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Ethnic-Racial Socialization among Mothers of Black and Black-White Biracial Daughters during
the Pubertal Transition

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Abstract

Ethnic-racial socialization is a salient component of parenting in Black families. What is less clear is how Black families discuss ethnicity-race and social inequalities with pubescent children. We examined associations between pubertal timing and ethnic-racial socialization among mothers (M_{age}= 42) of Black (n=286) and Black-White biracial (n=233) girls aged 9-12. Moderation by maternal stress about puberty was also examined. Results indicated mothers of Black girls who were stressed about puberty reported more preparation for bias; whereas both groups of mothers reported more cultural socialization. Early pubertal timing and high maternal stress about puberty predicted more cultural socialization among both groups and more egalitarian beliefs among only mothers of Black-White biracial girls. Findings highlight the importance of ethnic-racial socialization during puberty.

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Keywords: pubertal timing, ethnic-racial socialization, maternal stress about puberty

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In a racialized society, where Black people historically have been on the receiving end of overt and covert acts of discrimination and prejudice, it becomes incumbent upon parents to prepare their daughters for the potential of such harm. As such, ethnic-racial socialization practices such as teaching children about cultural practices to instill pride in and knowledge about one's ethnic-racial group(s) and strategies for succeeding in mainstream society that devalues historically marginalized groups are central and highly salient components of parenting in Black families (Hughes et al., 2006). What is less clear is how puberty, a normative process, is related to how Black families discuss social inequalities and injustices and how they teach their pubescent children to manage them. This is an important gap in the literature because Black girls enter puberty at younger ages than their White, Latinx, and Asian American counterparts and spend longer periods in the pubertal transition than Black girls in previous generations (Biro et al., 2013; Dorn et al., 2006; Herman-Giddens et al., 1997).

Black girls who develop earlier than their age cohort must contend with racialized forms of discrimination due to disseminated stereotypes related to ethnicity-race and gender such as coping with derogatory body stereotypes related to skin tone, body shape, and hair texture. Recently, a 10-year-old Black female basketball player was harassed by a referee for "inappropriate hair" (Kai, 2019). The referee disapproved of the girl's braided hairstyle even though braids are not prohibited by the school district. Seaton and Carter (2019) demonstrated that among African American and Caribbean Black girls who reported at least one instance of general discrimination experienced in the past year, those who perceived themselves to be more physically developed relative to peers reported more discriminatory incidents. Similarly, among African American and Caribbean Black girls who attributed their discrimination experiences to ethnicity-race in the previous year, perceiving themselves to be more physically developed relative to peers was linked with experiencing more racially discriminatory incidents. One way of bolstering Black girls coping strategies to deal with discrimination experiences is through the ethnic-racially specific coping strategy of ethnic-racial socialization (Hughes et al., 2006), which

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is postulated to disrupt the trajectory from discrimination to negative health and well-being. However, parental ethnic-racial socialization practices have not been examined in the puberty literature.

The purpose of this study, therefore, was to explore whether individual variations in pubertal timing and maternal stress about their daughters' pubertal development were associated with ethnic-racial socialization practices: preparation for bias (e.g., parents' efforts to promote their children's awareness of systemic and individual racial discrimination and guide them on how to respond), cultural socialization beliefs (e.g., parental practices that teach children about their cultural history and traditions to encourage the development of ethnic pride and positive group identity), egalitarian beliefs (e.g., parental practices that either encourage children to value emphasize diversity over ethnic-racial group membership or avoid any mention of ethnicity-race in discussions with their children), and promotion of mistrust beliefs (e.g., parental practices that emphasize the need for wariness and distrust in interracial interactions) (Hughes et al., 2006). Given the nuances of experiences among Black girls, we examined these associations using data from mothers of Black girls and mothers of Black-White biracial girls. Mothers with biracial daughters may use ethnic-racial socialization to prepare their daughters for social challenges associated with their heritage, which includes two groups. Because parents bring distinct ethnic-racial experiences and ethnic-racial identities as well as socialization experiences that prepared them for either privileged or marginalized statuses, (Bigler & Liben, 2006; Katz & Kofkin, 1997), it is important to consider whether ethnic-racial socialization practices during the pubertal transition differ among mothers of Black girls and mothers of Black-White biracial girls.

Guiding Theoretical Frameworks

Two theoretical frameworks guide the present study. The contextual amplification hypothesis (Ge & Natsuaki, 2009) and Phenomenological Variant of Ecological Systems Theory (Spencer, 2006; Spencer et al., 1997; Spencer & Markstrom-Adams, 1990). The contextual amplification hypothesis is one explanation used to better understand the effects of early pubertal timing. It posits that early pubertal timing coupled with adverse social contexts (e.g., interpersonal challenges, family conflict, neighborhood disorder) increases the risk for problematic outcomes. Adaptation is particularly difficult for early developers because the moderating role of context can overtax their undeveloped coping resources (Ge & Natsuaki, 2009). Most studies that provide support for this hypothesis focus on peer, family, and

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neighborhood contextual circumstances (Ge et al., 2002; Teunissen et al., 2011); few studies consider ethnic-racial-gender-related factors such as racial discrimination as important social contextual amplifiers (Carter, Leath, et al., 2017; Carter, Seaton, et al., 2017; Seaton & Carter, 2017). A robust line of research links multiple forms of racial discrimination and race-related stress with maladaptive outcomes among Black girls (Ahuja et al., 2021; Burt & Simons, 2015; Grollman, 2012; Joseph et al., 2016; Seaton et al., 2008; Seaton & Yip, 2009). Examining adaptive cultural factors in Black families, such as ethnic-racial socialization, are also important ethnic-racial-gender-related amplifiers that likely influence early pubertal timing effects among Black girls.

We utilize the PVEST to explore adaptive cultural factors that act in concert with the pubertal transition (Tolman et al., 2003). PVEST considers the unique and cumulative individual-context interactions that stem from being a member of a historically marginalized group, which is hypothesized to shape individual experiences within a given context (Spencer et al., 1997). PVEST theorizes ethnicity-race and gender lead to positive or negative experiences in contexts that impact developmental trajectories (Spencer et al., 2003; Spencer, 2006). Social interactions during the pubertal transition for Black girls may involve negotiating how they are treated and perceived by others as members of their ethnic-racial and gender group (e.g., dealing with disseminated stereotypes related to ethnicity-race and gender; Spencer, 2006); In contrast, Black-White biracial girls must navigate the complexities of their racial heritage and social position that may include marginalized and privileged statuses that can influence their social interactions such as interracial status markers (e.g., nose width, lip thickness, and hair texture, skin tone, with dark skin symbolizing lower status) (Csizmadia et al., 2014; Henriksen Jr & Trusty, 2004; Rollins & Hunter, 2013). PVEST suggests that normative challenges such as early pubertal maturation may be particularly harmful to children with African ancestry given broader societal stereotypes about Black girls and boys (Cunningham et al., 2003). Yet, the development of a healthy identity arises from coping behaviors as minority youth appraise their roles in specific situations (Spencer, 2006). Thus, parental ethnic-racial socialization may help girls with African ancestry cope with discrimination encounters linked to puberty-related experiences.

Pubertal Timing and Maternal Stress

A dramatic secular trend has occurred such that pubertal development now occurs at an earlier age compared to prior generations (Mendle, 2014). There are sex and ethnic-racial

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disparities in this acceleration with Black girls beginning puberty earlier than their same-age counterparts (Dorn et al., 2006). Because early puberty may result in a cascade of adverse health consequences in both adolescence and adulthood including depression and cardiovascular disease, the two leading causes of disability worldwide (Mendle et al., 2006), a better understanding of the factors that create resilience or vulnerability to puberty-linked health outcomes in Black children is essential. Whether parental ethnic-racial socialization practices are associated with pubertal timing remains unclear. However, Hughes and colleagues (2006) argued that ethnic-racial socialization should be examined in conjunction with parenting behaviors that have been linked to outcomes among Black families.

It is important to note that most studies combine multiple indicators of development such as changes in height, changes in the skin, and hair growth as indicators of pubertal timing or use Tanner stages (Marshall & Tanner, 1969), a system used to categorize where a child is in the process of puberty based on secondary sex characteristics (e.g., pubic hair growth; see Dorn et al., 2006). In addition to external and internal pubertal indicators, perceived pubertal timing relative to same-age peers is used to examine pubertal effects. Perceived relative pubertal timing assesses whether youth see themselves as being normative or non-normative in either direction (e.g., early or late) relative to their peers of the same sex and age (see Dorn et al., 2006). In this study, we used both perceived relative pubertal timing and a measure that combines multiple indicators of puberty (Petersen et al., 1988).

Maternal stress about puberty. Research has demonstrated that pubertal development, particularly menarche, is associated with a range of emotions (Lee, 2009; Marván & Molina-Abolnik, 2012). Girls experience anticipatory anxiety and both positive and negative feelings at the same time as the first menstrual period such as happiness and fear and excitement and nervousness (Marván & Molina-Abolnik, 2012). Marván and Molina-Abolnik (2012), for example, demonstrated that Mexican girls aged 12-15 years who participated in their study scored highest on negative feelings and secrecy rather than positive feelings about menarche. However, feelings and attitudes toward menarche among girls are likely influenced by the immediate environment in which girls develop. That is, positive reactions to menarche are related to a positive perception of menses, such as seeing it as a natural event; whereas negative attitudes toward menstruation are related to perceptions of menstruation as a negative event; something to be embarrassed about. However, research has demonstrated that emotionally

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connected mothers can mitigate daughters' feelings of shame and humiliation associated with menarche. Using narrative analysis, Lee (2008) demonstrated that emotional maternal support is indicated in positive experiences of menarche, as many with happy memories of menarche recalled celebratory and/or emotionally supportive mothers. Similarly, unsupportive maternal responses are implicated in negative memories of menarche on the part of daughters. Given the importance of maternal emotional response to their daughters' pubertal development we explored associations between pubertal timing, mothers' level of excitement or nervousness about their daughters' pubertal development. We extend this research by examining other changes associated with puberty such as hair growth, height changes, and breast development.

Ethnic-Racial Socialization Practices

Black children, by age 9, recognize discriminatory actions that are both overt (e.g., name-calling) and covert (e.g., being suspected of wrongdoing), understand that these actions may be caused by others' social stereotypes, and use contextual information to make decisions about whether discrimination is likely to have occurred (Spears Brown & Bigler, 2004, 2005). As such, most Black parents engage in culturally relevant strategies (i.e., ethnic-racial socialization; Hughes et al., 2006) to reduce the harm inflicted by discrimination on Black children. Ethnic-racial socialization includes implicit and explicit messages that parents transmit to their children including cultural socialization beliefs, preparation for bias, egalitarian beliefs, and promotion of mistrust beliefs (Hughes et al., 2006). The communication between families about ethnic-racial socialization matters and strengthened by greater ethnic-racial coping self-efficacy—is crucial for resolving ethnic-racially stressful matters and absolving subsequent negative outcomes related to unresolved ethnic-racial stress (Anderson & Stevenson, 2019).

This is particularly important as Black girls who develop early and move through puberty quickly differ substantially from their age cohort concerning noticeable physical attributes (e.g., breast size, height, hip-to-waist ratio). These deviations influence attitudes and beliefs about 'self' and alter how others respond to the developing child. Using an experimental design, Carter, Mustafaa, et al. (2017) demonstrated that elementary school teachers report that more physically developed Black and White girls would perform less optimally with academic outcomes and have more behavioral problems in the future. Moreover, early developing Black girls were expected to have more problems than early developing White girls. Similarly, Epstein and colleagues (2017) demonstrated that compared to White girls of the same age, adults view

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Black girls as less innocent and more adult-like and perceive that they are more independent, need less nurturing, protection, support, and comfort relative to White girls. Although parental ethnic-racial socialization practices have not been examined in the puberty literature, it is reasonable to assume that once parents notice the physical changes in their children, their communication about culture, ethnicity-race, and preparation for bias increases.

Extant studies have demonstrated that compared with Black boys, Black girls are more likely to receive messages designed to promote racial pride or cultural socialization, whereas Black boys are more likely to receive messages regarding preparation for racial bias and about the realities of ethnic-racial barriers in society (Hughes et al., 2009; McHale et al., 2006; Smith-Bynum et al., 2016). One study, for example, demonstrated that Black mothers spoke to their daughters more about racial advocacy and to their sons more about how to cope with racial discrimination (Smith-Bynum et al., 2016). Ethnic-racial socialization practices among Black families may be linked to parental perceptions of the different experiences that boys versus girls will encounter in the larger society (Hill, 2001; McHale et al., 2006). Although this work has enhanced the understanding of the role child sex plays in the ethnic-racial socialization process, this study focused on intragroup differences. A group-specific approach is particularly important when examining parental racial socialization because Black girls and Black-White biracial girls are racialized differently within their communities and society (Strmic-Pawl, 2016; Törngren, 2019). We posit that some aspects of parental ethnic-racial socialization are rooted in developmental differences among their children such as pubertal timing and intragroup differences inherent in being a member of two racial groups.

Mothers of Black-White Biracial Girls. Though few studies have examined how parents of Black-White biracial children talk to their children about race, the extant study findings reveal different approaches to ethnic-racial socialization relative to parents of Black children. Like parents of Black girls, parents of Black-White biracial girls prepare them for the social challenges associated with being a member of a marginalized group (Stokes et al., 2021). However, because of the dual racial status of Black-White biracial girls, parents also convey messages that deemphasize the importance of race and racial differences and actively avoid and reject opportunities to discuss race with their children (Stokes et al., 2021). This contrast gives rise to an inherently complex and multifaceted ethnic-racial socialization process for Black-White biracial girls relative to Black girls. Several correlates in families of Black-White biracial

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children, including family socioeconomic status and parents' racial group membership have been identified to explain these disparate socialization practices (Csizmadia et al., 2014).

Although most mothers of Black daughters are Black, many mothers of Black-White biracial girls are not racial-ethnic minorities and lack firsthand experience with what it means to be a member of a historically marginalized racial-ethnic group. As a result, how mothers of Black-White biracial daughters communicate with their daughters about ethnicity-race and culture may differ from mothers of Black girls. For example, some mothers may encourage the ethnic-racial identity of their daughters by automatically assigning them to their subordinate ethnic group based on the legacy of hypodescent in the U.S. (Rollins & Hunter, 2013). White mothers may also simply deny or deemphasize any race at all (egalitarian or color-blind socialization), a position of White privilege that disregards the impact of race and/or skin color on lived experiences either consciously or unconsciously (Hughes & Chen, 1999; Rockquemore & Laszloffy, 2005; Rollins & Hunter, 2013). Alternatively, from data collected from parents or biracial children separately, researchers have reported that parental racial socialization can support positive biracial identity development by addressing the uniqueness of the children's racial category through open communication and family discussions about race, preparing children for possible bias they may experience as multiracial individuals, and by offering various racial labels such as biracial, mixed race, and multiracial (Rockquemore & Laszloffy, 2005). Thus, we included mothers of Black-White biracial girls and mothers of Black girls in this study.

The Current Study

We examined the associations between maternal stress about their daughters' pubertal development, the timing of their daughters' pubertal development (pubertal timing and pubertal timing relative to peers), and maternal ethnic-racial socialization practices among mothers of Black girls and mothers of Black-White biracial girls. Four parental ethnic-racial socialization practices are examined: preparation for bias, cultural socialization beliefs, egalitarian beliefs, and promotion of mistrust beliefs. Examples include exposing children to culturally relevant books; discussing issues related to discrimination with their children, conveying messages that promote caution and wariness about other groups, and encouraging children to value individual qualities over racial group membership. The moderating role of maternal stress of a daughters' pubertal development on pubertal timing and maternal ethnic-racial socialization was also examined. Lastly, the extent to which the effects of maternal stress about their daughters' pubertal

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development and the timing of their daughters' pubertal development on maternal ethnic-racial socialization practices differed among mothers of Black girls and mothers of Black-White biracial girls was also examined (see Figure 1). It is important to note that the present study is exploratory given limited research on 1) maternal stress about pubertal development among mothers of Black girls and mothers of Black-White biracial girls, 2) maternal ethnic-racial socialization practices and pubertal timing, and 3) differences between mothers of Black girls and mothers of Black-White biracial girls during the pubertal transition. As such, no specific hypotheses were formulated.

Method

Participants

Data are drawn from parents who participated in an anonymous web-based study on puberty and parenting who self-identified their daughters' as either Black (n=315) or Black-White biracial (n = 315). Since the survey was placed on an open website, inclusionary criteria for participation were specified on the informed consent page however, adherence to the criteria could not be verified due to the anonymous nature of the survey. To minimize superfluous replies to the survey, an online survey hosting site was used (www.qualtrics.com).

A total of 630 (99.5% mothers) parents were considered eligible and agreed to participate in the study. The parents were considered eligible if their daughter was either Black or Biracial with one Black and one White parent. The parents of Black girls identified as 1) Black (91%; n = 286), 2) White (5%; n = 17), 3) Black-White biracial (4%; n = 12). The parents of Black-White biracial girls identified as 1) White (74%; n = 233), 2) Black (13%; n = 40), 3) Black-White biracial (12%; n = 38), and Multiracial (1%; n = 3). The study sample was limited to mothers only given 92% of the sample were mothers. The sample was further specified by only including Black parents of the Black girls (91%) and White parents of the Black-White biracial girls (74%) given the large percentage of parents in each group. Collapsed across both groups of mothers, thirty-eight percent of the mothers were married. Sixty-two percent of the mothers worked either full- or part-time, 25% unemployed, 9% disabled, 2% students, and 2% were retired. Thirty-four of the mothers had some college, 29% had either two- or four-year degrees, 27% graduated high school, 5% had either a doctorate or professional degree and 5% had less than high school. Fifty-two percent of the daughters lived with their mothers.

Procedure

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An anonymous web survey was designed to examine associations between parenting practices and pubertal development. The participants were recruited using a panel survey through Qualtrics LLC. As part of its panel survey program, Qualtrics hosts an 'in-house' pool of participants from whom they have collected basic demographic information. As part of the panel survey service, Qualtrics contacts participants from their pool who meet the demographic qualifications of the study. For this study, parents of Black girls and parents of biracial girls (black and white) aged 9-12 years were allowed to participate in the study.

The first page of the survey included parental consent. After agreeing to participate, the parents were asked a series of social demographic questions such as age, biological sex, and ethnicity-race of their daughter. Participants completed a series of questionnaires including ethnic-racial socialization measures, parental reports of their daughters' pubertal development, and how nervous/excited they were about their daughters' pubertal changes. Qualtrics offers its sample pool participants compensation in the form of in-program currency which can be amassed and exchanged for real-world rewards (e.g., gift cards, travel discounts). Before analyses, the responses were assessed both by Qualtrics and the primary investigator to remove low-quality data. Qualtrics staff, as part of the panel survey service, removed and replaced participants who did not match study demographics, had partially completed the survey, had completed the survey in less than one-third of the median time to complete (6.2 minutes), and participants who responded with the same numeric response for all close-ended questions.

Measures

Pubertal development. Mothers completed the 5-item Pubertal Development Scale (PDS) (Petersen et al., 1988) to assess the extent that the child had experienced pubertal growth across several domains during the past 12 months and perception of pubertal timing relative to same-age and -sex peers. On a scale ranging from 1 (have not begun) to 4 (development completed), parents rated daughters' body hair development, growth spurt, skin changes, development of breasts, and the occurrence of menarche for daughters. Regarding menarche, mothers were asked whether their daughter had their first menses (yes or no). For scoring purposes, first menses was coded as 4 = yes and 1 = no. The PDS yields a composite score by averaging the five items within each group to maintain the original metric (range 1 to 4). Higher composite scores indicated more advanced pubertal development (Cronbach's alpha for mothers of Black girls and mothers of Black-White biracial girls was .65, and .75 respectively). Petersen

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et al. (1988) reported internal consistency estimates for girls ranging from .76 to .83. The PDS has previously demonstrated good psychometric properties and convergent validity based on self- and physician-rated Tanner stages (Bond et al., 2006; Petersen et al., 1988) among ethnically diverse samples (Siegel et al., 1999). The average PDS total score for this sample was 2.57 (SD = .60) for mothers of Black girls and 2.44 (SD = .66) for mothers of Black-White biracial girls. Perceived relative pubertal timing was assessed using one item from the PDS by asking “How advanced would you say your child’s physical development is compared to other girls her age?” Mothers responded to this question on a 5-point scale, ranging from 1 (Look younger than most) to 5 (Look older than most). Higher numbers indicated earlier perceived development relative to same-sex, same-age peers.

Maternal stress about puberty. Mothers completed 20 items developed by the first author to assess the meaning-making of body changes that will occur because of puberty (Carter, 2018). On a scale ranging from 1 (very positive/excited) to 4 (very negative/stressful), mothers rated their level of excitement/nervousness about their daughters’ changes linked to puberty (e.g., body hair growth, growth spurt, skin changes, menarche, development of breasts). The items yield a composite score by averaging the 20 items: with higher scores indicating high levels of stress about their daughters’ pubertal changes. Cronbach’s alpha for mothers of Black girls and mothers of Black-White biracial girls was .92, and .91 respectively.

Ethnic-racial socialization practices. Mothers completed the 14-item Ethnic-Racial Socialization Scale (ERS) (Hughes, 2003) to assess four underlying dimensions of ethnic-racial socialization practices: preparation for bias, cultural socialization beliefs, egalitarian beliefs, and promotion of mistrust beliefs. These dimensions represent a range of parental behaviors and communications to children that concerned race and intergroup relations. Items focused on behaviors, rather than on attitudes and values, because of the likelihood that parents’ reports about their behaviors better reflect their actual practices. For each item, mothers estimated the number of times they had engaged in the specified behavior during the past 12 months (e.g., 0 = not at all important to 4 = very important). The preparation for bias dimension includes 4 items (mothers of Black girls $\alpha = .88$, mothers of Black-White biracial girls $\alpha = .78$) and assesses the degree to which mothers teach their daughters about prejudice and discrimination and how to cope with said experiences. The cultural socialization beliefs dimension includes 3 items (mothers of Black girls $\alpha = .91$, mothers of Black-White biracial girls $\alpha = .80$) and assesses the

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degree to which mothers teach their daughters about one's own group's culture, history, and heritage. The egalitarian beliefs dimension includes 4 items (mothers of Black girls $\alpha = .79$, mothers of Black-White biracial girls $\alpha = .71$.) and assesses the degree to which mothers emphasize the value of diversity and equality treatment across groups. The promotion of mistrust beliefs includes 3 items and (mothers of Black girls $\alpha = .77$, mothers of Black-White biracial girls $\alpha = .79$) and assesses the degree to which mothers communicate cautions or warnings about other groups.

Control variables. Two variables were used as control variables in this study: child age and family income. Mothers were asked their child's age with one item: "How old is your preteen daughter?" and the family annual income with one item: "What is your current ANNUAL family income? Participants responded to a range of categories from less than \$10,000 to more than \$150,000

Data Analysis Plan

To test whether pubertal timing, perceived relative pubertal times, and maternal stress about puberty were associated with ethnic-racial socialization practices, path analyses were conducted using Mplus 8.5 (Muthén & Muthén, 2018). Latent variables were not estimated for model parsimony. We used Full Information Maximum Likelihood estimation to account for missing data. There were small amounts of missing data, which occurred sporadically and never exceeded more than 3% of the cases for all key study variables [$\chi^2(4) = 3.757, p = .440$]. Adolescent age in years and family annual income were included in all path models as covariates for all endogenous variables. Correlated errors between endogenous variables were permitted, correlated errors between adolescent age and pubertal timing variables were permitted.

All path models were evaluated using multiple indicators of model fit: 1) Chi-square, 2) the CFI, 3) the root mean squared error of approximation (RMSEA), and 4) the standardized root mean square residual (SRMR). Hu and Bentler (1999) suggested CFI values close to .95 or greater, RMSEA values close to .08 or below, and SRMR values close to .08 represent acceptable model fit. The overall Chi-square, a statistical test of the lack of fit based on over-identifying restrictions on the target model was also reported. Non-significant Chi-squares suggest a good model fit; however, this estimation is a function of sample size and will almost always be significant with large samples. More focused tests of fit were also used to examine

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model fit such as modification indices and standardized residuals testing the difference between predicted and observed covariances in each cell.

Before the study analyses, the data for the continuous variables were assessed using model-based outlier analysis with a limited information approach in which the endogenous variables were regressed onto relevant predictors, and then standardized DFBETAs were examined for everyone. An outlier was defined as an individual with an absolute standardized DFBETA greater than 1 for a given coefficient. No outliers were found based on this analysis. Examination of univariate indices of skewness and kurtosis revealed no absolute skewness or kurtosis values greater than 2.059.

We conducted the analyses in two stages. The first stage involved descriptive analyses to examine study variable associations. These analyses were intended to isolate group differences in the core variables being studied. The second stage tested ethnic-racial group invariance using a multi-group solution strategy, with mothers of Black girls and mothers of Black-White biracial girls representing the two groups. First, the pubertal timing and maternal stress about puberty variables were mean-centered in the path model to avoid multicollinearity and to make the coefficients more interpretable (Jaccard et al., 1990). Significant interactions were plotted using Aiken et al.'s (1991) procedure for probing the interaction at one standard deviation above and below the mean levels of the independent variable and low (1) and high (4) values of the moderator variables.

Next, the path model was simultaneously fit to the two groups to establish a common model for both groups with no equality constraints across groups (i.e., unconstrained model). Then the unconstrained model was compared to a model that constrained all regression paths to be equal across groups (i.e., constrained model). Lastly, the constrained model was compared to a fully constrained model in which the regression paths and covariances were constrained to be equal across the groups. Comparisons of nested models were performed using a chi-square difference test in which the chi-square and the degrees of freedom for the unconstrained model were subtracted from the chi-square and degrees of freedom for the constrained model. Then, the chi-square and degrees of freedom for the constrained model were subtracted from the chi-square and degrees of freedom for the fully constrained model. If the chi-square difference tests indicated that this assumption of equality was untenable, we then tested models that sequentially constrained the parameters of the key study constructs to be equal across groups. This involved

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invariance testing of each key study parameter (e.g., regression weights) while constraining all parameters found to be cumulatively invariant across groups. We also performed a chi-square difference test to assess whether the fit of each constrained model was significantly different from the unconstrained model.

Results

Descriptive Analysis

Preliminary results using descriptive statistics such as means, standard deviations, and bivariate correlations for each study variable can be found in Table 1. Mothers of Black girls relative to mothers of Black-White biracial girls perceived that their daughters were significantly more advanced in their pubertal development, $F(1, 629) = 7.12, p = .001$. However, mothers of biracial girls were significantly more stressed about their daughters' pubertal changes relative to mothers of Black girls, $F(1, 629) = 9.87, p = .002$. In terms of ethnic-racial socialization practices, mothers of Black girls relative to mothers of Black-White biracial girls were significantly more likely to raise their daughters' awareness of systemic and individual racial discrimination and guide them on how to respond [prepare for bias; $F(1, 629) = 16.18, p = .001$], teaching their daughters about their cultural history and traditions to encourage the development of ethnic pride and positive group identity [cultural socialization; $F(1, 629) = 17.40, p = .001$], and directly or indirectly transmit messages that emphasize the need for wariness and mistrust of other groups [promotion of mistrust; $F(1, 629) = 49.55, p = .001$].

Testing for Invariance

As shown in Table 2, the χ^2 difference tests showed that the unconstrained and constrained models were significantly different from each other, $\Delta\chi^2(\Delta 20) = 36.288, p = .004$. The constrained (all regression paths to be equal across groups) and fully constrained (all regression paths and covariances were constrained to be equal across the groups) models were also significantly different from each other, $\Delta\chi^2(\Delta 15) = 49.894, p < .001$. These findings indicate that girls' ethnic-racial group membership moderated one or more structural parameters in the model. Thus, it was necessary to assess sequentially constrained models to determine which parameters were significantly different between mothers of Black girls and mothers of Black-White biracial girls.

Preparation for Bias. In the final model, see Figure 2, all regression paths were constrained to be equal except for the maternal stress about pubertal changes on preparation for

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bias path, see Table 2. The maternal stress about pubertal changes on preparation for bias path was statistically stronger for mothers of Black girls, $\beta = .128$, $p = .019$, relative to mothers of Black-White biracial girls, $\beta = .030$, $p = .585$; such that mothers of Black girls who reported high levels of stress about their daughters' pubertal changes reported more ethnic-racial socialization practices that raised their daughter's awareness of systemic and individual racial discrimination and guided them on how to respond. No other statistically significant paths were observed.

Cultural Socialization. In the final model, see Figure 2, all regression paths were constrained to be equal, see Table 2. The maternal stress about pubertal changes on cultural socialization path was statistically significant for both mothers of Black girls and mothers of Black-White biracial girls, $\beta = .107$, $p = .036$; such that mothers of Black girls and Black-White biracial girls who reported high levels of stress about their daughters' pubertal changes reported more ethnic-racial socialization practices that taught their daughters about their cultural history and traditions to encourage the development of ethnic pride and positive group identity. The pubertal timing X maternal stress about pubertal changes on cultural socialization path was also statistically significant for both mothers of Black girls and mothers of Black-White biracial girls, $\beta = -.115$, $p = .047$, see Figure 3. The significant interaction (decomposed with simple slope tests) revealed that early pubertal timing was associated with more cultural socialization for mothers with high levels of stress about their daughters' pubertal changes ($t = 2.509$; $p = .012$) but not low levels of stress ($t = .010$; $p = .98$). In other words, mothers who perceived that their daughters' development was early and worried more about their daughters' pubertal changes engaged in more ethnic-socialization practices that taught their daughters about their cultural history and traditions to encourage the development of ethnic pride and positive group identity. No other statistically significant paths were observed.

Egalitarian Beliefs. In the final model, see Figure 2 all regression paths were constrained to be equal except for the perceived pubertal timing X maternal stress about pubertal changes path, see Table 2. The perceived pubertal timing X maternal stress about pubertal changes path was statistically stronger for mothers of Black-White biracial girls, $\beta = -.144$, $p = .025$, relative to mothers of Black girls, $\beta = .094$, $p = .139$. As shown in Figure 4, the significant interaction (decomposed with simple slope tests) revealed that early pubertal timing was associated with more egalitarian beliefs for mothers with high levels of stress about their daughters' pubertal changes ($t = 4.268$; $p = .001$) and low levels of stress ($t = 2.305$; $p = .025$). Such that, mothers of

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Black-White biracial girls who perceived that their daughter's development was early relative to peers and worried more about their daughters' pubertal changes engaged in more ethnic-socialization practices that emphasized the value of diversity and equality treatment across groups; whereas mothers who perceived that their daughter's development was early relative to peers and worried less about their daughters' pubertal changes engaged in fewer ethnic-socialization practices that emphasized the value of diversity and equality treatment across groups. No other statistically significant paths were observed.

Promotion of Mistrust. In the final model, see Figure 2, all regression paths were constrained to be equal, see Table 2, however, no statistically significant paths were observed.

Discussion

Black children encounter unique ecological demands and developmental tasks stemming from society's inability to recognize Black humanity and the disregard for the existence of historically marginalized group members (Parker, 2017). As a result, the timing of pubertal development becomes essential in ethnic-racial socialization practices as parents decide when to prepare their children for the threat of such harm. Black and Black-White biracial daughters were the focal points of this study to demonstrate the multiplicity inherent in the lived experiences of girls with African ancestry and their mothers. By centering on Black and Black-White biracial girls, this study begins to peel away at the essentialism reified in racial classification systems that result in truncated understandings of the complex social positionality girls hold within the racial classifications. The results of this exploratory study illustrate this complexity by demonstrating the differing engagements with stress undergone by mothers depending on pubertal timing and the racial classification of their daughters'.

The present study revealed similarities in the roles of pubertal timing, relative pubertal timing, and maternal stress about pubertal development on ethnic-racial socialization practices between mothers of Black girls and mothers of Black-White biracial girls, there are also noteworthy differences between the two groups. We begin our discussion by noting that at a descriptive level, there were more differences than similarities between the two groups. Mothers of Black girls relative to mothers of Black-White biracial girls perceived that their daughters were significantly more advanced in their pubertal development. This finding is consistent with other comparative studies using samples of Black girls (Mendle et al., 2006). However, mothers of Black-White biracial girls were significantly more stressed about their daughters' pubertal

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changes relative to mothers of Black girls. It is possible mothers of Black-White biracial girls feel stressed about pubertal changes because of the hyper-sexualization of Black women and girls in the media (Matthews, 2018) and feel less prepared to help their daughters navigate these challenges given they are outgroup members.

Noteworthy distinctions between the groups were observed when examining mean levels of differences in ethnic-racial socialization practices. Mothers of Black girls relative to mothers of Black-White biracial girls were significantly more likely to engage in three of the four ethnic-racial socialization practices (i.e., preparation for bias; cultural socialization beliefs, and promotion of mistrust beliefs). Although mothers of Black girls were Black, mothers of Black-White biracial girls were White and thus lack firsthand experience with what it means to live as a member of marginalized groups. As a result, they may engage in ethnic-racial socialization practices differently.

High maternal stress about pubertal changes was a stronger predictor of maternal preparation for bias for mothers of Black girls. In many ways, this finding is consistent with the developmental progression of communicating with Black children about ethnicity-race, especially discrimination. The physical changes associated with puberty likely place Black children at increased risk of encountering racial bias which may trigger Black mothers to engage in conversation about the race. Whereas White mothers of Black-White biracial girls may feel unprepared to engage in conversations about race or choose to deemphasize race at all (e.g., color-blind).

Two paths were statistically significantly similar for both mothers of Black girls and mothers of Black-White girls. The maternal stress about pubertal changes on cultural socialization and the perceived pubertal timing and maternal stress about pubertal changes interaction on cultural socialization. A consistent pattern emerges with these findings. Stress about pubertal changes appears to prompt both mothers of Black girls and mothers of Black-White biracial girls to engage in ethnic-racial socialization practices. Mothers in this study who reported higher levels of stress about their daughters' pubertal changes reported more ethnic-racial socialization practices that taught their daughters about their cultural history and traditions to encourage the development of ethnic pride and positive group identity. This finding was further clarified by the interaction between perceived pubertal timing and maternal stress about pubertal changes on cultural socialization.

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A desire to teach daughters about their cultural history and traditions appears to emerge in concert with perceived early pubertal timing relative to peers and the stress associated with puberty. These findings are consistent with a robust line of research on the adaptive cultural factors in Black families that serve to strengthen the self-concept of girls of African ancestry (see Hughes et al., 2006) in hopes that pride in one's culture will serve to protect them in stressful situations. Research has demonstrated that deviations in physical appearance alter how others respond to Black girls (Ge et al., 2002) and alter teachers' and others' academic and social expectations of Black girls (Carter et al., 2017). Moreover, Black girls who perceived themselves to be more physically developed relative to peers are more likely to experience more racially discriminatory incidents and attribute these experiences to race (Seaton & Carter, 2019). Thus, the ethnic-racially specific coping strategy of ethnic-racial socialization may bolster Black girls and Black-White biracial girls to deal with discrimination experiences during the pubertal transition.

We also observed that high and low maternal stress about pubertal changes was a stronger predictor of ethnic-racial socialization practices that emphasized the value of diversity and equality treatment across groups (egalitarian beliefs) among mothers of Black-White biracial girls who perceived that their daughters were early developers relative to peers. Given there virtually is no research regarding associations between stress associated puberty and ethnic-racial socialization practices, we can only speculate as to why mothers of Black-White biracial girls engage in egalitarian belief practices (e.g., emphasize shared humanity across lines of ethnicity and race) when feeling worried about their daughters' pubertal changes. Although mothers may encourage their daughters to recognize the equality of all ethnicities and races, they may also recognize that both individual and institutional racism exists. Barr and Neville (2008) demonstrated that students received two distinct types of egalitarian messages from their mothers. Some students noted that their mothers' ethnic-racial socialization messages focused on their behavior toward other races. They were told to treat all races equally despite their differences. Another group of students reported that their mothers' messages focused on the equal status of all races. These messages focused on students' thoughts and values concerning other races. The authors concluded that these distinct egalitarian messages may have different implications. Although more research is needed, findings from this study add to the growing literature concerning ethnic-racial socialization practices during key developmental transitions.

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Limitations and Future Directions

The results of the present study suggest that ethnic-racial socialization practices (e.g., preparation for bias, cultural socialization beliefs, egalitarian beliefs, and promotion of mistrust beliefs) intersect with pubertal timing and maternal stress about pubertal development among mothers of Black girls and mothers of Black-White biracial girls in this study in important ways that require further investigation. Future research on this topic could build on the present study by addressing several limitations. One limitation of the present study is the lack of information regarding how girls feel about their pubertal changes (nervous/excited) and the potentially racialized nature of these changes within girls' peer context. Puberty acts as a social stimulus, altering how adults and peers respond to early adolescents as their bodies develop (Ge et al., 2002; Nadeem & Graham, 2005; Reynolds & Juvonen, 2011). As a result, how mothers communicate information, values, and perspectives about ethnicity-race to their daughters as their bodies develop can be critical determinants of vulnerability. Given the fact that Black girls enter puberty at earlier ages than their same age cohort, future research should examine how mothers and girls themselves make meaning around potentially racialized aspects of pubertal development. Additional research is needed to determine whether the results of this study generalize to other Black girls and Black-White biracial girls; studies with larger samples in diverse contexts are needed to replicate these findings.

A related limitation is the use of mothers as informants of the child's pubertal development. Although most studies have used child self-ratings of pubertal development, studies have demonstrated that parent and self-ratings of pubertal development tend to be highly correlated (Hamilton et al., 2014). Although mothers can adequately report on their child's pubertal development, the effects of pubertal timing on adolescent outcomes have been found to vary depending upon who rates the adolescents' pubertal development (i.e., parent, adolescent, and physician; (Dorn et al., 2003). As such, future studies should include an even broader source assessment (e.g., adolescent self-report; hormonal biomarkers, physician-report).

Another limitation of the present study was the cross-sectional nature of the data preventing causal conclusions. It would be interesting to examine what ethnic-racial messages are conveyed to girls before puberty and the extent to which those messages shift or change with the onset of puberty. Yet, our study supports the notion that normative developmental transitions (e.g., puberty) are important moments in which to unpack how ethnic-racial socialization

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practices can inform youth outcomes linked to pubertal timing. A final limitation is that the present study relied on items created by the first author to capture maternal stress about pubertal development. Although the items yielded excellent reliability for both mothers of Black girls (.92) and mothers of Black-White biracial girls (.91); future work on this topic should note whether and how measurement may play a role in the study findings.

Conclusion

Our findings offer new insights into the synergistic linkages between maternal stress about their daughters' pubertal development, the timing of their daughters' pubertal development, and ethnic-racial socialization practices among mothers of Black girls and mothers of Black-White biracial girls. In the wake of 2020 as the hypervisibility of racial discrimination is at a new high, this time is ripe to discuss how mothers socialize their children around culture and race during the pubertal transition. Our findings also suggest ways to develop interventions for mothers of Black girls and Black-White biracial girls to help them navigate how their daughters may encounter racial bias because we live in a society that does not recognize black humanity. Our study findings suggest interventions that focus on ethnic-racial socialization and puberty development could aid families with pubescent girls.

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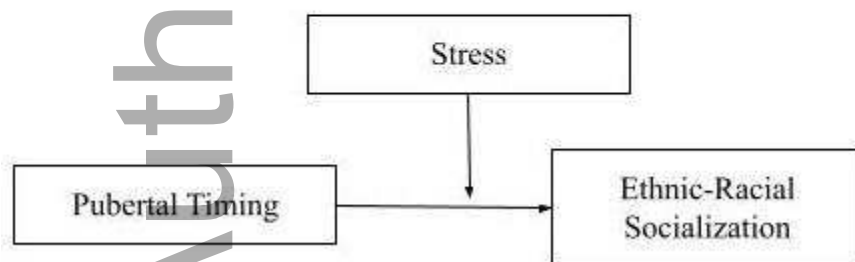
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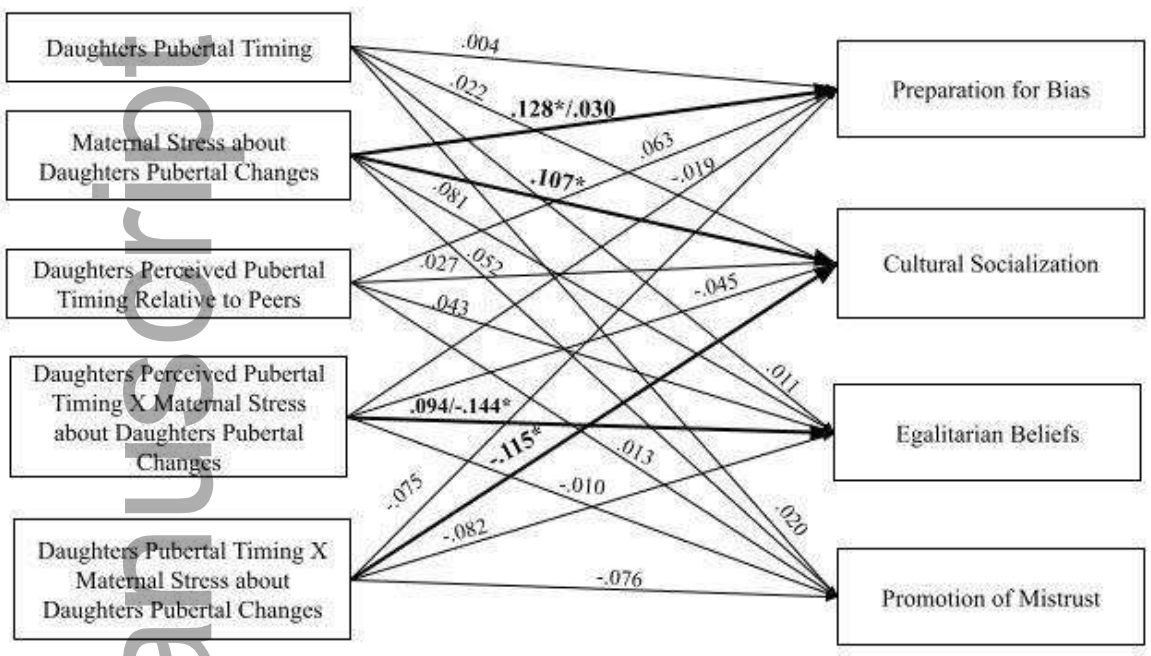
Figure 1

Conceptual Model

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Figure 2

Final model



Note: Mothers of Black girls/mothers of Black-White biracial girls standardized coefficients reported accordingly. Adolescent age and family annual income are covariates in the model although not shown.

*p < .05

Figure 3

*Interaction Between Pubertal Timing and Maternal Stress about Daughters
Pubertal Changes for both Mothers of Black Girls and Mothers of Black-White-
Biracial Girls*

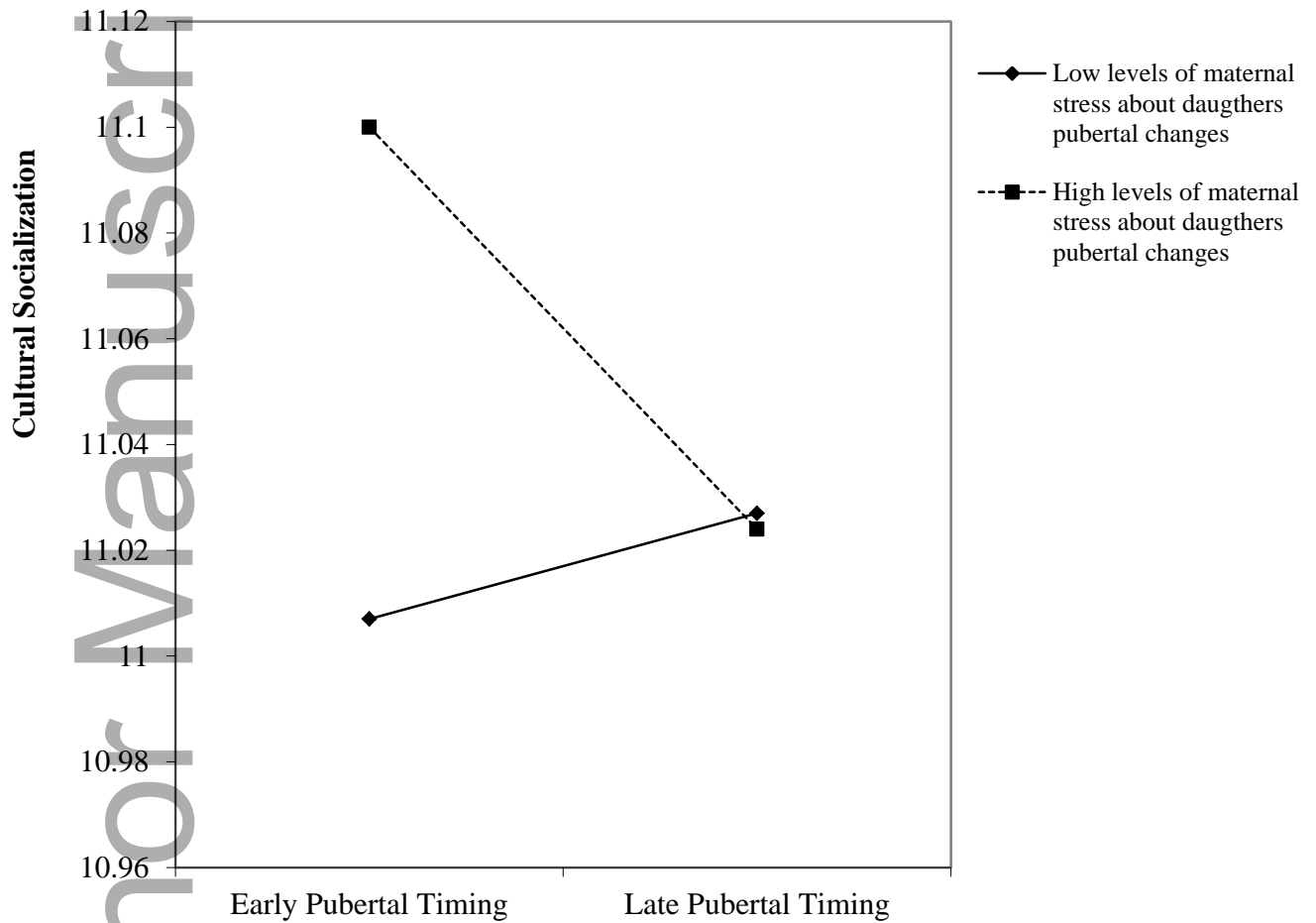
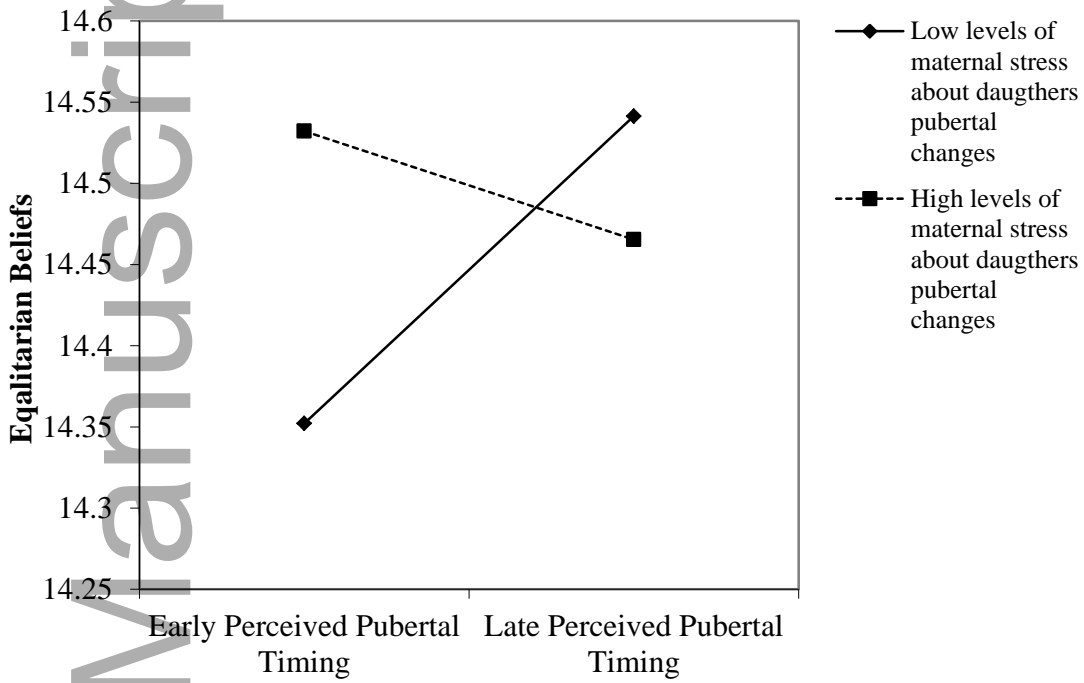


Figure 4

Interaction Between Perceived Pubertal Timing and Maternal Stress about Daughters Pubertal Changes for Mothers of Black-White Biracial Girls



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Table 1

Bivariate correlations, means, and standard deviations for study variables by ethnic-racial subgroup

Variables	1	2	3	4	5	6	7	Mothers of Black girls M (SD)	Mothers of Black- White biracial girls M (SD)
1. Daughters pubertal status	--	-.423**	-.036	.001	.016	.026	.005	2.57(.60)*	2.44(.66)
2. Daughters relative pubertal timing	-	--	-.035	.070	.025	-.005	-.059	2.65(.85)	2.62(.80)
	.384**								
3. Maternal stress daughters pubertal changes	.006	-.038	--	.120*	.090	.077	-.054	48.79(11.54)	51.50(10.04)*
4. Preparation for bias	-.016	.096	.001	--	.716**			14.55(2.08)*	13.85(2.23)
						.582**	.301**		
5. Cultural	-.013	.093	.004	.616**	--			10.70(1.76) *	10.07(1.98)

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socialization						.538**	.342**		
6. Egalitarian beliefs	-.026	.073	.083	.531**	.510**	--		14.55(2.00)	14.71(1.81)
7. Promotion of mistrust	.027	.086	-.042	.217**	.319**	.019	--	7.75(2.87)*	6.18(2.73)

Note: Coefficients above the diagonal are for mothers of Black girls (n = 286) and those below the diagonal are for mothers of Black-White biracial girls (n = 233); All data are maternal-report.

*p<.05; **p<.01

Table 2

Fit statistics and comparisons of nested models

Model	χ^2	df	CFI	RMSEA (90% CI)	SRMR	$\Delta\chi^2(\Delta df)$
1. Baseline-Mothers of Black girls	3.173	6	.99	.01 (.01, .05)	.01	--

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2. Baseline-Mothers of Black-White biracial girls	3.729	6	.99	.01 (.01, .06)	.01	--
3. Unconstrained	6.772	12	.99	.01 (.01, .03)	.01	--
4. Constrained	43.060	32	.98	.04 (.01, .06)	.03	--
Model 3 vs Model 4	--	--	--	--	--	36.288 (20) *
5. Fully constrained	92.924	47	.92	.06 (.04, .08)	.05	--
Model 4 vs Model 5	--	--	--	--	--	49.894 (15) *
6. SPC → PB constrained equal	11.405	13	.91	.18 (.12, .24)	.04	4.633 (1) *
7. PPT → PB constrained equal	6.797	13	.99	.01 (.01, .02)	.01	.025 (1)
8. PPT, PT → PB constrained equal	7.767	14	.99	.01 (.01, .03)	.01	.995 (2)
9. PPT, PT, PTxSPC → PB constrained equal	8.530	15	.99	.01 (.01, .02)	.02	1.758 (3)
10. PPT, PT, PTxSPC; PPTxSPC → PB constrained equal	12.669	16	.99	.01 (.01, .05)	.02	5.897 (4)
11. PPT, PT, PTxSPC; PPTxSPC → PB and SPC → CS constrained equal	15.633	17	.99	.01 (.01, .06)	.02	8.861 (5)
12. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT → CS constrained equal	17.938	18	.99	.01 (.01, .06)	.02	11.17 (6)
13. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT → CS constrained equal	17.947	19	.99	.01 (.01, .05)	.02	11.18 (7)
14. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC → CS constrained equal	18.673	20	.99	.01 (.01, .05)	.02	11.90 (8)
15. PPT, PT, PTxSPC; PPTxSPC → PB and	18.714	21	.99	.01 (.01, .05)	.02	11.94 (9)

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SPC, PPT, PT; PTxSPC; PPTxSPC → CS

constrained equal

16. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC → EQ constrained equal	19.007	22	.99	.01 (.01, .04)	.02	12.23 (10)
17. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC, PPT → EQ constrained equal	19.496	23	.99	.01 (.01, .04)	.02	12.72 (11)
18. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC, PPT, PT → EQ constrained equal	23.558	24	.99	.01 (.01, .05)	.03	16.79 (12)
19. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC, PPT, PT, PTxSPC → EQ constrained equal	23.558	25	.99	.01 (.01, .05)	.03	16.79 (13)
20. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC, PPT, PT, PTxSPC; PPTxSPC → EQ constrained equal	32.432	26	.98	.03 (.01, .06)	.03	25.66 (14) *
21. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC, PPT, PT, PTxSPC → EQ and SPC → PM constrained equal	23.663	26	.99	.01 (.01, .04)	.03	16.89 (14)

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22. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC, PPT, PT, PTxSPC → EQ and SPC, PPT → PM constrained equal	30.579	27	.99	.02 (.01, .06)	.03	23.81 (15)
23. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC, PPT, PT, PTxSPC → EQ and SPC, PPT; PT → PM constrained equal	30.580	28	.99	.02 (.01, .05)	.03	23.81 (16)
24. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC, PPT, PT, PTxSPC → EQ and SPC, PPT; PT; PTxSPC → PM constrained equal	30.878	29	.99	.02 (.01, .05)	.03	24.11 (17)
25. PPT, PT, PTxSPC; PPTxSPC → PB and SPC, PPT, PT; PTxSPC; PPTxSPC → CS and SPC, PPT, PT, PTxSPC → EQ and SPC, PPT; PT; PTxSPC; PPTxSPC → PM constrained equal	34.404	30	.99	.02 (.01, .05)	.03	24.11 (18)
6. Final model	34.404	30	.99	.02 (.01, .05)	.03	--

Notes: CFI= comparative fit index; RMSEA=root mean-square error of approximation; SRMR= standardized root mean squared residual; PPT= perceived pubertal timing; PT= pubertal timing; PB= preparation for bias; CS= cultural socialization; EQ= equalitarian beliefs and PM= promotion of mistrust

*p < .05

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