow-up for children ages 10–12 years at baseline. The researchers call into question whether restricting in take of foods at early ages is detrimental to child weight outcomes (Campbell et al., 2010). Rather, parents may be responding to child characteristics.

Family Income and Ethnicity

Although researchers find that overweight and obesity are more prevalent in low SES and ethnic minority groups (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010; Shrewsbury & Wardle, 2008; Spruijt-Metz, Li, Cohen, Birch, & Goran, 2006), limited research has examined the relationship of these socio-demographic variables with parental feeding practices (e.g., Hennessy Hughes, Goldberg, Hyatt, & Economos, 2010; Sacco, Bentley, Carby-Shields, Borja, & Goldman, 2007; Murashima et al., 2012; Sparks & Radnitz, 2013; Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002). Existing literature with low-income minority samples suggests that certain parental feeding practices, such as an indulgent feeding style, were associated with child overweight (Hughes, Power, Fisher, Mueller, & Nicklas, 2005). However, some inconsistencies exist in the literature. For example, in a cross-sectional study of ethnically diverse, low-income preschoolers and their mothers, May et al. (2007) found that neither child race nor maternal pressure to eat and restriction were linked to child overweight based on child BMI. Although there does not appear to be a strong link between child race and child BMI, ethnic differences in parental feeding styles have been found, with Hispanic parents reporting more indulgent and African-American parents reporting more uninvolved feeding practices than other ethnic groups (Hughes et al., 2005). In contrast to pressure to eat and restriction which are considered two different types of controlling parental feeding practices, indulgent and uninvolved feeding are two different types of permissive feeding practices. While indulgent and uninvolved feeding may not have a bijective relationship or one-to-one correspondence to pressure to eat or restriction, it is likely that indulgent feeding consists of a combination of high pressure to eat and low restriction of unhealthy or snack foods. Of particular relevance to the present study, Cardel et al. (2012) found that low SES was linked to child adiposity, parental restriction, and parental pressure to eat in an ethnically and economically diverse U.S. sample.

The present study focused on relations between measures of parental control in child feeding and child body composition. In addition, we tested whether two types of controlling feeding practices would explain unique variances in measures of child body composition. Descriptive statistics were conducted to examine potential socio-demographic differences in the major study variables. In addition, the unique and joint effects (above and beyond contributions from household income and child ethnicity) of parental pressure and restriction on three indices of child body composition (i.e., parental perception of child weight, child BMI, and child percent of body fat) were examined. Based on prior research in economically and ethnically diverse samples (e.g., Cardel et al., 2012), we hypothesized that controlling parental feeding practices and child body composition would vary by household income and child ethnicity. We expected indicators of child overweight (perceived child weight, child BMI and child percent body fat) to be inversely related to pressure to eat but positively related to restriction. Also, we expected household income to be inversely related to pressure to eat, restriction, and indicators of child overweight. Lastly, we hypothesized that the two controlling feeding practices (i.e., pressure to eat and restriction)would explain unique variances in the measures of child body composition.

Method

Participants

Participants were 243 children aged 4 to 6 years old (126 males and 116 females; $M = 4.80$ years, $SD = 0.84$) and their caregivers (89% biological mothers, 8% biological fathers, and 3% step- or grand-parent). Persons per household ranged from 2 to 10 ($M = 4.27$, $SD = 1.41$), and the majority of parents (49.8%) reported a monthly household income of $3,000 or below, and 11.3% reported a monthly household income above $9,000. Using persons per household and monthly household income data, families were classified as either above or

below the poverty line using the U.S. Department of Human Health and Human Services guidelines, and 33% of families were considered living at or below the poverty line. Children's ethnicity was coded as White Non-Hispanic (44.6%), White Hispanic (26.3%), Black, (21.3%), Asian (5.8%), and American Indian (2.1%).

Procedures

This study was part of a larger study that examined child and parental factors associated with children's self-regulation, eating behaviors, and body composition. Recruitment and data collection protocols were approved by the university Institutional Review Board (IRB). Using flyers, participants were recruited from waiting rooms of pediatricians' offices, daycare centers, preschools, and local stores or businesses that were frequented by families. In addition, information was sent via electronic mailto university-affiliated personnel who worked with families asking them to distribute flyers to eligible participants. Information on contacting the researchers to participate in the study was provided on flyers. To participate, children must have been ages 4 to 6 years old. Children and their biological parents were excluded if (1) they were unable to use English fluently, (2) had a history of traumatic brain injury, (3) had a significant disability that would prevent them from completing the tasks in this proposal, such as blindness, etc. (4) had food allergies related to the food groups (chocolate or grapes) that were provided in the larger study. For the larger study, children and their parents visited the laboratory for one session that lasted approximately 1.5 hours that included a series of observational tasks not included in the present study. As part of the experimental session, parents completed a series of questionnaires on them selves and their child. For each session, parents received $50 and children received a toy as a token of appreciation and compensation for their time and participation.

Measures

Primary study measures included parents' controlling feeding practices and child body composition. Controlling feeding practices (specifically pressure to eat and restriction) were assessed using parent ratings, and child body composition was assessed using parent perceptions, calculated BMI, and calculated percent body fat.

Controlling parental feeding practices—To assess parents' controlling child feeding practices, parents rated items on a 5-point scale from the Pressure to Eat and the Restriction subscales (αs = .76 and .81, respectively) of the Child Feeding Questionnaire (CFQ; Birch et al., 2001). The CFQ asks parents to rate how frequently they use particular feeding practices. Pressure to Eat consists of 4 items such as "My child should always eat all of the food in his/her bowl." Restriction consists of 10 items such as "I have to be sure that my child does not eat too much of his/her favorite foods." The CFQ is a rating scale commonly used for examining these variables (e.g., Faith, Berkowitz, et al., 2004; Hughes et al., 2005; Spruijt-Metz et al., 2002).

Child body composition—To assess child body composition, data was collected on parent perceptions, calculated BMI, and calculated percent body fat. Parents rated their perceptions of their child's weight status (as markedly underweight, underweight, normal, overweight, or markedly overweight) using items from the Perceived Child Weight subscale (α = .85) of the CFQ (Birch et al., 2001). In addition, child BMI was calculated as BMI-for-age (age- and sex-specific)using experimenter-measured child weight and height with Centers for Disease Control and Prevention (CDC) growth charts (Kuczmarski et al., 2000). Note that we did not transform the BMI-for-age values into BMI Z-scores or percentiles (Cole, Faith, Pietrobelli, & Heo, 2005). The percent of child body fat was calculated using data provided by a body composition machine calibrated for children. Typically, over 20%

body fat is considered overweight and below 13% body fat is considered underweight for 4- to 6-year-olds (McCarthy, Cole, Fry, Jebb, & Prentice, 2006).

Results

Descriptive statistics

Descriptive statistics were conducted to examine if participant and socio-demographic characteristics were associated with major variables. Refer to Table 1 for information on sample characteristics and the means and standard deviations of major study variables.

Child age and gender—Correlations and single-factor (gender) multivariate analyses of variance (MANOVA) were conducted to test for differences on major variables for child age and gender, respectively. Results indicate no child age or gender differences.

Child ethnicity—To examine whether there were ethnic group differences on the three indices of body composition, a single-factor (ethnicity) MANOVA was conducted and differences were found, Wilks's *F*s (12,582) =2.66, $p < .01$. Univariate results indicate ethnic group differences on all three indices of body composition (i.e., perceived child weight, child BMI, and child percent body fat), *F*s (4, 222) = 3.49, 4.29, and 2.55, *p*s< .05, respectively. Post-hoc paired comparisons were conducted to interpret ethnic differences on indices of body composition. On measures of perceived child weight, parents of White Hispanic children perceived their children to be heavier ($M = 2.63$, $SD = 1.47$) than parents of White Non-Hispanic children ($M = 1.90$, $SD = 1.13$). On measures of child BMI, White Non-Hispanic children ($M = 16.29$, $SD = 1.78$) were lower than Black children ($M = 17.17$, $SD = 2.69$) but higher than Asian children ($M = 14.76$, $SD = 1.72$). In addition, Asian children were lower on BMI than White Hispanic ($M = 16.83$, $SD = 2.16$) and Black children. The same pattern was found for percent body fat, with Asian children ($M = 18.69$, $SD = 4.74$) being lower than White Hispanic ($M = 22.95$, $SD = 6.28$) and Black children ($M = 23.14$, $SD = 4.74$). See Figure 1 for comparisons of indices of child body composition among ethnic groups.

To examine ethnic group differences on the two forms of controlling parental feeding practices with child BMI as a covariate, multivariate analysis of covariance (MANCOVA) was conducted, and results revealed a main effect of ethnic group on feeding practices: Wilks' $\lambda = 86$, $F(8,440) = 4.49$, $p < .01$. Univariate results indicate ethnic differences on pressure to eat and restriction, *F*s (4, 221) =7.04 and 2.53, *p*s< .01 and .05, respectively. Post hoc multiple pairwise comparisons with Bonferroni corrections were conducted. On pressuring to eat, White Non-Hispanic parents reported lower pressure ($M = 2.32$, $SD = 1.0$) than White Hispanic, Black, and Asian parents (*M*s = 2.73, 3.01, and 3.42, *SD*s = 1.03, 1.12, and .99, respectively). On restriction of unhealthy or snack foods, Asian parents reported higher restriction ($M = 4.07$, $SD = .68$) than White Non-Hispanic, White Hispanic, and Black parents (*M*s = 3.33, 3.40, and 3.42, *SD*s = .94, 1.13, and.77, respectively); however, the difference between Asian and Black parents was marginally significant. See Figure 2 for comparisons of parental pressure and restriction among ethnic groups.

Family income—Family or household monthly income was negatively correlated with parental pressuring child to eat, parents' perceptions of child weight status, and child BMI (*r*s = −.22, −.14, and −.15, *p*s< .05, respectively). See Figures 3 and 4 for comparisons of indices of child body composition and parental pressure and restriction among ethnic groups and among economic groups. Economic groups were classified as living above or below the poverty line (calculated using persons per household and monthly household income data). For subsequent analyses, household monthly income data were used rather than the

dichotomous poverty classification in order to consider the economic diversity of families in this sample.

Correlational Analyses

Due to differences on major variables that were found for child ethnicity and household income, partial correlations controlling for ethnicity and income were conducted to examine relations among major variables. Correlations are summarized in Table 1, and we highlight the major findings in text. Partial correlations indicated both types of controlling parental feeding practices (i.e., pressure and restriction) were positively related to one another. The three indices of child body composition (i.e., parental perception of child weight, child BMI, and child percent of body fat) were all positively related to one another. In addition, perceived child weight was positively related to parental restriction, but not to pressure to eat. Furthermore, high child BMI and high body fat measures were associated with low pressure to eat.

Regression Analysis

To test whether the two forms of control parental feeding practices explain unique variances in the three indices of child body composition, three separate hierarchical multiple regression analyses were conducted. Child ethnicity and household income were included as covariates and entered in the first step, with pressure to eat and restriction entered in the second step of the regression analyses to predict each of the three indices of child body composition. Results for the three regression analyses are summarized in Table 2. Results indicated that pressure to eat and restriction explained unique variances in child BMI and child percent body fat. Pressure to eat predicted lower, where as restriction predicted higher, BMI and percent body fat. For parental perceived child weight, restriction (but not pressure to eat) predicted perceived child weight.

Discussion

The primary purpose of our study was to examine whether controlling parental feeding practices and child body composition differed by socio-demographic variables, and the effects of two types of controlling parental feeding practices on multiple metrics of child body composition. Study results indicate that measures of parental coercive control in child feeding and measures of child body composition differed across ethnic groups and SES. Even when accounting for such ethnic and SES differences, both types of controlling feeding practices (i.e., pressure to eat and restriction of unhealthy foods) explained unique variances in child BMI and child percent body fat. However, only restriction (not pressure to eat) explained variance in parental perceived child weight.

Ethnic and Family Income Differences

Compared to higher income households, low household income was associated with greater parental pressure to eat and higher child weight (based on subjective and objective measures of perception and BMI). Our findings are consistent with previous studies that found higher rates of obesity and overweight in low SES and ethnic minority groups (Ogden et al., 2010; Shrewsbury & Wardle, 2008). In regard to parental feeding practices, our findings generally corresponded with the pattern of results from another study with an ethnically and economically diverse sample (Cardel et al., 2012). Consistent with findings from Cardel et al. (2012), we found that low SES was associated with higher adiposity (see Figure 3) as well as with high pressure (see Figure 4). Our findings differed somewhat from Cardel et al. (2012) who found that low SES was associated with high restriction. Instead, our data indicates that parents living below the poverty line were more likely to endorse low restriction of unhealthy or snack foods (Figure 4). However, this difference might partly be

explained by the fact that low SES is some what different than living below the poverty line. Families living in poverty often experience food insecurity, which may make it more challenging for parents to be restrictive of unhealthy or nutrition-poor foods (Fiese & Jones, 2012; Larson & Story, 2011). Further research is needed on influences of poverty on parental feeding and child body composition. Additionally, we found ethnic differences on parental pressure or force feeding and restrictive feeding. White Non-Hispanic parents were lower than other ethnic groups on pressure or force feeding, where as Asian parents were higher on restrictive feeding than other ethnic groups (see Figure 2). It is unclear why Asian parents endorse higher restrictive feeding practices than other ethnic groups. Perhaps Asian parents are responding to their children becoming more acculturated or "Americanized" and adopting foods such as desserts and sweetened beverages into their diet (Diep et al., in press). Traditional Asian values require parents to make good choices for their children using strictness-supervision such as parental monitoring and limit-setting (Liew et al., in press), and restriction of unhealthy or snack foods may be considered part of parents' duty.

Previous research has identified restriction and pressure to eat as two important parental practices that influence child eating habits and body composition both concurrently and longitudinally (Faith, Berkowitz, et al., 2004; Faith, Scanlon, et al., 2004; Birch & Davison, 2001). Our results indicated that pressure to eat and restriction of unhealthy or snack foods were positively correlated with each other, suggesting that indeed, they are both forms of controlling parental feeding practices but they comprise distinct dimensions. In line with prior research, our results are best understood by taking into account the bidirectional nature of child characteristics and parental feeding practices (also see Sparks & Radnitz, 2013). Our study further contributes to the literature by situating these relationships within the socio-demographic context of the family.

Pressure and Force Feeding

Prior studies have indicated that parental pressure to eat impacts child eating behavior in a variety of ways with researchers' arriving at a general consensus that pressure is counter productive for children's development of healthy eating practices (Mitchell, Farrow, Haycraft, & Myeyer, 2013). In particular, pressuring or forcing child to eat (even if foods are considered healthy) may disrupt children's development of self-regulated eating. Parental pressure is associated with children's decreased liking and consumption of the to-be-eaten food (Galloway, Fiorito, Francis, & Birch, 2006; Galloway, Fiorito, Lee, & Birch, 2005), less enjoyment of eating (Webber et al., 2010), food avoidance (Powell, Farrow, & Meyer, 2011), and increased food consumption (Orrell-Valente et al., 2007). Although few studies have been conducted with multi-ethnic samples, existing studies suggest that there are cultural differences in the endorsement or the use of parental pressure (e.g., Cardel et al., 2012). Present study results indicate that parents of White (Non-Hispanic) children were lower on pressuring their child to eat than other ethnic groups (see Figure 2). This corresponded with Cardel et al. (2012)'s finding that European American parents were lowest on pressuring children to eat compared to Hispanic American and African American parents. This may be a cultural difference related to reasons that parents pressure their children to eat (healthy or unhealthy foods) based on cultural values and priorities. Conversely, our findings indicated that parents of Asian children were higher on pressuring child to eat than other ethnic groups. Previous studies indicate that while Asian American stend to eat out less often than Whites (Non-Hispanic), more acculturated or "Americanized" Asian American youth adopt foods such as desserts, salty snacks, and sweetened beverages into their diet (Diep et al., in press). It is possible that Asian parents use pressure in response to children adopting unhealthy or snack foods into their diet, and parents react by pressuring children to eat healthy foods which may include traditional Asian foods. It is important to note that Asian children in this sample were lower on multiple

indices of body composition than other ethnic groups. Thus, an alternative explanation may be that Asian parents viewed their children as under the weight of peers, although we found no evidence that parents of Asian children perceived their child's weight as lower or as higher than other ethnic groups. However, it is important to note that we did not assess parents' concern about child's (over or under) weight and longitudinal research suggests that mother's concern for child's weight may protect against an increase in child adiposity in white mother-child dyads (Spruijt-Metzet al., 2006). Webber et al. (2010) suggest that pressure may be a more complex construct than restricting child eating; on the one hand parents may pressure children to eat because of a perceived need for weight gain to attain a healthy weight, conversely parents may pressure overweight children to eat more healthy foods in order to lose weight (Webber et al., 2010). Our findings suggest that further study of parental perceptions and practices with reference to cultural and socioeconomic factors is warranted.

Restriction of Unhealthy or Snack Foods

Restriction was unrelated to indicators of childhood overweight (BMI and percent body fat) in our sample. Although restriction has been related to childhood over weight in a U.S. sample of non-Hispanic white children from middle- to upper-income families (Johnson & Birch, 1994), findings have been inconsistent in studies with lower income and ethnic minority samples. In a sample of low-income African Americans, a positive association between maternal restriction and their preschoolers' BMI was found only for obese mothers (Powers, Chamberlin, van Schaick, Sherman, & Whitaker, 2006). In an economically diverse and multi-ethnic elementary-aged sample, Cardel et al. (2012) found that restriction predicted child adiposity.

Our findings indicated no significant ethnic differences for restrictive feeding. This contrasts with prior research (e.g., Cardel et al., 2012) that found Hispanic American parents had higher levels of restriction than European American and African American parents. Studies have also found that African American mothers tend to report higher levels of pressure and restriction than White Non-Hispanic mothers (Sacco et al., 2007; Spruijt-Metz et al., 2006). Indeed, we find a similar pattern for restriction between Black and White Non-Hispanic mothers (see Figure 2), although differences were not found across ethnic groups. It also important to note the items for restriction on the CFQ (Birch et al., 2001) involve the restriction of unhealthy foods (e.g., sweets) and foods as rewards, where as pressure to eat involves items that are related to eating food in general (e.g., clearing the plate). This has implications for the interplay between child and parent characteristics, including how parental perceptions of child weight may prompt parents to restrict their child from unhealthy or snack foods.

Child Body Composition

Overall, our findings indicate correspondence among the three indices of child body composition. The two "objective" indices of body composition (child BMI and percent body fat) were related to low pressure to eat, where as the "subjective" index (perceived child weight) was related to restriction. Consistent with previous research, the relation between parental perception of child weight and restriction but not with pressure to eat may reflect parental concern about the child becoming overweight or obese in the future (Keller, Olsen, Kuilema, Meyermann, & van Belle, 2013). Regression analyses indicate that pressure to eat and restriction explain unique variances in the two "objective" indices of body composition (child BMI and percent body fat). In contrast, only restriction explained variance in perceived child weight. It is possible that parents pressure their child to eat healthy foods but restrict their child from unhealthy or snack foods (based on parental perceptions that their child is overweight). Such an interpretation of results would be consistent with Sud and

collegues' (2010) finding that parents increased restriction of desirable foods to children who weighed more, but they also used fewer foods as rewards for children who weighed more (also part of the restriction scale). Thus, parents who perceive their children as overweight or obese may be more likely to apply restrictive feeding practices with their children. It is important to recognize that while parental perception of child weight was positively correlated with the two "objective"indices of body composition, our study results indicate a difference in the associations between child feeding practices and the objective versus subjective measures of child body composition.

Our study's diverse sample allowed us to examine whether there were ethnic differences in the measures of body composition (see Figure 1). For White parents, those of Hispanic decent perceived their child to be heavier than those of Non-Hispanic descent, although these two groups did not differ significantly from each other on measures of BMI or percent body fat. This perceptual difference of child weight may be related to cultural differences in what is considered healthy. In Latino culture, parents have reported experiencing familial pressures to raise a "chubby child" because a chubby child is considered a healthy child in Latino culture (Lindsay, Sussner, Greaney, & Peterson, 2011). African American and Hispanic parents with limited incomes have reported a desire to raise larger-size children (Murashima et al., 2012). In our sample, Black children were most at-risk for childhood over weight using the metric of BMI, while Asian children were lowest on BMI and percent body fat (also see McCarthy et al., 2006).

Future Directions and Conclusion

Above and beyond household income and ethnic influences, pressure to eat and restriction of unhealthy or snack foods are two different types of controlling feeding practices that have unique or additive effects on child weight outcomes (BMI and percent body fat). However, our findings need be interpreted in light of several study limitations. Controlling parental feeding practices were assessed with parent reports, and inclusion of observational data in naturalistic or laboratory settings may allow for triangulation of data. The cross-sectional design of our study does not allow us to determine directionality or causal pathways between parental feeding and child weight. It is possible that child body composition influences parental feeding practices, although preliminary evidence suggests that controlling parental feeding practices have causal influence son child weight as early as 1 year of age (Farrow &Blissett, 2008). Also, we did not include data on parental body composition (e.g., parental BMI) as a potential covariate in our analyses. Future studies employing longitudinal designs will allow for a better understanding of the cumulative effects that parental feeding practices might have on children's developmental outcomes across early and middle childhood. In addition, although our sample was relatively diverse in SES and ethnicity, study results may not readily generalize to international or unique populations. Thus, further research is needed to explore and understand potential ethnic and cultural differences in parental feeding practices as well as parental perceptions of what is considered healthy weight across different developmental stages. Importantly, design and implementation of culturally sensitive and effective interventions for wellness and obesity prevention depends on understanding the relations between parental feeding practices and child weight as well as whether socio-demographic differences exist in those relations (Musher-Eizenman et al., 2009). In summary, our study contributes to the literature on parental control in child feeding and child body composition, and has implications for programs and interventions aimed at helping parents learn about feeding practices that promote children's development of healthy eating habits and simultaneously serve as an obesity prevention strategy (Mitchell et al., 2013; Skouteris et al., 2011).

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Highlights

- Tested pressuring and restrictive feeding as predictors of multiple metrics of child weight
- Ethnic and family income differences were found on measures of feeding and child weight
- Pressure and restriction both explained unique variances in BMI and percent body fat
- Only restriction (not pressuring) explained unique variance in perceptions of higher child weight
- Results inform healthy child feeding and childhood obesity prevention programs

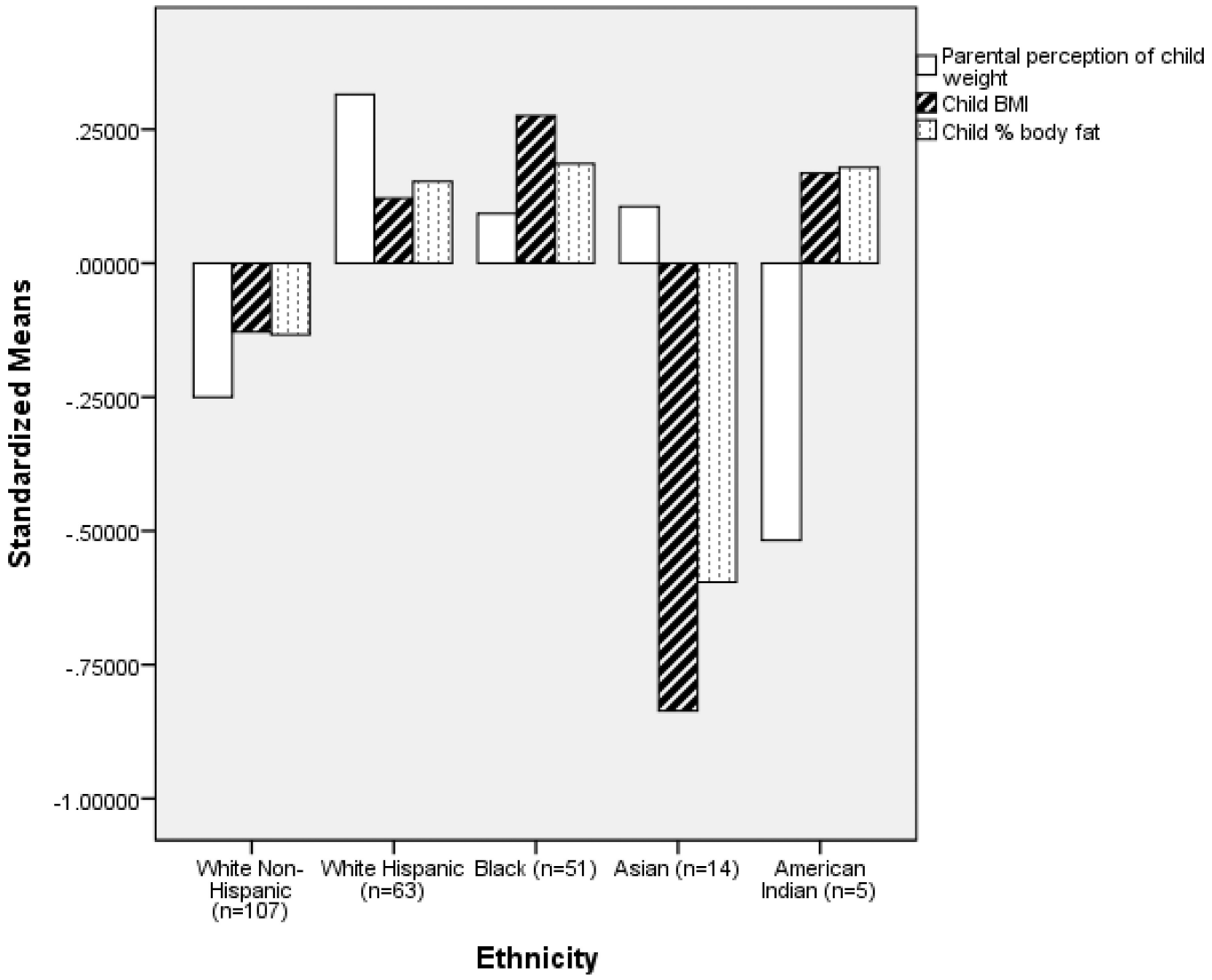

Figure 1.
Indices of child body composition by ethnic groups.

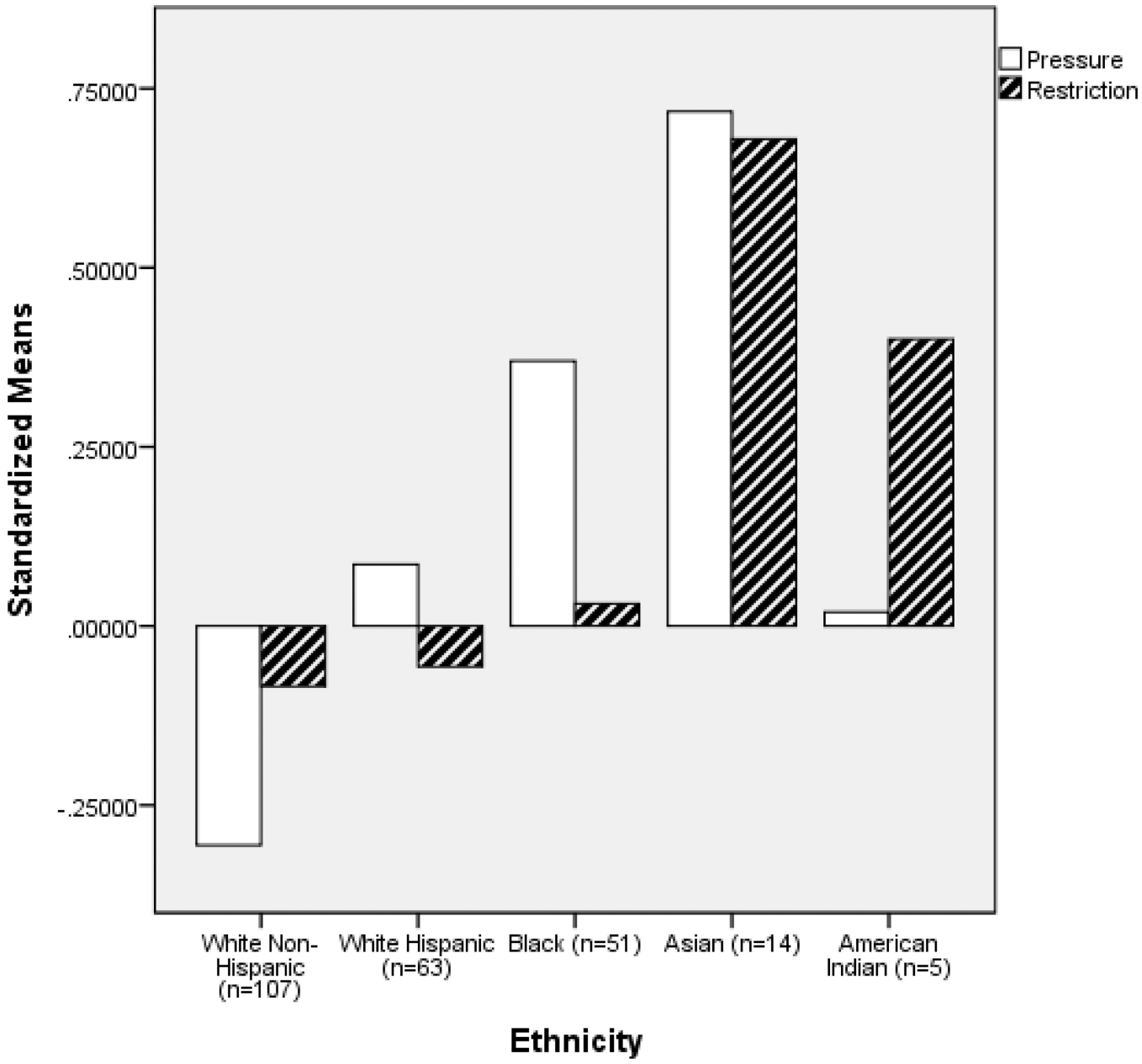

Figure 2.
Parental pressure and restrictive feeding by ethnic groups.

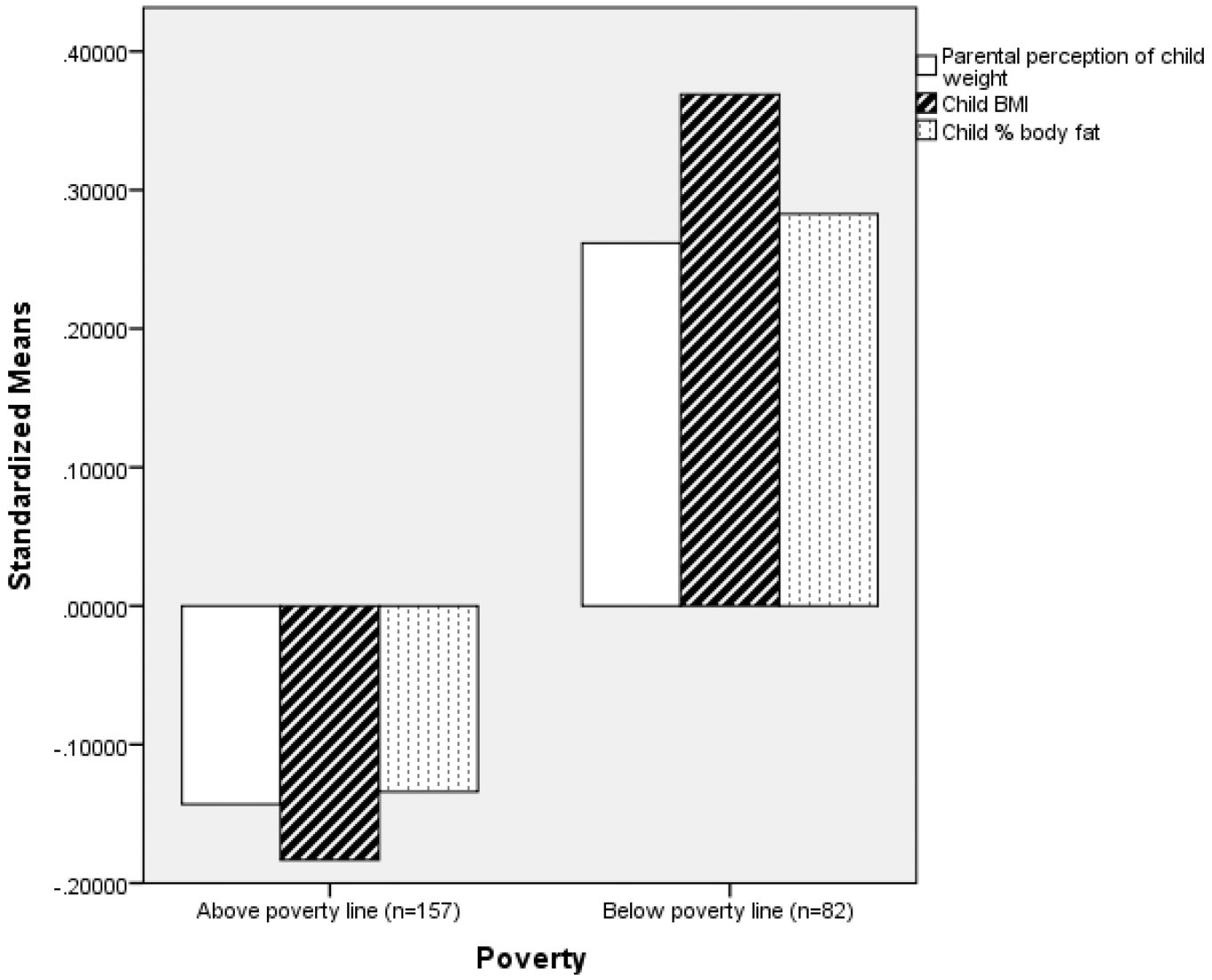

Figure 3.
Indices of child body composition by economic groups.

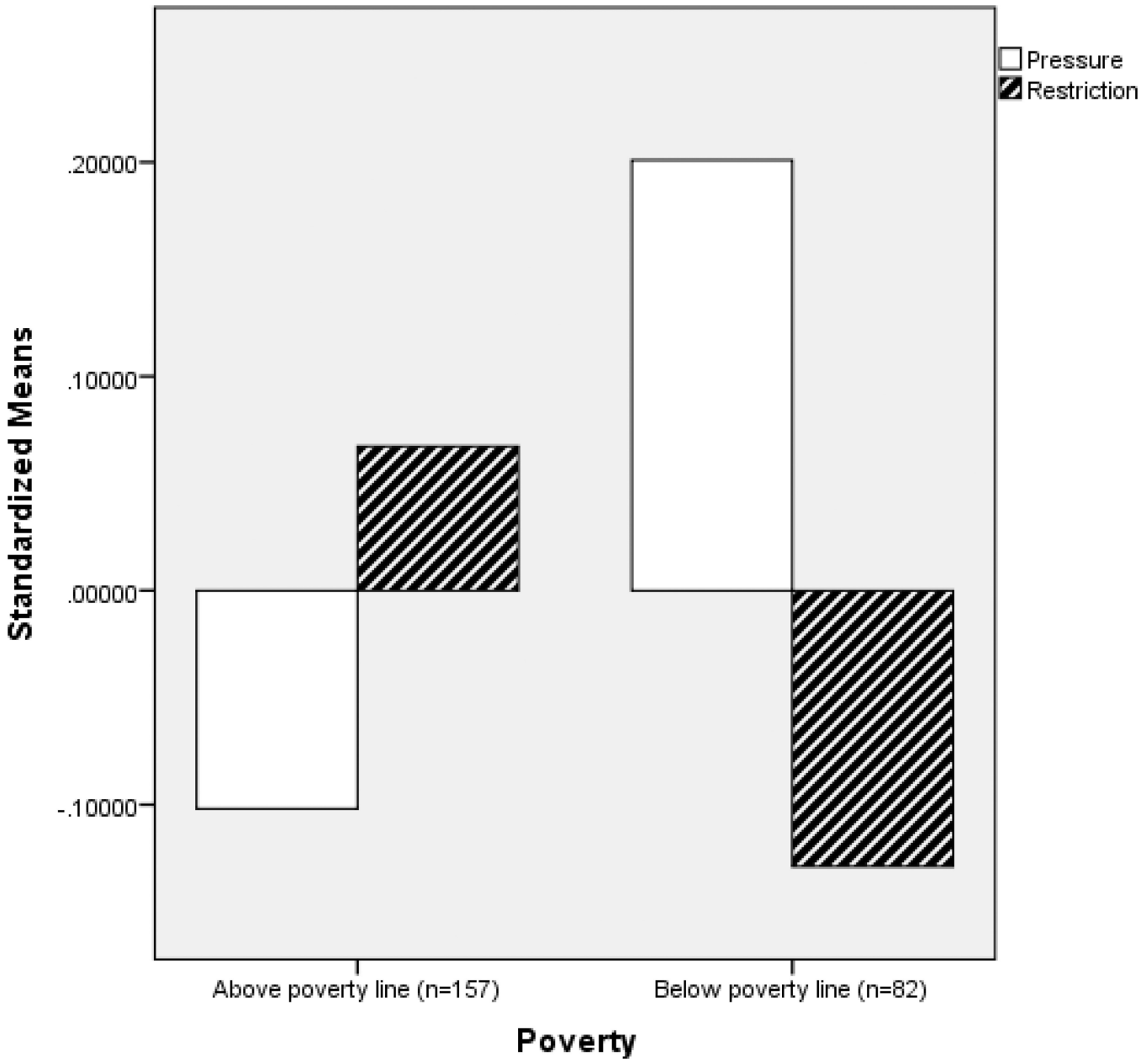

Figure 4.
Parental pressure and restrictive feeding by economic groups.

Table 1

Partial Correlations for Major Variables Controlling for Child Ethnicity and Family Income

		1	2	3	4	5
1.	Pressure to eat	—				
2.	Restriction	.18**	—			
3.	Perceived child weight	.04	.40**	—		
4.	Child BMI	−.31**	.12+	.30**	—	
5.	Child percent body fat	−.24**	.13+	.28**	.86**	—
	Mean and SD	2.63 (1.11)	3.41 (.97)	2.22 (1.28)	16.57 (2.17)	22.08 (5.70)

Note. + $p < .10$,

* $p < .05$,

** $p < .01$.

Table 2

Hierarchical Multiple Regression Analyses for 3 Separate Measures of Child Body Composition

		Measure of child body composition								
		Perceived child weight			Child BMI			Child percent body fat		
	Predictor	*B*	R^2	ΔR^2	*B*	R^2	ΔR^2	*B*	R^2	ΔR^2
1.	Child ethnicity Family income	.07 − 17**	.20	04**	.05 −.26**	.18	.03*	.06 −.16*	.10	.01
2.	Pressure to eat Restriction	−.04 41**	.45	.21**	−.36** .18**	.40	.16**	−.30** .18**	.32	.10**

Note. Beta values are standardized partial regression coefficients from the final step of the regression analyses.

* $p \leq .05$,

** $p \leq .01$.