PUBERTAL DIFFERENCES IN THE EFFECTS OF PARENTING ON BINGE EATING RISK IN FEMALE PRE-ADOLESCENTS AND ADOLESCENTS

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Psychology—Master of Arts

2022

ABSTRACT

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Puberty is a period of increased risk for the development of binge eating in female adolescents. Studies thus far have examined changes in genetic factors and personality characteristics that could contribute to increased risk, but none have examined parenting practices that are known to change across development and significantly contribute to youth outcomes (e.g., parent-child conflict, parental warmth, parental overprotection). The current study examines whether interactions between puberty and parenting predict higher levels of binge eating symptoms during/after puberty in female youth. Analyses used cross-sectional data in a sample of 999 female youth (ages 8-16) and their parents from the Michigan State University Twin Registry. Youth provided ratings of binge eating, eating in the absence of hunger, emotional eating, perceived parental care and overprotection. and pubertal development. Both youth and parents provided ratings of parent-child conflict.

Although higher levels of parental overprotection and conflict, and lower levels of parental care, significantly predicted all binge eating measures, none of the associations were significantly moderated by pubertal development or age. The quality of the parent-child relationship is significantly associated with binge eating in female pre-adolescents and adolescents regardless of developmental stage, highlighting the need for targeting harmful parenting strategies during adolescent eating disorder intervention

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INTRODUCTION

Puberty is a critically important developmental period for the development of binge eating (i.e., eating a large amount of food in a short period time accompanied by loss of control) and binge-related disorders in girls (Klump, 2013; Klump et al., 2017). Pre-pubertal onset of bulimia nervosa (BN) and binge eating disorder (BED) is rare, and rates of binge eating are substantially higher in post-puberty relative to pre-puberty (Klump, 2013). To date, studies have focused on increases in certain personality characteristics (e.g., negative urgency; Pearson et al., 2012; Davis & Smith, 2018) and genetic influences (Klump et al., 2017) as factors contributing to pubertal increases in risk. Studies examining other potential risk factors has been exceedingly rare.

One relatively ignored set of factors is parenting and changes in the parent-child relationship across development. Parenting is a robust predictor, perhaps the most robust predictor, of a wide range of academic and psychological outcomes in youth (Maccoby, 1992). Indeed, controlling and harsh parenting (e.g., high in conflict and criticism) strongly predict internalizing and externalizing disorders in youth (Burt et al., 2005; Yap & Jorm, 2015), while warm parenting (e.g., high in care and acceptance) improves these same outcomes. The vital importance of parenting is underscored by the fact that interventions for a wide range of youth psychopathology focus quite heavily on altering parenting practices as key mechanisms of effects (Le Grange et al., 2015; Tully & Hunt, 2016; Yap et al., 2016).

Importantly, studies from the general developmental psychology literature show substantial increases in parent-child conflict, and decreases in closeness, during early adolescence and puberty (Steinberg, 1987; Paikoff & Brooks-Gunn, 1991). Some studies find that girls report more intense parent-child conflict than boys during early adolescence (i.e., ages

11-14), despite similar levels of conflict frequency (Allison & Schultz, 2004). Moreover, a recent meta-analysis found that low parental warmth and high parental harsh control (e.g., punishment, intrusiveness) had a stronger association with internalizing problems (i.e., anxiety and depressive symptoms) as children's age increased (Pinquart, 2017). Finally, puberty has been found to significantly moderate associations between parenting and adolescent mental health outcomes (Doom et al., 2015), such that parental support during a stress test was less strongly associated with physiological stress responses in girls at more advanced stages of puberty.

Taken together, data thus far suggest that there are changes in associations between both positive (i.e., parental support) and negative (i.e., harsh control) parenting practices and internalizing/stress phenotypes problems across age and pubertal development that may also be present for disordered eating. Unfortunately, no studies have examined whether pubertal differences in parenting predict increased binge eating symptoms in girls during/after puberty. Most studies of parenting have focused on older adolescent/young adult samples of individuals with BN or BED and used retrospective reports of parenting. These studies found significant associations between binge eating symptoms and low parental care (Ackard et al., 2006; Krug et al., 2016) and high parental control (Salafia et al., 2009; Berge et al., 2014; Depestele et al., 2017). In the one study to date to examine age differences in parenting/disordered eating associations, Spanos et al. (2010) found stronger associations between parent-child conflict and binge eating at ages 14 and 17 as compared to age 11. Taken together, these findings suggest that developmental differences in the effects of parenting may be present, and that parent-child conflict, parental care, and parental control may be important constructs to examine for pubertal effects.

Given the above, the purpose of the current study is to examine associations between parenting and binge eating across the key developmental period of puberty in a large, population-based sample of female pre-adolescents and adolescents and their parents. A multi-method approach was used to assess binge eating (i.e., measuring binge eating, emotional eating, eating in the absence of hunger) in order to capture the full spectrum of dysregulated eating that may be present in female pre-adolescents and adolescents. Parenting was examined using a range of parenting variables (i.e., perceived parent-child conflict, parental care, parental over-protection) that have been shown to be associated with binge eating in older samples and may exhibit important developmental differences in their associations with binge eating across pubertal development. Finally, I explored the effects of both maternal and paternal parenting practices, as data regarding potential differences in the influence of mothers' versus fathers' parenting are generally lacking, especially in studies examining developmental differences in effects.

METHODS

Participants

The current study used archival, cross-sectional data from the *Twin Study of Mood, Behavior, and Hormones during Puberty* (TSMBH; Klump et al., 2018). The TSMBH sample was recruited from the larger, population-based Michigan State University Twin Registry (MSUTR; Burt & Klump, 2019; Burt & Klump, 2013; Klump & Burt, 2006**)** that recruits twins within particular birth ages (e.g., ages 3-17) using birth records (see Klump & Burt, 2006, Burt & Klump, 2013, and Burt & Klump, 2019 for a description of registry recruitment). Response rates of the MSUTR (56-85%) and the TSMBH (65%) are on par with or better than other twin studies using similar recruitment methods (Burt & Klump, 2019; Klump et al., 2018). MSUTR twins are demographically representative of the Michigan population with respect to race, ethnicity, and socioeconomic status (Burt & Klump, 2019).

The current study focused on the 1,000 female twins (ages 8-16 years; M = 11.75, SD = 2.03) and their parents. As the TSMBH's primary aim involved examining ovarian hormone concentrations in the twins, the twins had to meet several including criteria in order to be eligible to for participation: 1) no hormonal contraceptive use within the past 3 months; 4) no psychotropic or steroid medications within the past 4 weeks; 5) no pregnancy or lactation within the past 6 months; and 6) no history of genetic or medical conditions known to influence hormone functioning or appetite/weight. The TSMBH sample is demographically representative of the Michigan population in regard to race and ethnicity (80.6% identified as White, 7.8% identified as African American/Black, 3.8% identified as Hispanic/Latinx, 0.6% identified as Asian, 0.2% identified as Native American/Alaskan Native, 7% identified as Multiracial) as well as annual household income (5.6% reported an annual household income of under $20,000,

12.8% $20,000-$40,000, 15.2% $40,000-$60,000, 26.2% $60,000-$100,000, 34.7% over $100,000, 5.4% missing data).

Measures

Twins provided self-reports on all binge eating and puberty measures, and they provided self-reports of the level of parent-child conflict and perceived parenting of their mothers and fathers separately. In addition to these youth self-reports of parenting, maternal reports on measures of binge eating and parent-child conflict were also available for 480 (96%) of families. The TSMBH only required the participation of one parent, and most commonly, that parent was the mother. However, there are also paternal reports of binge eating and parent-child conflict available from 185 fathers (37% of families) who either served as the single parent participant (18 fathers, 3.6% of families) or who opted to also participate in the study with the family (167 fathers, 33.3% of families). In order to examine potential differences in outcomes across these families, analyses examining effects of parent-child conflict were conducted with all families and then separately based on whether the participant had one or both parental reports (see Table S2). Although there were some differences in the main effects of parenting on binge eating (e.g., more significant associations between negative parenting styles and binge eating in families with only one parent report), there were no differences in results for the primary study hypothesis (i.e., pubertal status x parenting interactions). Consequently, findings reported are from analyses with all families only.

Finally, it is important to note that there was poor convergence between parent and youth reports on the binge eating measures in this sample (Mean *ICC* =.15; see Vo, et al., 2019); thus, only youth reports on binge eating were used in analyses. Parent reports of parent-child conflict

showed better convergence and were included in the current analyses (see more on this in Statistical Analysis).

Demographic Information. Parents reported on demographic variables including twin sex assigned at birth (e.g., female), race and ethnicity, household income, parent occupation, and parent level of education. Gender identity was not assessed. Ethnicity was measured dichotomously as yes or no to the question "Would you describe your twins' ethnicity as Hispanic or Latino?". Options for race included "White", "Black or African American", "Asian", "American Indian or Alaska Native", "Native Hawaiian or Other Pacific Islander", "More than One Race" and "Unknown or Not Reported". Participants were able to select all that applied for race.

Binge Eating. The 7-item binge eating scale from the Minnesota Eating Behaviors Survey (MEBS; von Ranson et al., 2005)[1] was used to assess engaging in, or thoughts of engaging in, binge eating and secretive eating. The MEBS was developed for use in youth as young as age 9, and studies have shown it to be appropriate for use in pre-pubertal children (Luo et al., 2016). Internal consistencies for the binge eating subscale have ranged from .65-.75 in past work (von Ranson et al., 2005) and is .68 in the current sample (Klump et al., 2018; Vo et al., 2021). The MEBS also shows good criterion-related validity, such that girls with BN score significantly higher than controls on the binge eating subscale (von Ranson et al., 2005).

The total score from the 14-item Eating in the Absence of Hunger Scale (EAH-C; Tanofsky-Kraff et al., 2008) was used to assess eating when not hungry. This measure was

[1]The Minnesota Eating Behavior Survey (MEBS; previously known as the Minnesota Eating Disorder Inventory [M-EDI]) was adapted and reproduced by special permission of Psychological Assessment Resources, Inc., 16204 North Florida Avenue, Lutz, FL 33549, from the Eating Disorder Inventory (collectively, EDI and EDI-2) by Garner, Olmstead, and Polivy (1983) by the Psychological Assessment Resources, Inc. Further reproduction of the MEBS is prohibited without prior permission from Psychological Assessment Resources, Inc.

developed for and has been successfully used in youth aged 6-19 years. The EAH-C total score was calculated by summing and averaging items and was used to assess eating in response to negative affect (i.e., feeling sad or depressed, anxious or nervous, angry or frustrated), eating in response to fatigue or boredom, and eating in response to external stimuli (i.e., when food looks, tastes, or smells good, or when others are eating). The EAH-C total score exhibits good internal consistencies in prior studies (α = .80-.88; Tanofsky-Kraff et al., 2008) and in the current sample (α = .87; Vo et al., 2021), as well as good test-retest reliability (*ICC*'s = .65-.70) and convergent validity with loss of control over eating assessed using the Eating Disorders Examination (Tanofsky-Kraff et al., 2008).

The total score of the 26-item Emotional Eating Scale – Child (EES-C; Tanofsky-Kraff et al., 2007) was used to assess the urge to cope with negative emotions (e.g., anxiety and depressive symptoms) by eating food. The EES-C was developed for use in youth aged 8-17. The total score was calculated by summing and averaging items and exhibits very good internal consistency (α = .83-.95) in child and adolescent samples (Tanofsky-Kraff et al., 2007), including the current sample (α = .95; Vo et al., 2021), and shows strong convergent validity with self-reports of loss of control over eating in youth (Tanosky-Kraff et al., 2007).

Parenting. The 12-item conflict subscale from the Parental Environment Questionnaire (PEQ; Elkins et al., 1997) was used to assess the degree of discontent or hostility within the parent-child relationship (e.g., "My parent often loses her/his temper with me"). The PEQ was originally developed for use in adolescents ages 11 to 17, but it has been used in children as young as age 6 (Waller et al., 2018). All subscale items are rated on a 4-point scale (from "definitely true" to "definitely false") that will be reverse-scored and summed to ensure that higher scores indicate greater perceived conflict. The conflict subscale has shown good internal

consistency in child samples ages 6 to 10 (α =.85-.87; Waller et al., 2018), adolescent samples ages 10 to 18 (α =.90; Klahr et al., 2011), and in the current sample (α = .89-.90). The conflict subscale has shown moderate-to-high correlations with self-reported parent-child conflict measured with the Family Environment Scale (*r* = .55; Elkins et al., 1997).

Twins' perceived parenting received by mothers and fathers was examined using twin report on the 25-item Parental Bonding Instrument (PBI; Parker et al., 1979). The PBI includes a care subscale that assesses the level of perceived parental care and warmth (e.g., "Spoke to me in a warm and friendly voice"), as well as an overprotection subscale that assesses the level of parental overprotection or over-control (e.g., "Tried to control everything I did"). The PBI was originally developed for use in adult participants who were asked to rate how well each item described their parents, as remembered from childhood up to age 16. The TSMBH asked youth to rate parental behaviors as remembered during their entire life up to the point of completing the survey. Prior studies in adolescent samples aged 12 to 16 that had participants rate items based off of experiences with parents up to their current age demonstrated good internal consistency for both scales in prior studies (*α*'s = .84-.87; Rigby et al., 2007). Internal consistency in the current sample ranges from .80-.84 for parental care and .68-70 for parental overprotection. The test-retest reliability of the PBI was measured in the original validation sample by having participants complete the inventory three weeks after they had initially completed it, and they found correlations of .76 and .63 for the care and overprotection subscales, respectively (Parker et al., 1979).

In addition to the individual care and overprotection scales, scores on these measures can be used to generate quadrants of parenting styles including: (1) Affectionate constraint (high care, high overprotection), (2) optimal parenting (high care, low overprotection), (3)

affectionless control (low care, high overprotection), and (4) neglectful parenting (low care, low overprotection). These quadrants were included in analyses to increase understanding of whether overall profiles of parenting better predict binge eating symptoms than individual dimensions of parenting. The PBI parenting quadrants are developed by calculating a mean split on both the care and overprotection subscales to generate both "low" and "high" classifications of each, which are then paired together in each quadrant (e.g., low care and high overprotection as "affectionless control"). The original validation study used means from adults and established the cutoffs to be 27 and 13.5 for maternal care and maternal overprotection, respectively, and 24 and 12.5 for paternal care and paternal overprotection, respectively (Parker, 1983). Several adolescent studies using either retrospective or current reports have used these original cut-offs in order to generate parenting quadrants (Canetti et al., 1997; Mannarini et al., 2018). Since the current study used current reports by pre-adolescents/adolescents, I established cutoffs for care and overprotection by using sample-specific means on the averaged twin reports of maternal and paternal behaviors (*M* care = 28.80; *M* overprotection = 14.04).

Pubertal Development. Pubertal development was assessed using the Pubertal Development Scale (PDS; Petersen et al., 1988). Participants' reported changes in body hair, skin, growth spurts, and breast development on a 4-point scale: (1) "Not yet started showing changes"; (2) "Have barely started showing changes"; (3) "Changes are definitely underway"; (4) "Changes seem completed". Onset of menses was also assessed and coded as absent (1) or present (4). All PDS items are summed and averaged to develop an overall pubertal development score. Similar to past studies, I minimized missing data on pubertal status by substituting in maternal report on the PDS when the youth report is missing (Klump et al., 2017, 2018). Past studies show acceptable internal consistency in samples of adolescent girls (α =.76-.83; Petersen

et al., 1988) and high correlations between PDS scores and clinician ratings of pubertal development (*r*'s = .61-.67, Petersen et al., 1988). Internal consistency in this sample has been shown to be good (α =.84; Vo et al., 2021).

Body Mass Index. Body mass index (BMI) was calculated (kilograms/meters^2) using twin height and weight measured by trained research assistants with a wall-mounted ruler and digital scale, respectively.

Statistical Analyses

Data Preparation. Following study conventions for the TSMBH sample, scores on the binge eating and parent-child relationship measures will be prorated if they are missing ≤ 10% of items; if they are missing greater than 10% of items, the scores will be coded as missing. Both the MEBS Binge Eating score and the EAH-C Total Score were log-transformed to account for positive skew.

As noted above, only twin report was used for measures of binge eating and parental care and overprotection. Concordance on ratings between twin-reported paternal and maternal levels of care and overprotection were examined in order to determine whether twin reports on mothers and fathers should be examined separately in analyses (see Table 1). Twin reports of care and overprotection with the mother and father were very highly correlated (*r* = .66-.68), and thus, analyses used averaged scores on the care and overprotection scales.

In contrast, both twin and parent reports were used to measure parent-child conflict. Similar to previous studies of other phenotypes (Burt et al., 2005; Burt et al., 2007; Klahr et al., 2011), I explored parent-child concordance on reports of parent-child conflict to determine if parent and twin reports should be examined separately in analyses (see Table 1). Correlations between twin report and both parent reports of conflict were in the medium effect size range (*r* =

.27-.36). Moreover, twin reports of conflict with the mother and father were very highly correlated (r = .66 to .71).

In past studies, researchers have used aggregated scores when correlations between all of these different informants were in that range (e.g., Burt et al., 2005, 2006; Spanos et al., 2010). Thus, following methods in these previous papers, I first averaged the twin reports of conflict with the mother with the twin report of conflict with the father. I then averaged the mother and father reported conflict together. As a last step, I made an aggregate score of all informants by averaging the twin-reported mother/father score with the mother/father-reported conflict score. This produced one overall, parent-child conflict score that I used in all analyses[2]. Nonetheless, I also conducted the parent-child conflict models separately using only twin report averages or parent report averages, and results were identical for the primary hypotheses (i.e., pubertal status x parenting interactions - see Table S1) although main effects using parent report were no longer statistically significant.

Statistical Models. Mixed linear models (MLMs) were used for analyses given the non-independence of the family data. I controlled for non-independence using two-level models with data from individual respondents (level 1) nested within family (level 2). To control for the number of analyses, a p value of .01 was used for all models.

Using the MLMs, I first examined whether pubertal status moderates associations between the parent-child relationship variables and binge eating. Predictor variables included the main effects of the parent-child relationship scores, the main effects of pubertal status, and the

[2]When combining reports on conflict, up to two missing reports were allowed in order to maximize the number of participants with conflict data. For example, in the case when paternal report on conflict was missing, twin-reported conflict on mothers and fathers was averaged first, and then averaged with maternal report on conflict to generate the composite score.

interaction between the parent-child relationship variables and pubertal status. Models were conducted separately for each parent-child predictor variable (i.e., parent-child conflict, parental care, parental conflict, PBI quadrants) as well as each binge eating outcome variable (i.e., binge eating, emotional eating, eating in the absence of hunger).

Importantly, I conducted all models with and without several important covariates to directly examine their effects. Given that higher BMI is associated with both higher levels of binge eating (Telch et al., 1988) and later pubertal development (Bini et al., 2000), I examined BMI as a covariate to examine whether effects persist after controlling for differences in weight across pubertal development. I also conducted exploratory, three-way interaction models in order to examine whether effects of puberty and the parent-child relationship differ across race/ethnicity. Overall, there is a lack of data on racially and ethnically diverse populations in the eating disorders field, and there are calls for researchers to routinely consider these important contextual variables in the study of risk factors (Mikhail & Klump, 2020). Surprisingly, no studies have ever examined differences in associations between parent-child relationships and disordered eating, despite evidence that different parenting styles may be more or less protective in different races/ethnicities (e.g., parenting characterized by high levels of control may be more protective/effective for Black/African American youth due to contextual factors such as socioeconomic status or neighborhood disadvantage; Finkelstein et al., 2001, Pinderhughes et al., 2001). Only individuals reporting 'White/Caucasian' (*N* = 805, 80.6%), 'Black/African American' (*N* = 78, 7.8%), 'Hispanic/Latinx' (*N* = 38, 3.8%), or 'More than one race' (*N* = 70, 7%) were included in these analyses, given the small number of respondents for other race/ethnicity categories (*N* = 8 total, 0.8%). Given the small sample sizes in the Black/African

American group (N = 78) and the Hispanic/Latinx group (N = 38), covariates (income, BMI, age) were examined one-by-one for each model.

Power Analyses. Power analyses were conducted using GPOWER (Erdfelder et al., 1996) by treating the model as a multiple regression and halving the sample size to account for nonindependence of the family data. With a halved sample size of 500 and a $p < .01$, all models have ≥80% power to detect small-to-medium effect sizes ($f^2 = .03$-$.05$), including those with the smallest number of predictors (i.e., 3 predictors; parenting variable, pubertal status, parenting X pubertal status) and those with the largest number of predictors (i.e., 11 predictors; parenting, pubertal status, race/ethnicity, parenting X pubertal status, parenting x race/ethnicity, pubertal status x race/ethnicity, parenting x pubertal status x race/ethnicity, BMI, BMI x parenting, BMI x pubertal status, BMI x race/ethnicity.

RESULTS

Descriptive Statistics

Descriptive statistics for binge eating variables, parenting variables, pubertal development, body mass index (BMI) are presented in Table 2. The full range of scores were present for the binge eating measures as well as the PDS; on average, twins were at mid-puberty (M = 2.23, SD = .90). A wide range of parenting behaviors were reported on each parenting scale, although extremely low levels of parental care were not captured in this sample (observed range for PBI Parental Care Composite score = 10-36 out of a possible range 0-36). The distribution of binge eating and parenting scores are consistent with other population-based (Spanos et al., 2010; Ong et al., 2016) and community samples (Tanofsky-Kraff et al., 2007, 2008). Additionally, there was adequate variability in the distribution of parenting styles (38.5% optimal, 18.7% affectionate constraint, 28.6% affectionless control, 11.2% neglectful, 2.9% missing), although there were higher rates of optimal and affectionless control, which is in line with prior studies examining PBI parenting styles in adolescent community samples (Ong et al., 2016).

Pearson Correlations

Pearson correlations are presented in Table 3. As expected, more negative parenting behaviors (e.g., higher parental overprotection and parent-child conflict) were positively correlated with one another (r = .33, p <.001), and negatively correlated with more positive parenting behaviors (e.g., care; r = -.47 to -.52 , p<.001). Significant positive correlations were also observed between all binge eating measures (e.g., binge eating, eating in the absence of hunger, emotional eating; r's = .36 to .53, p<.001). As expected, higher BMI was significantly

associated with higher levels of MEBS binge eating and eating in the absence of hunger (*r*'s =.14 to 15, *p*<.001) and more advanced pubertal development (*r* = .49, *p*<.001).

In terms of associations between binge eating, parenting behaviors, and pubertal development, higher levels of parental overprotection, higher levels of parent-child conflict, and lower levels of parental care were significantly associated with higher scores on all three measures of binge eating (*p*'s < .01-.001; see Table 3), although effect sizes tended to be in the small-to-moderate range (e.g., *r* = .10 to .21). More advanced pubertal development was also associated with higher scores on all of the binge eating measures (*r*'s = .07 to .49; *p*'s <.05-.001) as well as lower parental care (*r* = -.11; *p* = .001) and higher parent-child conflict (*r* = .24; *p* <.001). Pubertal development was not significantly associated with parental overprotection (*r* = .06; *p* = .089).

Multilevel Models

Individual Parenting Variables. As shown in Table 4, there were a number of significant main effects of parenting and pubertal development on binge eating scores, but there were no significant puberty x parenting interactions for any of the binge eating measures (*p*'s = .066 - .948, *M p-value* = .606). These data suggest that although parenting and pubertal status are both significantly associated with binge eating, there are no significant differences in associations between parenting and binge eating across pubertal development.

In terms of the main effects, lower levels of parental care predicted higher levels of all forms of binge eating symptoms (β's= -.16 to -.11, *p's* <.01-.001), and higher levels of both parental overprotection and parent-child conflict predicted higher levels of binge eating symptoms (β's= .09 to .17, *p's* <.01-.001; β's= .11 to .19, *p's* <.01-.001). Pubertal development also exhibited significant main effects for MEBS binge eating scores and eating in the absence of

hunger in the models examining parental care and overprotection (β's = .10 to .22 , p's <.01-.001; see Table 4), but not emotional eating (β's = .06 to .07 , p's = .051-.084; see Table 4). In the parent-child conflict models, pubertal development exhibited significant main effects only for eating in the absence of hunger (β = .20, p <.001). All main effects of parenting and pubertal development persisted even after including BMI as a covariate in the models (all p's <.01; see Table 4). Finally, although not a main focus of the analyses, it is important to note that there was a significant parental care x BMI interaction for eating in the absence of hunger (β = -.08, p = .009). For participants with higher BMIs (i.e., 1 SD above the sample mean), lower levels of parental care were associated with increased eating in the absence of hunger scores (see Figure 1). For participants with lower BMIs (i.e., 1 SD below the sample mean), eating in the absence of hunger scores were similar across levels of parental care.

Parenting Styles. MLMs were also used to examine parenting styles from the PBI (optimal parenting, affectionate constraint, affectionless control, and neglectful parenting) to examine whether the effects of combinations of parenting behaviors, rather than individual behaviors, interacted with pubertal status.

Once again, the puberty x parenting interactions were all non-significant (p's = .152-.955, M = .489; see Table 5), although there were significant main effects of the parenting styles on binge eating scores (see Table 5). Follow-up models using dummy coding were conducted to compare parenting styles to one another (see Table 6). Parenting style was coded either '0' or '1', depending on which was coded as the reference group. For example, in order to compare optimal and affectionate constraint parenting, a dichotomous variable was created to represent the presence or absence of affectionate constraint parenting (coded '1') or that of optimal parenting (coded '0'). Overall, the groups characterized by lower parental care and/or higher

overprotection (i.e., the affectionate constraint, affectionless control, and neglectful parenting groups) generally reported significantly higher binge eating scores than the optimal parenting group (*p*'s <.01-.001), but there were no significant differences between the low care/high overprotection groups (i.e., affectionate constraint, affectionless control, and neglectful parenting) (all *p*'s >.255). The pattern of main effects was generally similar across all binge eating measures, although comparisons were statistically significant for some (but not all) of the parenting groups (e.g., comparisons between optimal and the affectionless control and neglectful parenting groups were not significant for affectionate constraint; see Table 6). Given that the parenting styles characterized by lower levels of parental care showed more differences overall than the styles characterized by higher levels of parental care, these findings could indicate that lower levels of parental care are more strongly associated with dysregulated eating regardless of other parenting traits.

Exploratory Analyses on Racial/Ethnic Differences

Additional MLMs were conducted to explore the possibility that associations between parenting, puberty, and binge eating symptoms differ across race/ethnicity (see Table 7). Importantly, race/ethnicity did not exhibit significant main effects on binge eating across any of the models, and nearly all two-way interactions and three-way interactions were non-significant. These data suggest that in general, there are no significant differences in binge eating scores or in associations between pubertal development, parenting behaviors, and binge eating, across the races and ethnicities examined herein.

The only exception to this general rule was a significant three-way interaction (pubertal status x parenting x race/ethnicity) for parent-child conflict and emotional eating scores. Simple slopes analyses were conducted to further examine this interaction (see Figure 2). Results

indicate that, at earlier stages of puberty, stronger associations were observed between parent-child conflict and emotional eating scores in Black/African American participants and Hispanic/Latinx participants as compared to the overall sample (β's = -.41 to -.55, p's = .009-.01). For both groups, significant three-way interactions persisted after accounting for BMI (β's = -.22 to -.18, p's <.01; see Table 8) and annual household income (β's = -.20 to -.15, p's <.05-.01), although effects only persisted in the Black/African American group (at a trend level: β = -.20, p = .032) when age was included in the models. Overall, these findings suggest that lower parental care may be more predictive of emotional eating in Black/African American and Hispanic/Latinx adolescents at earlier stages of puberty or younger ages.

DISCUSSION

This is the first study to examine whether pubertal development moderates the association between binge eating behaviors and parenting variables (care, overprotection, conflict). Findings suggest that although lower parental care, higher parental overprotection, and higher parent-child conflict are each associated with increased BE, pubertal development does not significantly impact these associations. Overall, findings are significant in suggesting that associations between parenting and binge eating are present for a range of binge eating symptoms and are present across pre-adolescent and adolescent development.

The significant main effects of parenting that were observed are consistent with past literature conducted with older adolescents and adults (Tetley et al., 2014; Krug et al., 2016; Depestele et al., 2017**)** and suggests that findings in adults are not just due to retrospective recall biases. Nonetheless, the lack of significant pubertal development effects were surprising given studies showing that parenting behaviors shift across both pubertal development and age (Steinberg, 1987; Paikoff & Brooks-Gunn, 1991) and predict behaviors that have been linked to negative mental health outcomes (e.g., anxiety and depressive symptoms; Pinquart, 2017). One possible explanation for these findings is that factors associated with age (e.g., social expectations, grade level in school, i.e., elementary versus middle versus high school) may matter more than pubertal development in moderating associations between parenting and binge eating. Indeed, Spanos and colleagues (2010) found that associations between parent-child conflict and binge eating were stronger at ages 14 and 17, as compared to age 11, in adolescent girls. Given these findings, I conducted post-hoc analyses examining whether age (instead of pubertal development) moderated associations between binge eating and each of the parenting variables. Findings were highly similar such that age did not significantly moderate associations

between parenting and binge eating (see Table S3). Taken together, data from the current study suggest that age and pubertal status are not significant moderators of these associations. Reasons for discrepant findings between Spanos and colleagues (2010) and the current data are unclear, although findings from a meta-analysis for internalizing disorders suggest that the effects of age may be significant, but small in magnitude (Pinquart et al., 2017). The study by Spanos and colleagues (2010) had very discrete ages where all participants were age 11, 14, or 17, and had large sample sizes at each age. The lack of significant findings in the current study could be due to the use of cross-sectional data and, if effects are small in magnitude, the need for a larger sample size at each age or pubertal stage. Additional studies conducted in a longitudinal sample are needed to examine whether age, pubertal status, or both may moderate parenting effects.

The current study expanded upon past research by examining parenting styles rather than just individual parenting behaviors. Although these styles also did not show interactions with puberty or age, they did show significant main effects where "non-optimal" parenting styles (i.e., affectionless control, affectionate constraint, and neglectful parenting) significantly predicted higher levels of binge eating symptoms than "optimal" parenting styles. Although post-hoc comparisons found that the non-optimal parenting styles were not significantly different from one another in their prediction of binge eating, the styles characterized by lower parental care (i.e., affectionless control and neglectful parenting) showed the strongest associations with each binge eating measure (see Table 6). Affectionless control was a particularly strong predictor, as it was significantly associated with higher scores on all three measures of binge eating. These findings are in line with past studies that have shown that affectionless control is the strongest predictor of negative outcomes in adults (e.g., depressive symptoms; Rodgers, 1996) and is the most likely to be reported by adult patients diagnosed with Anorexia Nervosa (AN) or BN

(Monteleone et al., 2020). Fewer studies have examined PBI parenting styles in adolescents, but results show a similar pattern with affectionless control being the most likely to be associated with lower self-esteem (Herz & Gullone, 1999) and depressive symptoms (Martin & Waite, 1994). Additionally, Krug and colleagues (2016) found that only low parental care independently predicted increased binge eating in adolescents, and this risk substantially increased when combined with other negative parenting behaviors (e.g., low parental monitoring) (Krug et al., 2016). This suggests that parenting characterized by low parental care, such as affectionless control, may be more likely to increase risk of dysregulated eating in adolescents, especially in the presence of other co-occurring negative parenting behaviors. Affectionless control parenting and its strong association with negative outcomes may also be explained by its similarity to authoritarian parenting (i.e., low responsiveness, high demandingness; Baumrind, 1991). Authoritarian parenting been consistently linked to negative psychological outcomes (including binge eating; Zubatsky et al., 2015) in youth, possibly due to the transmission of poor emotion regulation skills (Shaw & Starr, 2019). Future research should examine potential mechanisms driving effects of parenting behaviors and styles on binge eating.

Exploratory analyses of race and ethnicity showed that all main effects of parenting were present across the races/ethnicities examined and, once again, there were no significant interactions with pubertal development. These findings suggest that associations between negative parenting behaviors (low care, high overprotection, high conflict) and binge eating are similar across development for each of the racial/ethnic groups in the study. Interestingly, parent-child conflict showed some differential associations with emotional eating across pubertal development (i.e., stronger associations in early puberty) for both Hispanic/Latinx and Black/African American adolescents, but findings were trend-level and inconsistently present

after controlling for covariates. If these findings are replicated, it could mean that factors such as acculturation and/or minority stress may impact how parenting influences binge eating across pre-adolescent and adolescent development. Additionally, it could indicate that for some groups, the negative effects of parent-child conflict may be stronger at earlier stages of puberty, when higher levels of parent-child conflict are less common, on average (Steinberg, 1987).

Although this study had several strengths (e.g., large population-based sample, multiple measures of binge eating and parenting, youth and parent reports), there were also some limitations that should be noted. First, self-report measures were used rather than interviews and observational data. Binge eating is often over-estimated using self-report questionnaires (Decaluwé & Braet, 2004; Fairburn & Beglin, 1994), so additional studies with interviews are needed. Additionally, parenting was examined using self-report rather than observational measures. Future studies should include multiple measures of parenting in order to determine whether observed parenting behaviors show similar effects on binge eating or if effects are limited to parenting perceived by youth.

Second, the study used a community-based sample instead of a clinical sample. Thus, generalizability to individuals with clinical eating pathology is unclear, and additional studies are needed in these populations. Nonetheless, eating disorder symptoms exist on a continuum, which includes sub-clinical levels of eating pathology, (Luo et al., 2016), and a wide range of binge eating behaviors were reported in the current sample, including those of clinical severity.

Third, participants in the sample were younger in comparison to those in previous studies with adolescent samples (Spanos et al., 2010; Krug et al., 2016), and most participants were in early or mid-puberty. Previous studies have found that parent-child conflict is more strongly associated with binge eating in late adolescence (i.e., age 17; Spanos et al., 2010) versus early

adolescence (i.e., age 11; Spanos et al., 2010). It could be that associations between parenting and binge eating are relatively stable during pre-puberty and mid-puberty, but associations may change in strength once pubertal maturation is complete.

Fourth, exploratory analyses were also limited given small sample sizes for examining three-way models in racial/ethnic groups, the small number of racial/ethnic groups examined, and not collecting data on variables that could account for differences (e.g., acculturation, minority stress). Finally, data were cross-sectional instead of longitudinal. It could be that parenting and binge eating associations change across pubertal maturation within an individual rather than across individuals at different pubertal stages. Additionally, it will be important to parse out directionality of associations between parenting and adolescent binge eating symptoms given that previous studies have shown that engaging in binge eating can lead to increased parent-child conflict rather than conflict leading to increased binge eating (Spanos et al., 2010). Although the directionality of these effects remain unclear, parenting behaviors will be important targets given strong associations with binge eating.

In summary, findings suggest that parenting behaviors are significantly associated with binge eating, and these associations remain stable across age and pubertal development. If replicated, findings have implications for understanding eating disorder risk and improving current interventions, especially interventions that involve parents. Family based treatment (FBT), which initially was developed for adolescent AN (Lock et al., 2010) but has been adapted to treat adolescent BN (Le Grange et al., 2015), involves supporting parents in regulating their child's eating behaviors. Interventions such as FBT may be strengthened by helping facilitate parental warmth in combination with parental monitoring and regulation of the child's food intake, and by targeting any parenting strategies (e.g., high criticism, high overcontrol) or styles

(e.g., affectionless control) that are harmful throughout treatment, both increasing the likelihood that adolescents will be receptive to parents' efforts and aiding in preventing risk for remission and additional negative psychological outcomes later on.

APPENDICES

APPENDIX A

Tables

Table 1 Pearson Correlations between Parenting Variable Informants

Variable	1	2	3	4	5	6	7	8
Twin's Report on Parenting								
1. Care – mom	–							
2. Care – dad	.68***	–						
3. Overprotection – mom	-.48***	-.42***	–					
4. Overprotection – dad	-.36***	-.48***	.66***	–				
5. Conflict – mom	-.52***	-.44***	.43***	.28***	–			
6. Conflict - dad	-.48***	-.57***	.39***	.37***	.71***	–		
Parent's Report on Parenting								
7. Conflict – mom	-.19***	-.20***	.14***	.10**	.27***	.23***	–	
8. Conflict – dad	-.07	-.34***	.12*	.16**	.22***	.30***	.36***	–

* p <.05, ** p <.01, *** p <.001.

Table 2 Descriptive Statistics

Variable	**Mean**	***SD***	**Observed Range**	**Possible Range**
MEBS Binge Eating	0.88	1.32	0 – 7	0 – 7
Eating in the Absence of Hunger	1.53	0.48	1 – 4.71	1 – 5
Emotional Eating	1.58	0.60	1 – 4.42	1 – 5
PBI Care Composite	28.80	5.57	10 – 36	0 – 36
Twin report on mom	29.45	5.61	7 – 36	0 – 36
Twin report on dad	28.14	6.42	3 – 36	0 – 36
PBI Overprotection Composite	14.04	5.39	0 – 32.88	0 – 39
Twin report on mom	14.38	5.66	0 – 32	0 – 39
Twin report on dad	13.65	5.99	0 – 35.75	0 – 39
PEQ Conflict Composite	20.60	5.45	12 – 45.09	12 – 48
Twin report on mom	20.04	7.72	12 – 48	12 – 48
Twin report on dad	19.48	7.96	12 – 48	12 – 48
Mom report on twin	21.33	6.74	12 – 45.82	12 – 48
Dad report on twin	21.63	6.59	12 – 44.73	12 – 48
PDS Final Average Scores	2.23	0.90	1 – 4	1 – 4
BMI	19.49	4.47	10.70 – 46.55	--

Table 2 (cont'd)

Note: MEBS = Minnesota Eating Behaviors Survey; PBI = Parental Bonding Instrument; PEQ = Parental Environment Questionnaire; PDS = Pubertal Development Scale; BMI = Body Mass Index. Although log-transformed values were used for MEBS Binge Eating and Eating in the Absence of Hunger Total Score, raw means, standard deviations, and ranges are listed here for descriptive purposes.

Table 3 Pearson Correlations between Binge Eating Variables, Parenting Variables, Pubertal Development, and BMI

Variable	1	2	3	4	5	6	7	8
1. MEBS Binge Eating	–							
2. Eating in the Absence of Hunger	.53***	–						
3. Emotional Eating	.36***	.44***	–					
4. Care Composite	-.19***	-.15***	-.112**	–				
5. Overprotection Composite	.18***	.12***	.19**	-.52***	–			
6. Conflict Composite	.21***	.18***	.11**	-.47***	.33***	–		
7. Pubertal status	.12***	.22***	.07*	-.11**	.06	.24***	–	
8. BMI	.14***	.15***	.03	-.13***	.03	.19***	.49***	-.11***

Note. MEBS = Minnesota Eating Behaviors Survey; BMI = body mass index.

* p <.05, ** p <.01, *** p <.001.

Table 4 Multilevel Models Examining Associations between Parenting, Puberty, and Binge Eating, with and without BMI

Parental Care (no covariate)

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.002	.04	489.20	0.04	.965	.01	.04	477.80	0.16	.870	-.01	.04	475.48	-0.31	.755
Care	-.16	.03	943.55	-4.86	**<.001**	-.12	.03	921.22	-3.60	**<.001**	-.11	.03	843.62	-3.14	**.002**
Puberty	.10	.04	695.23	2.80	**.005**	.22	.03	666.14	6.35	**<.001**	.06	.03	608.53	1.73	.084
Care x Puberty	.03	.03	952.42	1.09	.277	-.01	.03	937.56	-0.28	.783	-.05	.03	872.04	-1.41	.158

Parental Care (BMI as a covariate)

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.02	.04	546.85	0.46	.644	.02	.04	535.43	0.60	.549	-.01	.04	519.61	-0.24	.808
Care	-.15	.03	938.22	-4.50	**<.001**	-.11	.03	916.28	-3.17	**.002**	-.11	.03	836.67	-3.04	**.002**
Puberty	.06	.04	760.45	1.64	.101	.20	.04	733.58	5.22	**<.001**	.07	.04	659.39	1.79	.075
BMI	.08	.04	822.08	2.05	.040	.05	.04	791.14	1.20	.230	-.02	.04	713.50	-0.49	.627
Care x BMI	-.06	.03	942.71	-1.85	.065	-.08	.03	940.03	-2.62	**.009**	-.02	.03	895.26	-0.49	.622

Table 4 (cont'd)

Puberty x BMI	-.04	.04	867.53	-1.14	.254	-.05	.04	837.24	-1.25	.210	-.004	.04	760.05	-0.11	.915
Care x Puberty	.06	.04	948.95	1.84	.066	.03	.04	935.98	0.97	.335	-.04	.04	874.94	-1.04	.297

Parental Overprotection (no covariate)

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	-.01	.04	488.77	-0.14	.885	.01	.04	478.60	0.26	.798	-.01	.04	472.35	-0.22	.830
Overprotection	.17	.03	947.88	5.37	**<.001**	.12	.03	938.88	3.57	**<.001**	.09	.03	878.79	2.71	**.007**
Puberty	.11	.04	695.07	3.04	**.002**	.22	.03	669.92	6.45	**<.001**	.07	.03	606.05	1.95	.051
Overprotection x Puberty	-.01	.03	936.24	-0.46	.649	-.02	.03	934.63	-0.51	.609	.04	.03	901.56	1.13	.257

Parental Overprotection (BMI as a covariate)

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.01	.04	549.92	0.25	.806	.02	.04	538.07	0.50	.614	-.01	.04	517.76	-0.35	.731
Overprotection	.17	.03	944.99	5.40	**<.001**	.12	.03	936.04	3.59	**<.001**	.09	.03	875.73	2.71	**.007**

Table 4 (cont'd)

Puberty	.07	.04	758.06	1.67	.095	.20	.04	736.66	5.09	**<.001**	.07	.04	656.97	1.78	.076
BMI	.10	.04	809.21	2.52	.012	.06	.04	784.12	1.58	.114	-.01	.04	702.93	-0.22	.826
Overprotection x BMI	.07	.04	940.68	1.86	.064	.07	.04	935.81	1.79	.074	.01	.04	889.40	0.29	.775
Puberty x BMI	-.03	.04	852.38	-0.88	.378	-.02	.04	827.22	-0.63	.529	.01	.04	744.21	0.34	.736
Overprotection x Puberty	-.04	.03	935.11	-1.14	.254	-.04	.03	931.14	-1.18	.239	.03	.03	898.19	0.92	.358

Parent-Child Conflict (no covariate)

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	-.003	.04	499.63	-0.07	.945	-.001	.04	483.68	-0.02	.981	-.01	.04	478.25	-0.15	.884
Conflict	.19	.04	841.44	5.49	**<.001**	.14	.03	802.30	3.98	**<.001**	.11	.04	732.10	3.01	**.003**
Puberty	.07	.04	701.44	1.98	.048	.20	.04	666.20	5.72	**<.001**	.05	.04	612.68	1.26	.210
Conflict x Puberty	-.02	.03	884.41	-0.65	.519	.00	.03	844.38	0.07	.948	.00	.03	778.80	0.08	.934

Table 4 (cont'd)

Parent-Child Conflict (BMI as a covariate)															
	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.02	.04	549.50	0.40	.690	.01	.04	530.03	0.32	.748	-.01	.04	512.86	-0.16	.874
Conflict	.18	.04	827.56	5.18	**<.001**	.13	.04	792.42	3.67	**<.001**	.11	.04	721.29	3.04	**.002**
Puberty	.05	.04	759.68	1.20	.229	.19	.04	727.65	4.78	**<.001**	.05	.04	655.25	1.31	.191
BMI	.07	.04	796.91	1.60	.111	.04	.04	760.44	1.02	.306	-.02	.04	686.67	-0.37	.712
Conflict x BMI	.05	.03	931.57	1.53	.126	.06	.03	927.55	1.79	.073	-.02	.04	887.11	-0.63	.531
Puberty x BMI	-.05	.04	875.61	-1.27	.204	-.04	.04	844.17	-0.97	.334	.01	.04	779.49	0.21	.832
Conflict x Puberty	-.04	.04	902.27	-1.12	.265	-.02	.04	869.60	-0.64	.523	.01	.04	795.50	0.30	.767

Note: MEBS = Minnesota Eating Behaviors Survey; BMI = Body Mass Index. Models used standardized Z-scores. MEBS Binge Eating and Eating in the Absence of Hunger scores were both log-transformed before analyses to account for positive skew.

Table 5 Prediction of Binge Eating by Parenting Style, controlling for BMI

Affectionate Constraint															
	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	df	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.04	.04	575.16	0.85	.396	.04	.04	561.16	0.92	.359	.005	.04	542.22	0.12	.909
Affectionate constraint	.13	.04	919.65	3.16	**.002**	.09	.04	919.17	2.03	.042	.09	.04	900.94	2.03	.042
Puberty	.06	.04	789.39	1.59	.113	.19	.04	766.94	4.64	**<.001**	.08	.04	689.12	1.87	.062
BMI	.12	.04	848.46	2.70	**.007**	.08	.04	825.37	1.76	.078	-.02	.04	746.78	-0.50	.619
Affectionate constraint x BMI	.02	.05	910.60	0.41	.686	.02	.05	910.16	0.39	.695	-.06	.06	899.78	-1.14	.257
Puberty x BMI	-.03	.04	854.42	-0.76	.450	-.02	.04	829.16	-0.47	.641	.01	.04	741.87	0.37	.715
Affectionate constraint x Puberty	.003	.05	899.00	0.06	.955	-.05	.05	900.68	-1.03	.302	.03	.05	898.61	0.62	.538

Table 5 (cont'd)

Affectionless Control															
	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.03	.04	554.75	0.77	.441	.03	.04	538.99	0.81	.419	-.000	.04	523.87	-0.01	.993
Affectionless control	.16	.04	942.86	4.02	**<.001**	.11	.04	929.23	2.68	**.007**	.11	.04	860.16	2.81	**.005**
Puberty	.06	.04	761.30	1.58	.115	.20	.04	736.55	5.05	**<.001**	.07	.04	660.00	1.88	.060
BMI	.11	.04	804.51	2.59	**.010**	.07	.04	776.24	1.68	.094	-.01	.04	698.49	-0.27	.785
Affectionate control x BMI	.06	.04	944.00	1.30	.193	.06	.04	934.93	1.32	.186	-.02	.04	880.06	-0.40	.688
Puberty x BMI	-.04	.04	854.58	-1.07	.284	-.03	.04	827.21	-0.78	.435	.01	.04	744.70	0.24	.814
Affectionless control x Puberty	-.05	.04	941.96	-1.22	.224	-.01	.04	935.98	-0.17	.869	.06	.05	883.39	1.32	.187
Neglectful															
	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				

Table 5 (cont'd)

Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.06	.04	622.92	1.48	.140	.06	.04	607.92	1.47	.142	.02	.04	584.84	0.51	.614
Neglectful	.18	.05	939.97	3.67	**<.001**	.13	.05	935.54	2.59	**.010**	.13	.05	887.42	2.56	.011
Puberty	.05	.04	820.62	1.07	.286	.17	.04	798.70	3.94	**<.001**	.09	.04	714.93	1.98	.048
BMI	.12	.04	866.11	2.64	**.009**	.10	.04	844.12	2.16	.031	-.04	.04	758.17	-0.79	.433
Neglectful x BMI	.01	.06	924.11	0.18	.859	.07	.06	922.42	1.25	.212	0.10	.06	900.23	-1.67	.096
Puberty x BMI	-.03	.04	874.28	-0.90	.367	-.03	.04	851.19	-0.73	.464	.02	.04	758.92	0.42	.677
Neglectful x Puberty	-.04	.06	918.43	-0.76	.446	-.08	.06	920.69	-1.43	.152	.07	.06	899.44	1.17	.732

Note: MEBS = Minnesota Eating Behaviors Survey; BMI = Body Mass Index . Models used standardized Z-scores. MEBS Binge Eating and Eating in the Absence of Hunger scores were both log-transformed before analyses to account for positive skew. Parenting style was effect-coded for affectionate constraint, affectionless control, and neglectful parenting, with optimal parenting serving as the reference group in each group. For example, the effect code for affectionate constraint coded participants reporting affectionate constraint parenting as '1', affectionless control and neglectful parenting as '0', and optimal parenting as '-1'. Effect codes compared effects of the parenting style being examined with the effects across all the parenting styles.

Table 6 Follow-up Comparisons between Optimal, Affectionate Constraint, Affectionless Control, and Neglectful Parenting Groups, Controlling for BMI

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Optimal	-.19	.05	429.62	-3.69	**<.001**	-.13	.05	411.40	-2.30	.022	-.13	.05	396.33	-2.57	.011
Affectionate constraint vs Optimal	.23	.08	530.53	3.06	**.002**	.14	.08	542.86	1.60	.111	.16	.09	541.97	1.79	.075
BMI	.10	.05	547.24	2.05	.041	.11	.05	522.71	2.01	.045	.05	.05	457.54	1.01	.314
Affectionate constraint vs Optimal X BMI	.05	.09	541.87	0.53	.593	-.06	.10	552.67	-0.65	.515	-.08	.10	538.24	-0.83	.410
Optimal	-.18	.05	489.53	-3.38	**.001**	-.12	.05	476.30	-2.23	.026	-.12	.05	449.62	-2.36	.019
Affectionless control vs Optimal	.31	.08	634.05	4.04	**<.001**	.23	.08	612.06	2.84	**.005**	.22	.08	566.87	2.70	**.007**
BMI	.13	.05	604.51	2.46	.014	.11	.06	586.42	1.91	.056	.06	.05	532.26	1.04	.299
Affectionless control vs Optimal X BMI	.01	.07	656.16	0.17	.866	.09	.08	641.52	1.14	.256	.01	.08	601.63	0.07	.941

Table 6 (cont'd)

Optimal	-.18	.05	362.51	-3.46	**.001**	-.13	.05	344.57	-2.47	.014	-.13	.05	340.73	-2.55	.011
Neglectful vs Optimal	.29	.10	492.59	2.99	**.003**	.30	.11	479.67	2.88	**.004**	.26	.10	460.18	2.49	.013
BMI	.13	.05	467.22	2.57	.011	.12	.05	434.72	2.14	.033	.05	.05	403.56	1.15	.250
Neglectful vs Optimal X BMI	-.13	.09	482.70	-1.42	.155	.05	.10	485.00	0.52	.605	-.15	.10	466.70	-1.52	.128
Affectionate constraint	.06	.08	420.66	0.75	.453	.03	.08	418.36	0.35	.727	.02	.08	388.73	0.28	.783
Affectionless control vs Affectionate constraint	.09	.10	460.56	0.89	.372	.08	.10	456.79	0.85	.393	.07	.10	417.27	0.72	.472
BMI	.14	.10	430.21	1.47	.133	.04	.09	427.04	0.48	.629	-.03	.10	403.84	-0.26	.796
Affectionless control vs Affectionate constraint X BMI	.02	.11	446.67	0.15	.884	.16	.11	442.40	1.47	.144	.09	.11	413.59	0.79	.433
Affectionate constraint	.06	.08	230.21	0.72	.475	.02	.07	243.10	0.28	.780	.02	.08	276.00	0.30	.766
Neglectful vs Affectionate constraint	.06	.12	266.01	0.45	.655	.16	.12	274.00	1.33	.184	.11	.13	276.00	0.89	.372
BMI	.14	.09	241.00	1.53	.127	.03	.09	254.08	0.25	.727	-.03	.09	276.00	-0.27	.787
Neglectful vs Affectionate constraint X BMI	-.15	.13	262.89	-1.14	.254	.14	.12	274.32	1.11	.267	-.07	.13	276.00	-0.54	.593

Table 6 (cont'd)

Neglectful	.15	.07	315.43	2.18	.030	.11	.06	307.23	1.79	.074	.09	.07	292.80	1.42	.155
Neglectful vs Affectionless control	-.05	.12	393.00	-0.38	.705	.03	.11	387.22	0.28	.783	.02	.12	364.53	0.17	.866
BMI	.14	.06	359.62	2.36	.019	.20	.05	341.08	3.66	**<.001**	.06	.06	327.14	1.02	.309
Neglectful vs Affectionless constraint X BMI	-.11	.11	392.07	-1.01	.311	-.03	.11	388.02	-0.26	.794	-.15	.11	365.42	-1.32	.188

Note: BMI = Body Mass Index; MEBS = Minnesota Eating Behaviors Survey. Models used standardized Z-scores. MEBS Binge Eating and Eating in the Absence of Hunger scores were both log-transformed before analyses to account for positive skew. Parenting style was dummy coded in follow up comparisons.

Table 7 Multilevel Models Examining Associations between Race/Ethnicity, Puberty, and Parenting

Parental Care															
Black/African American vs Overall Sample															
	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.01	.06	555.52	0.09	.928	.05	.06	559.65	0.82	.412	-.07	.06	560.67	-1.05	.293
Care	-.20	.05	918.02	-4.34	**<.001**	-.11	.05	917.10	-2.26	.024	-.16	.05	901.66	-3.18	**.002**
Puberty (PDS)	.10	.06	837.76	1.63	.104	.13	.06	817.96	2.16	.031	.04	.06	757.06	0.65	.515
Black vs Overall	.02	.07	553.21	0.24	.811	.05	.07	557.18	0.77	.439	-.07	.07	556.93	-0.99	.323
Care x PDS	.03	.05	914.08	0.66	.507	-.01	.05	915.22	-0.24	.814	-.01	.05	903.32	-0.11	.915
Care x Black vs Overall	-.07	.05	918.02	-1.48	.138	.01	.05	918.04	0.18	.857	-.07	.05	902.19	-1.36	.174
PDS x Black vs Overall	.002	.07	838.94	0.03	.974	-.12	.06	819.16	-1.90	.058	-.04	.07	756.07	-0.62	.537
Care x PDS x Black vs Overall	-.01	.05	916.27	-0.21	.835	.02	.05	918.08	0.32	.752	.06	.05	903.74	1.16	.249

Table 7 (cont'd)

	MEBS Binge Eating					Eating in the Absence of Hunger					Emotional Eating				
Hispanic/Latinx vs Overall Sample															
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.005	.07	515.08	0.07	.948	-.004	.07	506.70	-0.06	.952	-.11	.07	501.32	-1.70	.089
Care	-.23	.06	947.84	-4.16	**<.001**	-.15	.06	941.00	-2.61	**.009**	-.22	.06	883.23	-3.84	**<.001**
Puberty (PDS)	.11	.07	715.08	1.64	.102	.19	.07	688.36	2.81	**.005**	.04	.07	632.55	0.61	.540
Hispanic vs Overall	.01	.08	509.74	0.19	.853	-.01	.07	500.35	-0.14	.885	-.12	.07	494.48	-1.65	.101
Care x PDS	.004	.06	939.83	0.07	.948	.02	.06	937.18	0.31	.760	.02	.06	892.15	0.31	.758
Care x Hispanic vs Overall	-.10	.06	948.85	-1.68	.093	-.04	.06	938.27	-0.61	.545	-.15	.06	867.47	-2.37	.018
PDS x Hispanic vs Overall	.02	.07	696.70	0.23	.820	-.05	.07	670.33	-0.64	.526	-.04	.07	616.62	-0.58	.565
Care x PDS x Hispanic vs Overall	-.05	.07	944.47	-0.67	.505	.04	.07	940.29	0.57	.570	.08	.07	886.25	1.17	.244
Multiracial vs Overall Sample															

Table 7 (cont'd)

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.04	.06	510.35	0.62	.538	.03	.06	500.37	0.50	.615	-.05	.06	506.20	-0.82	.410
Care	-.21	.05	948.26	-4.13	**<.001**	-.08	.05	936.77	-1.56	.119	-.16	.05	876.52	-3.00	**.003**
Puberty (PDS)	.11	.06	738.47	1.96	.050	.17	.05	709.83	3.15	**.002**	.02	.05	661.49	0.31	.757
Multiracial vs Overall	.06	.07	505.87	0.88	.380	.03	.06	495.03	0.39	.695	-.04	.06	501.10	-0.69	.491
Care x PDS	.02	.05	946.92	0.46	.647	-.004	.05	940.98	-0.09	.928	-.02	.05	890.04	-0.34	.736
Care x Multiracial vs Overall	-.08	.06	943.37	-1.37	.172	.06	.06	927.07	1.00	.316	-.07	.06	861.02	-1.28	.199
PDS x Multiracial vs Overall	.01	.06	722.61	0.23	.815	-.07	.06	694.19	-1.18	.240	-.07	.06	646.47	-1.24	.215
Care x PDS x Multiracial vs Overall	-.02	.05	948.84	-0.37	.713	.02	.05	939.88	0.30	.765	.05	.05	883.31	0.90	.368

Table 7 (cont'd)

Parental Overprotection															
Black/African American vs Overall Sample															
	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	*β*	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	-.003	.07	566.19	-0.06	.954	.02	.07	564.99	0.38	.707	-.03	.07	552.89	-0.45	.654
Overprotection	.21	.06	940.78	3.76	**<.001**	.15	.06	927.96	2.61	**.009**	.09	.06	855.34	1.47	.141
Puberty (PDS)	.09	.07	820.41	1.41	.160	.14	.07	798.54	2.12	.034	.02	.07	726.06	0.30	.762
Black vs Overall	.01	.07	564.20	0.13	.900	.02	.07	563.39	0.24	.812	-.04	.07	551.44	-0.53	.598
Overprotection x PDS	-.01	.05	928.63	-0.19	.848	-.02	.05	927.50	-0.32	.747	.03	.06	899.71	0.53	.595
Overprotection x Black vs Overall	.05	.05	941.55	0.90	.369	.04	.06	929.12	0.72	.470	-.01	.06	858.27	-0.17	.866
PDS x BvO	-.02	.07	818.62	-0.24	.807	-.12	.07	797.00	-1.75	.080	-.07	.07	723.89	-0.98	.329

Table 7 (cont'd)

Overprotection x PDS x Black vs Overall	.01	.06	925.69	0.11	.914	-.02	.06	925.02	-0.32	.750	-.02	.06	900.00	-0.28	.782

Hispanic/Latinx vs Overall Sample

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.02	.07	490.93	0.32	.746	.01	.07	480.31	0.08	.941	-.07	.07	467.68	-1.06	.288
Overprotection	.20	.06	906.78	3.29	**.001**	.14	.06	883.79	2.29	.022	.12	.06	785.39	1.90	.058
Puberty (PDS)	.10	.07	697.64	1.44	.149	.18	.07	670.32	2.69	**.007**	.02	.07	607.87	0.25	.801
Hispanic vs Overall	.04	.07	489.54	0.52	.602	-.01	.07	478.37	-0.09	.931	-.08	.07	465.76	-1.16	.247
Overprotection x PDS	.01	.06	940.81	0.12	.901	-.02	.06	927.01	-0.35	.730	.02	.06	850.58	0.32	.748

Table 7 (cont'd)

Overprotection x Hispanic vs Overall	.04	.07	914.68	0.57	.569	.03	.07	892.89	0.43	.666	.03	.07	796.15	0.43	.667
PDS x Hispanic vs Overall	-.01	.07	686.26	-0.08	.933	-.06	.07	659.61	-0.79	.432	-.07	.07	599.08	-0.99	.325
Overprotection x PDS x Hispanic vs Overall	.03	.06	942.33	0.45	.654	-.01	.06	929.84	-0.14	.890	-.03	.07	855.72	-0.38	.706

Multiracial vs Overall Sample

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.03	.06	515.13	0.51	.609	.02	.06	504.06	0.30	.762	-.02	.06	504.24	-0.37	.708
Overprotection	.20	.05	943.96	3.93	**<.001**	.11	.05	933.58	2.07	.039	.08	.06	869.99	1.40	.163
(Puberty) PDS	.11	.05	731.75	1.96	.050	.18	.05	702.60	3.25	**.001**	.01	.05	638.29	0.11	.910

Table 7 (cont'd)

Multiracial vs Overall	.06	.07	511.04	0.85	.398	.01	.06	499.28	0.13	.895	-.03	.06	499.18	-0.40	.687
Overprotection x PDS	-.003	.04	938.28	-0.07	.944	-.02	.04	934.77	-0.39	.697	.03	.05	890.74	0.68	.496
Overprotection x Multiracial vs Overall	.05	.05	942.84	0.88	.379	-.01	.05	935.94	-0.19	.848	-.02	.06	880.51	-0.33	.744
PDS x Multiracial vs Overall	.005	.06	719.83	.08	.935	-.07	.06	691.08	-1.18	.238	-.09	.06	627.02	-1.54	.123
Overprotection x PDS x Multiracial vs Overall	.02	.05	935.84	.35	.725	-.01	.05	933.46	-0.21	.833	-.01	.05	892.29	-0.27	.785
Parent-Child Conflict															
Black/African American vs Overall Sample															
	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				

Table 7 (cont'd)

Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.08	.06	542.02	1.27	.207	.07	.06	524.94	1.11	.270	.02	.06	518.02	0.35	.725
Conflict	.22	.06	877.54	3.86	**<.001**	.11	.06	837.04	1.91	.056	.18	.06	775.50	3.03	**.003**
Puberty (PDS)	.04	.06	796.47	0.57	.571	.15	.06	755.61	2.44	.015	.01	.06	715.16	0.12	.908
Black vs Overall	.11	.07	541.70	1.57	.117	.08	.07	525.41	1.23	.220	.03	.07	518.65	0.42	.673
Conflict x PDS	-.07	.05	908.73	-1.31	.191	-.05	.05	874.98	-0.96	.340	-.12	.06	812.96	-2.13	.033
Conflict x Black vs Overall	.04	.06	883.90	0.57	.571	-.06	.06	844.46	-0.97	.331	.08	.06	783.68	1.21	.228
PDS x Black vs Overall	-.05	.07	798.68	-0.68	.498	-.08	.07	758.63	-1.17	.241	-.06	.07	717.16	-0.85	.396
Conflict x PDS x Black vs Overall	-.07	.06	914.14	-1.18	.238	-.09	.06	881.61	-1.63	.104	-.17	.06	821.48	-2.85	**.004**

Hispanic/Latinx vs Overall Sample

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	*β*	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*

Table 7 (cont'd)

Intercept	.07	.07	511.39	1.04	.299	.04	.07	489.82	0.55	.580	-.02	.07	483.52	-0.26	.798
Conflict	.21	.07	842.05	3.09	**.002**	.16	.07	801.04	2.31	.021	.23	.07	723.38	3.27	**.001**
Puberty (PDS)	.04	.07	723.46	0.62	.537	.17	.07	681.75	2.45	.014	-.02	.07	640.14	-0.25	.799
Hispanic vs Overall	.09	.08	507.32	1.24	.214	.04	.07	485.92	0.60	.552	-.02	.07	479.92	-0.29	.772
Conflict x PDS	-.07	.06	889.97	-1.11	.268	-.09	.06	854.74	-1.41	.159	-.14	.06	778.74	-2.22	.027
Conflict x Hispanic vs Overall	.02	.08	848.84	0.26	.798	.01	.07	807.94	0.14	.888	.14	.08	725.99	1.81	.071
PDS x Hispanic vs Overall	-.03	.08	707.95	-0.43	.665	-.04	.08	667.25	-0.58	.560	-.09	.08	626.70	-1.13	.257
Conflict x PDS x Hispanic vs Overall	-.06	.07	893.18	-0.92	.360	-.12	.07	857.22	-1.80	.073	-.19	.07	779.99	-2.69	**.007**

Multiracial vs Overall Sample

Table 7 (cont'd)

	MEBS Binge Eating					**Eating in the Absence of Hunger**					**Emotional Eating**				
Variable	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*	β	*SE*	*df*	*t*	*p*
Intercept	.08	.06	505.68	1.32	.189	.04	.06	486.57	0.62	.536	-.004	.06	484.24	-0.07	.946
Conflict	.16	.05	814.93	3.12	**.002**	.09	.05	776.35	1.66	.098	.13	.05	717.02	2.49	.013
Puberty (PDS)	.06	.06	729.04	1.13	.259	.17	.06	687.94	3.11	**.002**	-.02	.06	639.44	-0.33	.740
Multiracial vs Overall	.11	.07	501.91	1.68	.093	.05	.06	482.76	0.72	.475	-.001	.06	480.08	-0.02	.986
Conflict x PDS	-.04	.05	868.11	-0.83	.405	-.03	.05	831.24	-0.67	.504	-.03	.05	767.46	-0.66	.507
Conflict x Multiracial vs Overall	-.04	.06	816.42	-0.72	.472	-.08	.06	776.54	-1.45	.148	.03	.06	714.68	0.54	.588
PDS x Multiracial vs Overall	-.01	.06	717.17	-0.14	.887	-.04	.06	676.52	-0.76	.451	-.09	.06	627.38	-1.53	.128

Table 7 (cont'd)

Conflict x PDS x Multiracial vs Overall	-.03	.05	868.61	-0.53	.596	-.06	.05	829.88	-1.19	.236	-0.06	.05	765.21	-1.16	.246

Note: MEBS = Minnesota Eating Behaviors Survey; PDS = Pubertal Development Scale. Models used standardized Z-scores. MEBS Binge Eating and Eating in the Absence of Hunger scores were both log-transformed before analyses to account for positive skew. Race was effect-coded in analyses.

Table 8 Models examining Significant Three-way Interactions between Race/Ethnicity, Parent-Child Conflict, and Puberty controlling for Covariates (Age, Income, BMI)

Black/African American vs Overall						**Hispanic/Latinx vs Overall**					
Parent-Child Conflict x Puberty x Race with AGE						***Parent-Child Conflict x Puberty x Race with AGE***					
Variable	β	*SE*	*df*	*t*	*p*	Variable	β	*SE*	*df*	*t*	*p*
Intercept	.0004	.08	608.55	0.005	.996	Intercept	-.08	.09	556.73	-0.89	.374
Conflict	.19	.07	785.62	2.69	**.007**	Conflict	.22	.08	742.51	2.90	**.004**
Puberty (PDS)	.08	.10	879.07	0.79	.428	Puberty (PDS)	.03	.11	846.67	0.25	.805
Black vs Overall (BvO)	-.004	.09	607.94	-0.05	.962	Hispanic vs Overall (HvO)	-.10	.10	547.35	-1.05	.294
Age	-.11	.10	711.58	-1.12	.263	Age	-.11	.11	637.55	-1.02	.307
Conflict x Age	-.02	.09	791.77	-0.23	.820	Conflict x Age	-.09	.11	798.66	-0.83	.408
PDS x Age	.04	.08	779.03	0.46	.648	PDS x Age	.10	.09	667.26	1.14	.253
BvO x Age	.01	.10	715.54	0.10	.918	HvO x Age	-.003	.12	630.56	-0.03	.977
Conflict x PDS	-.11	.08	881.72	-1.26	.209	Conflict x PDS	-.09	.10	863.37	-0.90	.368

Table 8 (cont'd)

Conflict x BvO	.08	.06	779.91	1.26	.207	Conflict x HvO	.14	.08	719.29	1.83	.067
PDS x BvO	-.09	.10	878.93	-0.83	.407	PDS x HvO	-.13	.12	833.57	-1.11	.268
Conflict x PDS x Age	-.001	.04	800.55	-0.03	.973	Conflict x PDS x Age	.01	.04	804.46	0.20	.844
Conflict x BvO x Age	.02	.09	809.20	0.21	.830	Conflict x HvO x Age	-.08	.12	816.18	-0.69	.493
PDS x BvO x Age	.05	.09	779.26	0.57	.571	PDS x HvO x Age	.12	.10	651.06	1.29	.196
Conflict x PDS x BvO	-.20	.09	884.72	-2.14	.032	Conflict x PDS x HvO	-.15	.12	861.97	-1.27	.206
Parent-Child Conflict x Puberty x Race with INCOME						***Parent-Child Conflict x Puberty x Race with INCOME***					
Variable	β	*SE*	*df*	*t*	*p*		β	*SE*	*df*	*t*	*p*
Intercept	-.04	.08	494.45	-0.60	.598	Intercept	-.06	.07	447.47	-0.75	.451
Conflict	.22	.08	639.15	0.004	**.004**	Conflict	.23	.08	651.35	2.85	**.005**
Puberty (PDS)	.01	.09	657.64	0.95	.949	Puberty (PDS)	.02	.08	600.65	0.25	.799
Black vs Overall (BvO)	-.02	.08	496.47	0.81	.808	Hispanic vs Overall (HvO)	-.05	.08	444.71	-0.59	.553
Income	-.09	.06	467.92	0.11	.113	Income	-.09	.06	444.43	-1.45	.149
Conflict x Income	.05	.06	732.44	.042	.419	Conflict x Income	.01	.06	707.71	0.22	.824

Table 8 (cont'd)

PDS x Income	.01	.07	684.51	0.88	.876	PDS x Income	.07	.07	621.79	0.93	.353
BvO x Income	-.11	.06	460.97	0.08	.078	HvO x Income	-.09	.07	436.04	-1.29	.198
Conflict x PDS	-.10	.06	781.95	0.09	.087	Conflict x PDS	-.15	.07	754.48	-2.26	.024
Conflict x BvO	.09	.08	648.32	0.26	.256	Conflict x HvO	.12	.09	662.75	1.38	.167
PDS x BvO	-.06	.09	663.09	0.52	.520	PDS x HvO	-.05	.09	594.75	-0.53	.599
Conflict x PDS x Income	.01	.03	720.95	0.83	.834	Conflict x PDS x Income	.01	.03	723.95	0.44	.660
Conflict x BvO x Income	.06	.06	739.20	0.31	.311	Conflict x HvO x Income	-.01	.07	690.99	-0.08	.936
PDS x BvO x Income	.08	.07	690.48	0.29	.290	PDS x HvO x Income	.14	.08	607.28	1.80	.072
Conflict x PDS x BvO	-.15	.06	784.77	0.02	.022	Conflict x PDS x HvO	-.20	.07	753.59	-2.63	**.009**
Parent-Child Conflict x Puberty x Race with BMI						***Parent-Child Conflict x Puberty x Race with BMI***					
Variable	β	*SE*	*df*	*t*	*p*		β	*SE*	*df*	*t*	*p*
Intercept	.01	.07	522.13	0.19	.849	Intercept	-.03	.07	512.53	-0.41	.681
Conflict	.19	.06	733.86	2.99	**.003**	Conflict	.20	.07	701.95	2.77	**.006**

Table 8 (cont'd)

Puberty (PDS)	-.01	.07	719.91	-0.12	.905	Puberty (PDS)	-.01	.08	627.68	-0.13	.898
Black vs Overall (BvO)	.02	.07	526.51	0.27	.786	Hispanic vs Overall (HvO)	-.02	.08	519.60	-0.31	.760
Income	-.04	.06	691.03	-0.70	.482	Income	.02	.07	610.41	0.23	.815
Conflict x BMI	-.02	.05	884.67	-0.40	.687	Conflict x Income	.04	.06	876.29	0.76	.445
PDS x BMI	.08	.06	861.42	1.18	.238	PDS x Income	-.01	.07	884.50	-0.12	.905
BvO x BMI	-.04	.07	710.12	-0.60	.551	HvO x Income	.05	.07	609.60	0.62	.533
Conflict x PDS	-.11	.06	818.86	-1.97	.050	Conflict x PDS	-.14	.07	782.44	-2.03	.043
Conflict x BvO	.08	.07	759.95	1.17	.242	Conflict x HvO	.11	.08	714.60	1.30	.196
PDS x BvO	-.08	.08	738.20	-1.04	.296	PDSxHvO	-.10	.09	621.70	-1.13	.258
Conflict x PDS x BMI	-.02	.04	856.54	-0.56	.574	Conflict x PDS x BMI	-.03	.04	849.56	-0.75	.451
Conflict x BvO x BMI	.01	.05	883.04	0.15	.878	Conflict x HvO x BMI	.11	.07	878.55	1.72	.086
PDS x BvO x BMI	.07	.07	850.44	1.03	.303	PDS x HvO x BMI	-.04	.08	884.83	-0.44	.661
Conflict x PDS x BvO	-.18	.06	836.62	-2.81	**.005**	Conflict x PDSx HvO	-.22	.08	794.76	-2.84	**.005**

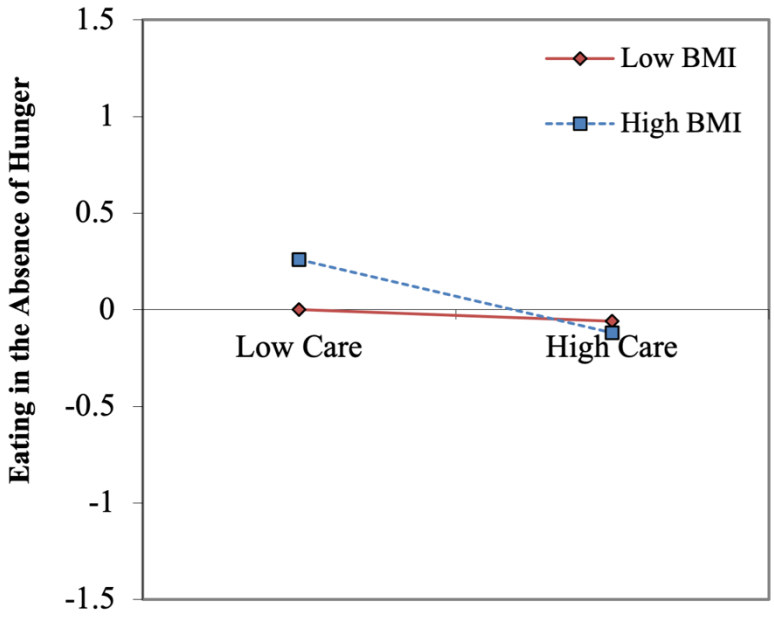
Table 8 (cont'd)

Note: BMI = Body Mass Index; PDS = Pubertal Development Scale; BvO = Black/African American compared to overall sample; HvO = Hispanic/Latinx compared to overall sample. Models used standardized Z-scores. Race was effect-coded in analyses.

APPENDIX B

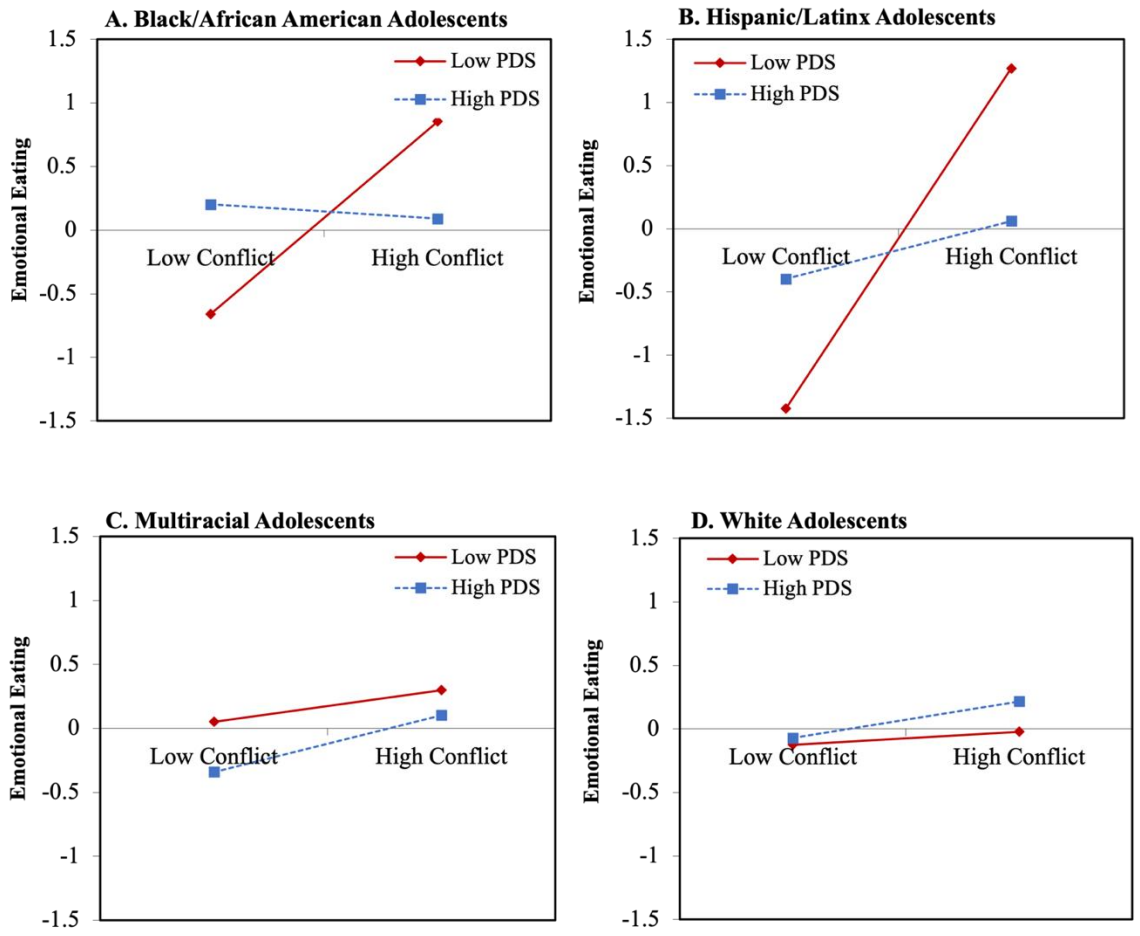
Figures

Figure 1 Two-Way Interactions between Parental Care and BMI for Eating in the Absence of Hunger



Note. High/low care and high/low BMI refer to values that are 1 standard deviation above or below the mean, respectively for that variable. BMI = Body Mass Index.

Figure 2 Associations between Parent-Child Conflict, Pubertal Development, and Emotional Eating



Note. PDS = Pubertal Development Scale. High/low conflict refers to levels of parent-child conflict that are 1 standard deviation above or below the mean for a particular adolescent. High/low PDS refers to pubertal development 1 standard deviation above or below the mean.

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