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Maternal familism predicts birthweight and asthma symptoms three years later

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ABSTRACT

There are marked ethnic and socioeconomic differences in birthweight and childhood asthma, conditions which may be linked causally or via a third variable. Cultural resources are often credited with diminished health disparities in infancy and childhood among subsets of poor and minority populations; yet direct empirical tests of this hypothesis are needed. In this study, ethnicity, lifespan family socioeconomic position (FSEP), and the cultural resource of familism were compared as predictors of birthweight and expression of asthma symptoms (AE) by age three. Familism and lifespan FSEP were assessed in 4633 socioeconomically disadvantaged African Americans, White Americans, and Latinas upon giving birth, as was offspring birthweight. AE was assessed in offspring through age three. Asthma diagnosis by age three was likelier in very low (≤ 1500 g) and low (≤ 2500 g) birthweight infants compared to infants born at average (2501–3999 g) or larger (≥ 4000 g) birthweights. Asthma risk associated with lower birthweight was higher for Latinos (17–35%) and African Americans (19–23%) than for White Americans (13–14%). As predicted, maternal familism was higher among White Americans than among African Americans and Latinas, an effect that was largely driven by ethnic disparities in lifespan FSEP. Familism predicted continuous birthweight ($p = .003$) and AE ($p = .001$) by age three independently of ethnicity and lifespan FSEP accounting for appropriate control variables, including maternal biomedical risk, maternal acculturation, parental marital status, and infant sex. There was a 71-g gain in birthweight for every one-unit increase in familism. The protective effect of familism on AE by age three was strongest for participants of lower lifespan FSEP. Maternal familism is one cultural resource that may reduce reproductive and intergenerational health disparities in both U.S.- and foreign-born Americans. Consistent with our previous work, familism and other nonmaterial resources covary with material resources. Nevertheless, culture is distinguishable from lifespan FSEP and ethnicity, and has health implications beyond associations to ethnicity, lifespan FSEP, and related biomedical and sociodemographic factors.

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Introduction

Anticipation and celebration of new life are common to all cultures, even when circumstances are difficult. Still, the likelihood of beginning life in optimal health varies greatly between individuals and groups of people. Adverse birth outcomes, such as very low birthweight (VLBW; ≤ 1500 g) and low birthweight (LBW; ≤ 2500 g) and related health conditions, including childhood asthma symptoms, disproportionately burden ethnic minorities and individuals of lower socioeconomic position (SEP) (Bloom & Dey, 2006). An important caveat is that links from SEP to birthweight and asthma are less reliable among certain segments of ethnic minority populations in America, including those who are

presumed to be less acculturated to mainstream America and/or to have retained more traditional values, particularly surrounding family (Cagney, Browning, & Wallace, 2007). In fact, despite high rates of poverty, unassimilated minorities are among the healthiest Americans, particularly where pregnancy and birth outcomes are concerned (Campos et al., 2008; Markides & Coreil, 1986). The paradoxical association of good health and poor socioeconomic resources in newer, presumably unassimilated Americans was initially observed in U.S. Latinos and was, thus, first referred to as the Latino Paradox (Markides & Coreil, 1986). As the phenomenon is increasingly observed in other groups, including U.S.- and foreign-born Blacks and Whites (Desai, Kan, & Rosenberg, 2002; Dey & Lucas, 2006), it is becoming more broadly known as the Epidemiological Paradox.

Cultural resources are commonly credited with these now well-documented unexpected health advantages in unassimilated Americans; but direct empirical tests of this hypothesis are needed.

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One major challenge to testing this hypothesis is the complex overlap and synergy among ethnicity, nativity, SEP, and cultural orientation (Abdou et al., 2010). In this study, we directly test this hypothesis by examining the independent and combined effects of ethnicity, lifespan family SEP (FSEP), and the cultural resource of familism (assessed as maternal endorsement of traditional views on familial obligation; Sabogal, Marín, Otero-Sabogal, & Marín, 1987), on birthweight and on childhood asthma expression (AE). Specifically, we hypothesized that cultural resources predict health over and above their relationships to ethnicity, nativity, and lifespan FSEP. Familism in particular, because of its direct relevance to childbearing and rearing, was predicted to be one cultural resource that may impact health across multiple generations.

Culture

Although conceptual definitions of culture and ethnicity differ greatly, it is common in quantitative health research to treat them as synonymous and, in particular, to operationalize culture as ethnicity (Abdou et al., 2010). *Culture* is used here to refer to socially held beliefs that allow for the evaluation of life experiences as normative and/or ideal (Fiske, Kitayama, Markus, & Nisbett, 1998; Triandis, 1984). We follow the recommendation in the literature that studies of cultural differences should examine the specific cultural element(s)—in this case, familism—hypothesized to be relevant to the process or outcome of interest (Betancourt & López, 1993; Oyserman, Coon, & Kemmelmeier, 2002a). In contrast, *ethnicity* is used to refer to social identification on the basis of shared phenotype, social conditions, language, or heritage more broadly. African Americans, White Americans, and Latinos are the three ethnic groups included in the present study. Group-level values about the self and relationships to others are commonly assimilated into individual value systems or personalities (Oyserman, 2002). Therefore, variability in the cultural value of familism was assessed both between (i.e., group differences) and across (i.e., individual differences) the three ethnic groups involved in this study.

Familism

Familism, like culture more broadly, has been defined, measured, and labeled numerous ways (Steidel & Contreras, 2003). Definitions of familism can be distilled into the belief that priority should be given to family relationships, roles, and responsibilities (Gaines et al., 1997). Familism has been studied primarily in Mexican Americans (Steidel & Contreras, 2003), but also in other Latinos, in African Americans (Abdou et al., 2010; Gaines et al., 1997), and in White Americans (Bardis, 1959; Cooley, 2001; Heller, 1970).

Studies of ethnic differences in familism and related cultural “meta-constructs” (Oyserman, Coon, & Kemmelmeier, 2002b), such as collectivism and communalism, have been mixed, alternately confirming (Campos et al., 2008) and challenging (Abdou et al., 2010; Schwartz, 2007) popular assumptions of the relational attributes of certain ethnic groups, including the emphasis on interdependence vs. independence. Some studies have found sex, age, and acculturation (commonly assessed as nativity and years in the U.S.) to be critical moderators of ethnic differences in familism. Specifically, ethnic differences in familism appear to be more probable in male, older, and less acculturated samples (Gaines et al., 1997; Steidel & Contreras, 2003). Other studies have found SEP to be more important than ethnicity in predicting familism, such that greater value is adaptively placed on kinship in the presence of fewer material resources (Luna et al., 1996; Stack, 1974). Still other researchers have suggested that impoverished contexts rarely

succeed at sustaining priority for close relationships, largely due to higher stress burden (McLoyd, 1998; Repetti, Taylor, & Seeman, 2002), suggesting that fewer material resources may actually be associated with lower familism.

Studies also seem to indicate that ethnic differences in familism may reflect measurement differences. Familism is generally assessed along four dimensions in the literature: (a) attitudinal familism, (b) perceived familial support, (c) family as referents, and (d) the dimension most relevant to the present study, familial obligation (Luna et al., 1996; Sabogal et al., 1987; Steidel & Contreras, 2003). To paraphrase George (1986), familial obligation involves the belief that family members should fulfill their roles and responsibilities, including spousal and filial obligations, even in the face of individual motivations to do otherwise.

Although trends in the literature suggest that *whether* and *how* specific cultural factors, including familism, are measured in general and within specific ethnic groups change over time, it remains the case that specific cultural factors are not equally likely to be studied in all ethnic groups (Schwartz, 2007). Similarly, it is common for cultural measures to be designed for use with specific ethnic groups (see Gaines et al., 1997 and Luna et al., 1996 for exceptions). Like the epidemiological paradox (formerly known as the Latino paradox), familism was initially conceptualized as a Latino construct. As a result, the majority of familism measures were developed as measures of Latino familism specifically (Luna et al., 1996). Similarly, although familism is studied in other ethnic groups with increasing frequency, it is still most likely to be studied in Latinos (Steidel & Contreras, 2003).

Schwartz (2007) proposed that all ethnic groups are familistic to some degree, which seems plausible given the significance of family to all societies. While familism appears to be a human value (rather than, for example, a Latino value), multiple factors likely determine endorsement of familial or any other beliefs. Personality, contextual constraints, and situational cues are a few factors likely to impact endorsement of values like familism (Oyserman et al., 2002a; Schwartz, 2007).

Family, birthweight, and asthma

We have come to appreciate the extent to which the intra-uterine environment determines quantity and quality of life (O’Keane & Scott, 2005). Adverse birth outcomes, such as LBW, are major family stressors and serious public health concerns. There are demonstrated links from LBW to long-term health consequences, including cardiovascular disease and adverse pregnancy outcomes in subsequent generations (Barker, 2000; Lu & Halfon, 2003). Also evidenced are more immediate health consequences of LBW, including increased risk of asthma and more severe asthma symptoms (Kumar, 2008; Villamor, Iliadou, & Cnattingius, 2009).

Significant ethnic and socioeconomic differences exist in pregnancy outcomes (Martin et al., 2006). With at least twice the odds of experiencing an adverse birth outcome, African Americans are worst off. Latinos are very difficult to generalize about at the aggregate. Latino birth outcomes vary tremendously by degree of acculturation, as assessed by place of birth and duration in the United States (Zambrana, Scrimshaw, Collins, & Dunkel-Schetter, 1997), and by Latino subgroup (Martin et al., 2006). To a large extent, Cubans and Mexicans drive the favorable birth outcomes of U.S. Latinos (who are both U.S.- and foreign-born), with LBW rates actually lower than U.S.-born White Americans, whereas Puerto Rican outcomes resemble African American outcomes (Rosenberg, Raggio, & Chiasson, 2005).

Stratification of favorable birth outcomes by Latino subgroup does not necessarily coincide with greater availability of socioeconomic resources (Collins & Shay, 1994). Although Cubans are fairly

well off relative to other U.S. Latino subgroups, Mexicans—like African Americans—are socially, economically, and politically marginalized. Diminished reliability of the SEP-health gradient in Latinos suggests we are overlooking determinants of health that may be as, or more, critical than material resources (James, 1993). The few existing efforts to compare subgroups of Blacks and other ethnic groups (e.g., U.S.- vs. foreign-born) show that, as with Latinos, there is important variability in contextual factors and outcomes within broad ethnic categories (Dominguez, Strong, Krieger, Gillman, & Rich-Edwards, 2009). It is plausible, therefore, that assimilation-related health processes, most commonly considered in research with Latinos, are relevant to other ethnic groups as well, including both U.S.- and foreign-born African Americans and White Americans (Anderson, 1991; Coohy, 2001; Landrine & Klonoff, 2004; Stuart, 1991).

Like LBW, asthma disproportionately affects minority and poor communities (Weiss, Gergen, & Crain, 1992). Despite challenges surrounding diagnosing asthma in children (see Bianca et al., 2009), asthma is the most common chronic illness experienced by children and the most common cause of childhood hospitalizations (Bloom & Dey, 2006). In contrast to cardiovascular disease, type-2 diabetes, or other chronic conditions which develop over the lifespan and are exacerbated by stress, asthma symptoms commonly present in infancy and early childhood (Suarez, Boyle, Lewis, Young, & Hall, 2006). As such, asthma is a unique disease model in which to examine family-driven psychosocial and cultural factors that are transmitted intergenerationally and may affect early health outcomes in offspring (Chen, Bloomberg, Fisher, & Strunk, 2003).

LBW infants often have underdeveloped lungs. As a result, sociodemographic groups with higher rates of LBW also tend to have higher rates of childhood asthma (Jobe & Ikegami, 2000; Kumar, 2008). This proximal LBW–childhood asthma link is exacerbated by additional, more distal shared risk factors, including perinatal exposure to infection, fetal growth restriction, being an ethnic minority, and lower FSEP (Bloom & Dey, 2006; Weiss et al., 1992). These shared risk factors underscore the importance of stress in LBW and in asthma etiology (Klennert et al., 2001; Lu & Halfon, 2003; Wright, 2007). Fetal growth restriction can result from prenatal exposure to stress hormones resulting from physiological (e.g., malnutrition, infection) and/or psychological (e.g., stressful life events, unstable home environment, lack of social support) threats (Barker, 2000; Lu & Halfon, 2003). In fact, several studies have shown that both objective stress measures (e.g., levels of circulating and placental stress hormones, including cortisol and corticotropin-releasing hormone) and subjective stress measures (e.g., maternal reports of chronic stress and acutely stressful life events) taken during gestation predict lower birthweight (Hilmert et al., 2008; Mancuso, Dunkel Schetter, Rini, Roesch, & Hobel, 2004). Similarly, a growing body of evidence suggests that asthma is highly sensitive to prenatal and early childhood exposures to stress, with the extant literature highlighting the role of family stressors (Chen, Chim, Strunk, & Miller, 2007). Maternal anxiety during pregnancy as well as poor family functioning and high family stress burden during infancy have also been linked to childhood onset asthma (Cookson, Granell, Johnson, Ben-Shlomo, & Henderson, 2009).

Cultural resources, such as familism, may have important implications for family functioning. Views on familial obligation likely vary with contextual factors, including lifespan FSEP. Familism and other cultural resources can help to buffer the greater burden of stress carried by ethnic minority and/or poor families and individual members, thereby reducing disparities in reproductive health and health in offspring, particularly early in life (James, 1993).

The present study

The suggestion that the socioeconomic gradient in birthweight and asthma can be moderated by cultural factors leaves many questions open. What is there to be learned about improving health using more direct and nuanced examination of the relative and synergistic contributions of culture, ethnicity, and SEP to health? Are there particular cultural resources that can attenuate, or even overshadow, the far-reaching health consequences of ethnic minority status and/or inadequate material resources? We suggest it is theoretically plausible that culture exerts its influence on health via direct independent pathways as well as indirect pathways resulting from interactions with ethnicity, SEP, and related sociodemographic factors.

Study predictions

The objective of the present study was to test culture as a predictor of intergenerational health processes (i.e., the transmission of health from mother to offspring), while also evaluating the role of culture in reducing ethnic and socioeconomic disparities. A family-directed aspect of culture, namely familism, was examined as a predictor of birthweight and AE and compared to established predictors, including ethnicity, lifespan FSEP, and relevant biomedical and sociodemographic controls. It was expected based on prior theoretical and empirical work (Abdou et al., 2010) that the cultural resource of maternal familism would vary largely as a function of higher lifespan FSEP and, thus, be higher among White Americans than among African Americans and Latinas. Nevertheless, it was hypothesized that familism would account for variability in birthweight and the potentially related onset and severity of childhood asthma three years later independently of its associations to ethnicity and lifespan FSEP, with higher maternal familism resulting in higher birthweight and lower AE. Also consistent with our earlier work (Abdou et al., 2010), it was further predicted that the health benefits of familism would be more pronounced among lower social status participants—namely, ethnic minorities and/or participants with lower lifespan FSEP.

Method

The Fragile Families Child Well-Being Study

African American, White American, and Latino mother–offspring dyads involved in the Fragile Families and Child Well-Being Study (FFCWBS) up to the third wave of data collection were included in this analysis. Time 1 data (corresponding with the birth of the focal child) were collected between February 1998 and September 2000; Time 2 data (corresponding with age 1 of the focal child) were collected between June 1998 and March 2002; and Time 3 data (corresponding with age 3 of focal child) were collected between April 2001 and December 2003. Participants were predominately very low income, unmarried families from 20 U.S. cities with populations greater than or equal to 200,000. Details of the FFCWBS design and sampling procedures are documented at great length in numerous places (see Reichman, Teitler, Garfinkel, & McLanahan, 2001). This study was exempt according to Institutional Review Board guidelines because it involves secondary analysis of existing anonymous data.

Participants

This study includes 95% of original FFCWBS families. Mothers who self-identified as an ethnicity other than African American, White American, or Latina were dropped from this analysis due to

insufficient numbers for subgroup analyses. Of the 4664 African American, White American, and Latina families included in the original FFCWBS sample, 31 were dropped from this analysis due to missing birthweight data, resulting in a final sample of 4633 mother–offspring dyads. The child followed from birth to age three in the present study is referred to as the *focal child*.

Response rates

Although unmarried mothers were more likely to enter FFCWBS (87% of unmarried mothers vs. 82% of married mothers approached), both married and unmarried mothers had a response rate of approximately 90% at each of the two follow-ups. Chi-square tests demonstrated that Latinas were less likely than African Americans and White Americans to be interviewed at Time 2 ($\chi^2(2,4633) = 10.94, p = .004$) and Time 3 ($\chi^2(2,4633) = 27.54, p < .001$).

Procedure and materials

All independent and control variables and birth outcome (i.e., birthweight) were measured at Time 1. Childhood asthma expression (AE) was assessed as an index of items measured across Times 2 and 3.

Independent variables

Ethnicity. Self-identified ethnicity was assessed in mothers. Although race and ethnicity (Latino vs. non-Latino) data were collected as two separate questions, they were collapsed into a single ethnicity item, with participants coded as African American, White American, or Latina. Thus, participants identifying as ethnically Latina were coded as Latina regardless of self-identified racial categorization. According to this classification, the final sample was 50% African American, 22% White American, and, 28% Latina. Just over half of those identifying as Latina were of Mexican origin specifically. Two ethnicity dummy variables representing the three ethnic groups were utilized in all regression analyses: 1) non-African American (coded 0) vs. African American (coded 1) and 2) Minority (coded 0) vs. White American (coded 1). There was a theoretical basis for using these particular dummy variables to represent the three ethnic groups involved in the present study. Being African American is among the strongest known predictors of lower birthweight (NCHS, 2010). Similarly, being African American or Latino is among the strongest known predictors of childhood asthma expression ([AE]; Cagney et al., 2007). This coding of ethnicity was, therefore, selected to impose the most stringent test of the cultural resource of maternal familism as a predictor of health over and above well-established ethnicity effects.

Lifespan family socioeconomic position. FFCWBS oversampled socioeconomically disadvantaged families and gave considerable attention to measurement of socioeconomic position (SEP), making it possible to construct a relatively comprehensive picture of lifespan family SEP (FSEP; Social Indicators Survey Center, 1999). Three maternal childhood FSEP factors and three parental (i.e., maternal and paternal) adulthood FSEP factors were assessed in order to produce the lifespan FSEP measure used in the present study. The six lifespan FSEP components were based on maternal reports at Time 1: (1) whether the mother was living with both of her parents at age 15, (2) educational attainment of focal child's maternal grandmother, (3) educational attainment of focal child's maternal grandfather, (4) educational attainment of focal child's mother, (5) educational attainment of focal child's father, and (6) adjusted annual household income (i.e., annual household income divided by the number of people dependent upon that income).

Mother living with both parents at age 15. Mothers reported (no = 0/yes = 1 so that a higher score would contribute to higher overall lifespan FSEP in the final measure) whether they were living with both of their biological parents at age 15. Forty-two percent of mothers were living with both parents at age 15; although this varied drastically by ethnicity, with 29% of African American mothers reporting that they lived with both parents at age 15 compared to 57% of White American mothers and 53% of Latina mothers ($p < .001$).

Educational attainment of maternal grandparents. Educational attainment by the focal child's maternal grandmother and grandfather was measured using an 8-point Likert scale (0 = no formal schooling to 7 = advanced degree). The full range of formal education was represented, with maternal grandmothers ($M = 3.17, SD = 1.61$) and grandfathers ($M = 3.27, SD = 1.66$) having completed high school on average.

Parental educational attainment. Educational attainment by the focal child's mother and father was measured using an 8-point Likert scale (0 = no formal schooling to 7 = advanced degree) like that used to assess educational attainment among maternal grandparents. Again, the full range of formal education was represented, ranging from .1% with no formal education to 3% with graduate school, and a mean educational attainment of high school for both mothers ($M = 3.32, SD = 1.57$) and fathers ($M = 3.30, SD = 1.54$). Maternal and paternal educational attainment were highly correlated ($r = .62, p < .001$) and identically distributed.

Adjusted annual household income. Adjusted annual household income was calculated by dividing annual household income by the number of people in the home reported to be dependent upon that income. The mean household size was 4.59 people ($SD = 1.65$, Range = 2–10). Annual household income was assessed as ranges represented by a 9-point Likert scale (1 = less than 5K to 9 = greater than 75K), with a mean of 4.75 ($SD = 2.64$), which translates to a mean annual household income of approximately 19K. The midpoint of the annual household income category was divided by household size to calculate adjusted annual household income scores. Adjusted annual household income ranged from –1.50 to 4.50, resulting in an average adjusted annual household income of .79 ($SD = .97$), which translates to approximately 4K available per person in the household per year.

Total lifespan FSEP. Scores on the six lifespan FSEP components were standardized to account for their different metrics, and a total lifespan FSEP score was calculated by averaging these scores (see Singh, Kogan, Siahpush, & van Dyck, 2008). Total lifespan FSEP was calculated with adequate reliability ($\alpha = .70$). Final lifespan FSEP scores ranged from –2.09 to 2.29 ($M = -.01, SD = .62$), with higher values indicating higher lifespan FSEP.

Maternal familism. Maternal familism was measured at Time 1 with five items used in previous population-based studies to assess beliefs about familial obligation and family structure (Thornton, 1989; Thornton & Young-DeMarco, 2001). Items were rated on a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree; sample item: "It is better for children if their parents are married."). Items were reverse scored as necessary to create the final familism scale, with higher values indicating higher maternal familism. The scale demonstrated fair internal consistency ($\alpha = .64$), and scores ranged from 1 to 4 ($M = 2.61, SD = .48$).

Biomedical and sociodemographic control variables

Maternal biomedical risk. A maternal biomedical risk score was calculated based on maternal age, parity, number of other biological

children, and the month in which prenatal care was initiated. Mothers ranged in age from 15 to 43 years ($M = 25$, $SD = 6$) at study entry. There is heightened risk associated with giving birth for the first time; thus, primiparous women (i.e., women for whom the focal child was a first live birth) were assigned a score of 1 (multiparous women [i.e., women with previous live births] = 0), so that higher scores would contribute to higher risk in the final maternal biomedical risk scale. The focal child was a first birth for 38% of mothers. Mothers had up to 12 other biological children ($M = 1.17$, $SD = 1.36$). Although there were mothers who initiated prenatal care as early as the first few weeks of pregnancy and as late as the last month of pregnancy, most mothers initiated prenatal care within the first trimester of pregnancy ($M = 2.46$, $SD = 1.48$). These four components of maternal biomedical risk were standardized to account for their different metrics and averaged, with higher values indicating higher risk ($\alpha = .64$).

Maternal acculturation. Maternal acculturation was assessed as a composite of standardized measures of nativity and years in the U.S. ($M = .17$, $SD = .63$). These are common (Schwartz, Pantin, Sullivan, Prado, & Szapocznik, 2006), albeit narrow, measures of nativity in the existing literature. Nativity was measured dichotomously (foreign-born = 0, U.S.-born = 1), such that higher values contribute to higher acculturation in the final maternal acculturation composite, and years in the U.S. was assessed continuously. Fifteen percent of mothers were foreign-born, with an average of 10 years ($SD = 7.44$) in the U.S. at study entry.

Parental marital status. Parental marital status was measured dichotomously (not married = 0 or married = 1). Reflecting sampling goals of the parent study, 24% of biological parents were married at the birth of the focal child.

Infant sex. Sex is an established predictor of birthweight and asthma; thus, was also included in models (male = 0 and female = 1). Being male is associated with higher birthweight as well as with increased risk for asthma onset and severity. Forty-eight percent of offspring were female.

Intergenerational health outcomes

Birthweight. Birthweight, modeled continuously in grams in all regression analyses, was assessed via maternal report of pounds and ounces and converted to grams ($M = 3207.36$ g or 7 lbs 2 oz, $SD = 639.69$ g or 1 lb 6 oz). Certain descriptive statistics were presented using a categorical measure of birthweight consisting of four clinically-established birthweight categories (i.e., VLBW [≤ 1500 g], LBW [≤ 2500 g], normal [2501–3999 g], and macrosomic [≥ 4000 g]). Table 1 contains additional information on the distribution of birthweight.

Asthma expression. An asthma index, termed asthma expression (AE), was calculated based on three questions assessed at Time 2 and reassessed at Time 3: (1) whether a doctor had told the mother that the child has asthma ($no = 0/yes = 1$), (2) presence of asthma episodes within the past year ($no = 0/yes = 1$), and (3) asthma-related urgent care visits within the past year (assessed as $no = 0/yes = 1$ at age 1, and assessed as 0 = never to 4 = four or more times at age 3). All items were based on maternal report. Responses to the six items were summed to compute the final AE score, with higher values indicating more severe AE. Final scores ranged from 0 to 9 ($M = .52$, $SD = 1.42$).

Data analysis

Sampling weights were applied in all regression analyses for national representativeness. Less than 5% of data were missing on

average. All analyses were conducted using four different methods of handling missing data: 1) allowing missing data, 2) using mean/median replacement at the level of individual items, 3) using mean/median replacement at the level of composite measures, and 4) estimating missing data using multiple imputation. Results were stable across all types of analyses, as well as across five sets of multiple imputation estimates. Final results reported here use multiple imputation estimates.

Sociodemographic characteristics and the distribution of birthweight and AE were examined in the full sample as well as within each ethnic group. Asthma prevalence by each of the four birthweight categories (i.e., VLBW, LBW, normal, and macrosomic) was then examined in the sample overall as well as by ethnicity, nativity, and lifespan FSEP. Next, ethnic and socioeconomic differences in the distribution of the cultural resource of familism were examined using weighted least squares regression. Finally, hierarchical weighted least squares regression analyses were conducted to compare ethnicity, lifespan FSEP, and the cultural resource of familism as predictors of continuous birthweight and birthweight-adjusted AE by age three.

Hierarchical regression models predicting both birthweight and AE controlled for maternal biomedical risk, maternal acculturation, parental marital status at the birth of the focal child, and offspring sex. In addition, the model predicting AE in offspring by age three included birthweight to account for established links between birthweight and AE in the literature and in the present sample.

Finally, to test for both the direct and indirect health effects of culture that were outlined in the introduction and study predictions, two-way interactions among familism, ethnicity, and FSEP were entered into the second step of hierarchical regression analyses predicting birthweight and AE. Hierarchical regression was used to impose the most stringent test of relative contributions of main effects and interactions (Cohen, Cohen, West, & Aiken, 2003).

Results

Sample distribution of birthweight and asthma

Table 1 summarizes sociodemographic characteristics and the distribution of birthweight and AE for the full sample as well as stratified by ethnicity. Ethnic differences in sociodemographic characteristics were generally as expected. The one exception is that maternal biomedical risk was actually higher in White Americans than in African Americans or Latinas ($p = .028$) due to older maternal age and greater likelihood of being primiparous among White American mothers.

The overall distribution of birthweight and asthma, as well as the higher prevalence of VLBW, LBW, and asthma among African Americans and Latinos compared to White Americans (all $ps < .001$), were all consistent with national data (also summarized in Table 1; Bloom, Cohen, & Freeman, 2010; NCHS, 2010). As expected, birthweight (here measured continuously) and asthma were correlated, such that higher birthweight was associated with lower risk for asthma diagnosis by age three ($r = -.09$, $p < .001$). Asthma prevalence by categorical birthweight in the full sample, as well as by ethnicity, nativity, and lifespan FSEP, is shown in Fig. 1.

Maternal familism

The distribution of maternal familism by ethnicity and lifespan FSEP (summarized in Fig. 2) supported the prediction that the nonmaterial cultural resource of familism would covary with material and other status-based resources. Significant ethnic

Table 1
Sociodemographic characteristics and distribution of birthweight and asthma in the full sample and stratified by ethnicity.

	Full sample (N = 4633)	African American (N = 2296)	White American (N = 1018)	Latino (N = 1319)
	M (SD)	M (SD)	M (SD)	M (SD)
Maternal biomedical risk (Standardized)	-.00 (.42)	-.01 (.44)	.03 (.36)	-.01 (.40)
Range = -1.87–2.79				
Maternal age at birth of focal child	25.17 (6.01)	24.53 (5.74)	27.10 (6.47)	24.78 (5.79)
Range = 15–43				
Primiparous (Giving birth for the first time)	38%	33%	46%	39%
Number of other biological children	1.17 (1.36)	1.35 (1.48)	.97 (1.10)	1.10 (1.29)
Range = 0–12				
Month prenatal care was initiated	2.46 (1.48)	2.53 (1.51)	2.22 (1.38)	2.53 (1.47)
Range = < 1st month–9th month				
Maternal acculturation (Standardized)	.17 (.63)	.35 (.37)	.35 (.36)	-.26 (.90)
Range = -2.36–1.63				
Mother is U.S.-born	85%	95%	95%	59%
Years mother has been in the U.S.	9.94 (7.44)	11.37 (7.20)	11.82 (10.16)	9.52 (7.15)
Range = 0–31				
Parents married at birth of focal child	24%	13%	49%	23%
Infant sex (Percent female)	48%	47%	47%	48%
Lifespan family socioeconomic position	-.01 (.62)	-.06 (.52)	.45 (.71)	-.27 (.52)
(Standardized) Range = -2.09–2.29				
Mother lived with both of her parents at age 15	42%	29%	57%	53%
Maternal grandmother educational attainment	3.17 (1.61)	3.47 (1.42)	3.68 (1.57)	2.19 (1.54)
(Categorical) Range = 0–7				
Maternal grandfather educational attainment	3.27 (1.66)	3.33 (1.35)	3.91 (1.78)	2.45 (1.75)
(Categorical) Range = 0–7				
Mother educational attainment	3.32 (1.57)	3.24 (1.36)	4.20 (1.77)	2.78 (1.45)
(Categorical) Range = 0–7				
Father educational attainment	3.30 (1.54)	3.22 (1.29)	4.16 (1.78)	2.74 (1.44)
(Categorical) Range = 0–7				
Annual household income	4.75 (2.64)	4.17 (2.53)	6.30 (2.43)	4.35 (2.43)
(Categorical) Range = 1–9				
Number of people dependent on income	4.59 (1.65)	4.62 (1.66)	4.15 (1.34)	4.87 (1.79)
Range = 2–10				
Adjusted annual household income	.79 (.97)	.66 (.88)	1.38 (1.03)	.57 (.89)
(Categorical income divided by # people)				
Familism	2.61 (.48)	2.57 (.46)	2.75 (.52)	2.56 (.44)
Range = 1–4				
Birthweight (continuous in grams)	3207.36 (639.69)	3092.20 (649.24)	3326.98 (644.54)	3315.52 (581.12)
Range = 453.59–5584.86				
Percent very low birthweight	2%	3%	1%	1%
Percent low birthweight	12%	15%	9%	7%
Percent normal birthweight	81%	80%	80%	84%
Percent macrosomic (large at birth)	7%	5%	11%	9%
Asthma expression (index)	.52 (1.42)	.67 (1.63)	.25 (.95)	.45 (1.29)
Range = 0–9				
Percent with asthma diagnosis by age 3	13%	15%	12%	8%
Asthma episodes by age 3	.13 (.40)	.17 (.46)	.06 (.27)	.11 (.37)
Range = 0–2				
Number of urgent care visits by age 3	.16 (.62)	.21 (.72)	.06 (.39)	.13 (.55)
Range = 0–5				

differences ($p < .001$) in familism were greatly reduced after accounting for lifespan FSEP. Specifically, familism was higher in White Americans as compared to African Americans and Latinos; an effect that was largely driven by higher lifespan FSEP among White Americans ($p < .001$).

Culture and intergenerational health

Results of hierarchical weighted least squares regression models predicting birthweight and AE are summarized in Tables 2 and 3. Findings supported the central study hypothesis that the cultural resource of maternal familism would directly affect health (i.e., birthweight and AE) net of its associations to ethnicity and lifespan FSEP, as well as other closely related biomedical and sociodemographic factors, including acculturation and parental marital status.

There was a strong positive association of maternal familism to birthweight, with every one-unit increase in maternal familism

resulting in a 71-g-increase in birthweight ($\beta = .06$, $p = .003$). No indirect effects of familism on birthweight were observed. The only significant interaction in this model was between White American (vs. non-White) ethnicity and lifespan FSEP. Specifically, birthweight advantages associated with higher lifespan FSEP were more pronounced for ethnic minorities than for White Americans ($\beta = .07$, $p = .009$), with ethnic minorities and White Americans of lower lifespan FSEP having identical average birthweight, but ethnic minorities of higher lifespan FSEP actually having higher birthweight than White Americans of higher lifespan FSEP. This finding is likely driven by Latinos given that lifespan FSEP did not interact with African American ethnicity alone.

Maternal familism was also a strong direct predictor of AE ($\beta = -.06$, $p = .001$). In addition, maternal familism interacted with lifespan FSEP, such that the benefit of maternal familism to AE in offspring was significantly greater for participants with lower lifespan FSEP compared to higher lifespan FSEP participants (illustrated in Fig. 3).

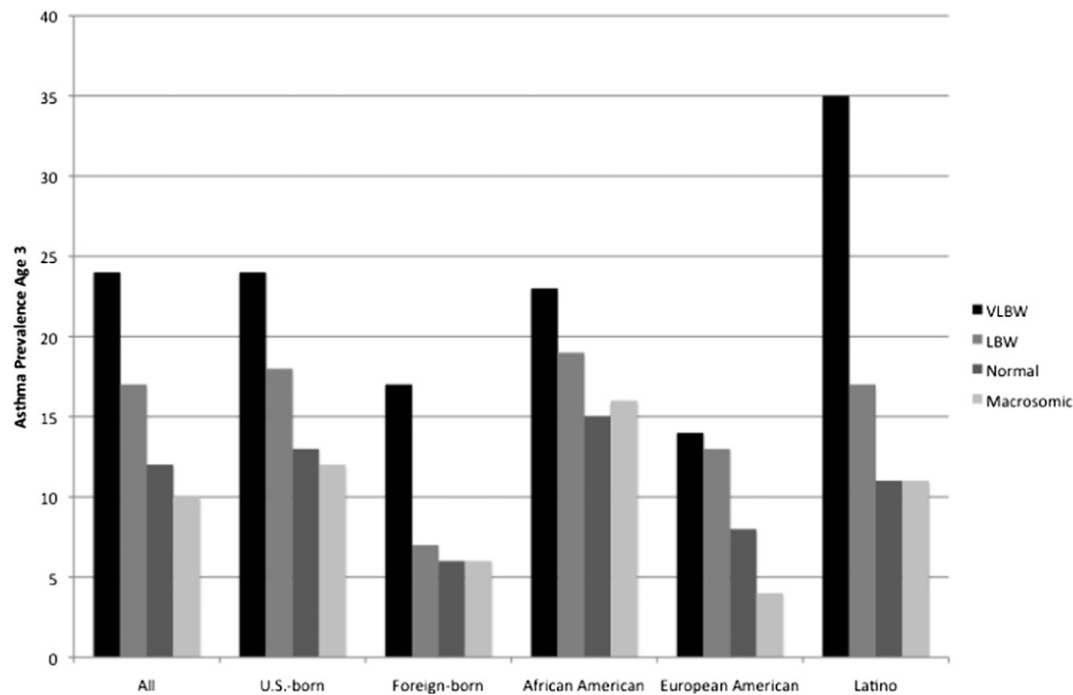


Fig. 1. Asthma prevalence by categorical birthweight in the sample overall and stratified by nativity and ethnicity.

Ethnicity, lifespan FSEP, maternal acculturation, being born to married biological parents, and infant sex were all associated with birthweight and AE in expected directions. Two findings in regression models predicting AE were counter to expectations: First, continuous birthweight did not emerge as a significant predictor of AE after adjusting for sociodemographic and biomedical controls. Second, a counterintuitive relationship between maternal biomedical risk and AE emerged, such that higher maternal biomedical risk predicted lower AE ($\beta = -.04$, $p = .043$). This relationship seems to reflect older age and greater likelihood of being primiparous among White American mothers, as discussed earlier, in the context of drastically lower asthma prevalence among White American children, which is as expected.

Discussion

Key findings

This research compared the cultural resource of maternal familism, ethnicity, and lifespan FSEP as predictors of birthweight and associated risk for childhood asthma expression ([AE] onset and severity) by age 3. As hypothesized, a 5-item measure of familism assessed in mothers at the birth of the focal child was associated with substantial variability in birthweight and in AE in offspring by age 3 independent of associations of familism to ethnicity and a comprehensive measure of lifespan FSEP in 4633 African American, White American, and Latino children born to

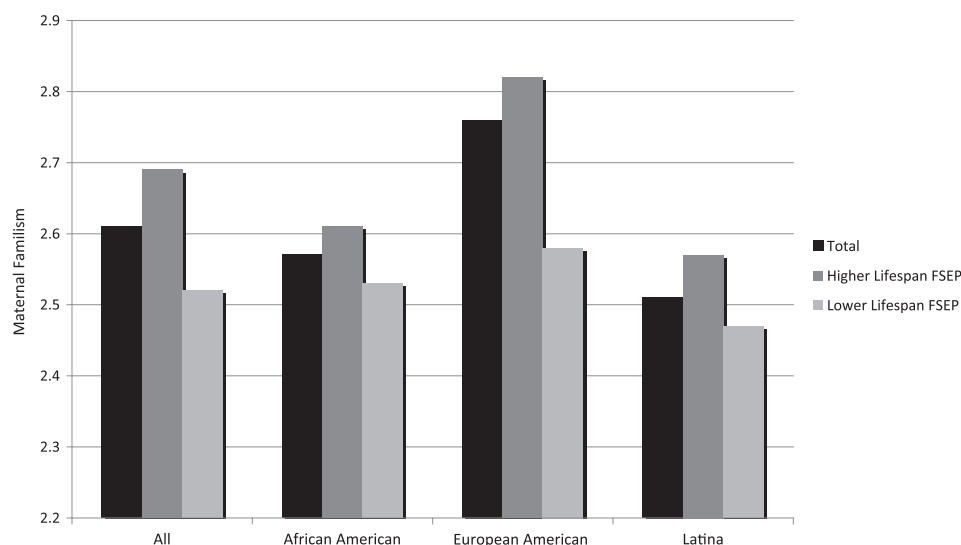


Fig. 2. Distribution of maternal familism by ethnicity and lifespan family socioeconomic position.

Table 2
Coefficients for effects on birthweight.

	Model 1				Model 2			
	B	Std. Error	β	Sig.	B	Std. Error	β	Sig.
African American (vs. Non-African American) ^a	–160.70	29.00	–.13	***	–153.51	30.09	–.12	***
White American (vs. Minority) ^b	14.57	33.70	.01		–11.06	34.89	–.01	
Maternal biomedical risk	–19.94	27.77	–.01		–23.01	27.79	–.01	
Maternal acculturation	–62.61	23.09	–.05	**	–61.48	23.65	–.05	**
Parents married at birth of focal child ^c	88.55	29.68	.06	**	67.97	30.46	.05	*
Infant sex (Female) ^d	–77.46	21.67	–.06	***	–79.41	21.66	–.06	***
Lifespan family socioeconomic position	9.36	3.87	.05	*	5.51	4.00	.03	
Familism	70.64	23.52	.06	**	67.59	24.57	.05	**
African American*Lifespan family socioeconomic position	–	–	–	–	–2.55	4.99	–.01	
White American*Lifespan family socioeconomic position	–	–	–	–	11.33	4.33	.07	**
African American*Familism	–	–	–	–	1.40	14.79	.00	
White American*Familism	–	–	–	–	2.57	13.53	.01	
Lifespan family socioeconomic position*Familism	–	–	–	–	.14	3.58	.00	
	N = 4633				N = 4633			
	F = 20.32***, R = .22, R ² = .05				FΔ = 3.34**, R ² Δ = .01			

* $p < .05$ ** $p < .01$ *** $p < .001$.^a Non-African Americans = 0, African Americans = 1.^b Ethnic minorities (African Americans and Latinos) = 0, White Americans = 1.^c Unmarried = 0, Married = 1.^d Male = 0, Female = 1.

predominately poor non-nuclear families. Observed effects of familism on birthweight and AE also accounted for maternal acculturation, marital status, and other relevant biomedical and sociodemographic controls. As hypothesized, familism was a positive predictor of birth outcome, with every one-unit increase in maternal familism resulting in a 71-g-increase in birthweight. Also consistent with hypotheses, higher endorsement of familism by mothers at baseline predicted lower AE in offspring three years later.

The standardized beta coefficients suggested that the effect of maternal familism on birthweight was not as strong as African American ethnicity or infant sex, but stronger than lifespan FSEP. In addition, the effect of maternal familism on birthweight was comparable to the effects of maternal acculturation and of being born to married biological parents. In contrast, the effect of maternal familism on AE by age three was stronger than that of ethnicity and of being born to married biological parents,

comparable to that of maternal acculturation, and just slightly weaker than that of lifespan FSEP and infant sex.

In addition to these direct independent effects on birthweight and AE, maternal familism interacted with lifespan FSEP, such that higher maternal familism eliminated the large disparity in AE among participants with lower lifespan FSEP. This interaction of maternal familism and lifespan FSEP lends support to our hypothesis that familism and other nonmaterial cultural resources are likely to be particularly important for health in the face of fewer material or other status-based resources (e.g., lower lifespan FSEP or ethnic minority status), resulting in reduced ethnic and/or socioeconomic disparities.

Familism

An important finding in the present study is that the cultural resource of maternal familism was differentially distributed by

Table 3
Coefficients for effects on asthma expression by age 3.

	Model 1				Model 2			
	B	Std. Error	β	Sig.	B	Std. Error	β	Sig.
African American (vs. Non-African American) ^a	.14	.07	.05	*	.13	.07	.05	+
White American (vs. Minority) ^b	–.13	.08	–.04	+	–.18	.08	–.06	*
Maternal biomedical risk	–.13	.06	–.04	*	–.12	.06	–.03	+
Maternal acculturation	.17	.05	.06	***	.16	.05	.06	**
Parents married at birth of focal child ^c	–.01	.07	–.00	+	–.06	.07	–.02	
Infant sex (Female) ^d	–.29	.05	–.10	***	–.30	.05	–.11	***
Birthweight (Continuous in grams)	.00	.00	–.02		.00	.00	–.03	
Lifespan family socioeconomic position	–.04	.01	–.09	***	–.05	.01	–.11	***
Familism	–.18	.05	–.06	***	–.19	.06	–.07	***
African American*Lifespan family socioeconomic position	–	–	–	–	–.02	.01	–.04	
White American*Lifespan family socioeconomic position	–	–	–	–	.00	.01	.01	
African American*Familism	–	–	–	–	–.03	.03	–.03	
White American*Familism	–	–	–	–	–.04	.03	–.04	
Lifespan family socioeconomic position*Familism	–	–	–	–	.03	.01	.07	***
	N = 4633				N = 4633			
	F = 17.64***, R = .22, R ² = .05				FΔ = 4.00***, R ² Δ = .01			

* $p < .05$ ** $p < .01$ *** $p < .001$ + $p < .10$.^a Non-African Americans = 0, African Americans = 1.^b Ethnic minorities (African Americans and Latinos) = 0, White Americans = 1.^c Unmarried = 0, Married = 1.^d Male = 0, Female = 1.

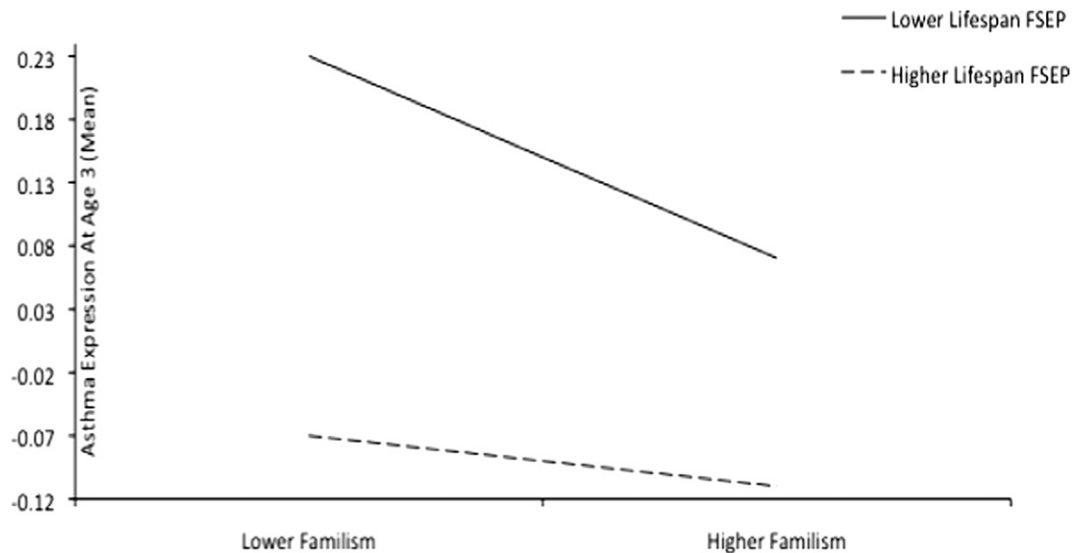


Fig. 3. Asthma expression by age three predicted by the interaction of lifespan family socioeconomic position with maternal familism.

ethnicity in ways that might initially seem counter to popular notions of independence (vs. interdependence) in particular ethnic groups (e.g., Almeida, Molnar, Kawachi, & Subramanian, 2009). Although such popular notions are, in and of themselves, under debate (Oyserman et al., 2002a), it is clear that ethnic differences in familism observed in the present study were largely driven by lifespan FSEP. This finding is consistent with study predictions and previous work by our research team demonstrating that the availability of cultural and other nonmaterial resources covaries with the availability of material and other status-based resources (Abdou et al., 2010). This pattern is also consistent with findings in the extant literature that impoverished contexts pose challenges to family functioning and familial obligations more specifically (McLoyd, 1998).

Several pieces of evidence point to the underlying socioeconomic patterning of familism in creating observed ethnic differences in this study. For instance, there were significant ethnic differences in the extent to which higher FSEP yielded increases in familism. This pattern likely reflects relative disadvantage even within the lower and higher lifespan FSEP subsamples. Lending support to this explanation, ancillary analyses (not shown) demonstrated significant ethnic differences in lifespan FSEP, not just in the sample overall, but *within* the lower and higher lifespan FSEP strata (based on median split) as well. Within the lower lifespan FSEP subsample, Latinos had lower lifespan FSEP than African Americans and White Americans; whereas, within the higher lifespan FSEP subsample, White Americans had higher lifespan FSEP than African Americans and Latinos (all p s < .001). In fact, within both the lower and higher lifespan FSEP subgroups, relative disadvantage—both in terms of mean lifespan FSEP levels and the range of FSEP represented—followed a pattern identical to maternal familism, with White Americans being relatively better off, Latinos being relatively worst off, and African Americans falling in between, although hovering much closer to Latinos than to White Americans.

The complexity of this picture is suggestive of additional indirect pathways at work beyond the scope of this study that determine the availability of both material (e.g., lifespan FSEP) and nonmaterial (e.g., familism) resources in this sample as well as within the general population, which ultimately affect health processes and outcomes across multiple generations. The nuanced relationships among familism, ethnicity, and lifespan

FSEP revealed in this study highlight the force that contextual and situational constraints can exert on individual beliefs and relational styles (Berkman, Glass, Brissette, & Seeman, 2000) that are commonly taken to reflect broader cultural orientations or worldviews. This issue also furthers the case for studying the constructs of culture, ethnicity, and social class conjointly to untangle their effects, rather than using them as proxies for one another. In a similar vein, it underscores the need to examine cultural variability within ethnic and socioeconomic groups, as opposed to taking cultural homogeneity as given within these broad social groupings.

Notably, however, interactions of familism with ethnicity or lifespan FSEP did not emerge in regression models predicting birthweight. This suggests that, although endorsement of familism may be bound by the contextual factors common to certain ethnic or socioeconomic groups, its benefits to birthweight are not. Whereas all ethnic and socioeconomic groups benefitted equally in terms of higher birthweight from the cultural resource of familism, the positive impact of familism on AE was stronger among participants with lower lifespan FSEP. Consistent with our prior work (Abdou et al., 2010), this finding suggests that nonmaterial resources—although less likely to be present in the face of insufficient material resources—exert a stronger effect when present under such conditions.

Limitations

This study is limited in that it evaluated a narrow definition of maternal familism. The familism measure consisted of just five items and assessed only the familial obligation dimension of familism, leaving out other critical dimensions of familism, including family as referents and perceived familial support. Notably, however, the brevity of the scale—combined with its focus on what might be considered the least appealing aspect of familism (i.e., obligation)—likely resulted in conservative estimates of the health benefits of maternal familism and nonmaterial cultural resources in general.

It is also important to note that studies of the familial obligation dimension of familism have been least likely to produce popularly-expected ethnic differences in familism, particularly when accounting for key moderators, including SEP, sex, and acculturation (Steidel & Contreras, 2003). We considered this lack of ethnic

specificity a strength of this familism measure for the purposes of the present study. In particular, this should have served the larger objective of conceptually and, critically, operationally distinguishing the construct of ethnicity from the construct of culture. This, similarly, allowed for investigation of the independent and synergistic contributions of individual-level (e.g., familism) and group-level (e.g., ethnicity) factors to health across multiple generations.

One additional consideration related to the measurement of familism in the present study is that the distribution of familism along lifespan FSEP, and thus ethnic, lines may reflect important reality differences that shape endorsement of beliefs about familial obligation in mothers. Due to unfavorable marriage and partnering markets, it may be a highly realistic assessment in the case of the poorest women in our sample that, for example, “single moms can do just as well as married parents” (Treas & Lawton, 1999). The inclusion of marital status (as well as ethnicity and lifespan FSEP) in predictive models was intended to statistically address the anticipated influence of the realities of mothers’ relationship status and/or perceived prospects on endorsement of familism. The sampling strategy of including mostly (76%) unmarried families, by design, does a great deal to address this issue as well.

Strengths and contributions

This study is among the first to examine the unique and synergistic contributions of ethnicity, lifespan FSEP, and the cultural resource of maternal familism to two important health outcomes that span multiple generations: namely, the proximal birth outcome of infant birthweight and the potentially associated distal outcome of asthma onset and severity (i.e., asthma expression) in offspring three years later. Several aspects of the FFCWBS design strengthened this analysis. The FFCWBS intentionally oversampled unwed and socioeconomically disadvantaged families within each ethnic group and, thus, gave considerable attention to measurement of FSEP. Therefore, by design, the study does a good deal to control for the systematic unequal distribution of lifespan FSEP by ethnicity. This afforded some greater clarity in terms of disentangling the health effects of ethnicity, culture, and lifespan FSEP.

Conclusion

The present findings have considerable theoretical and methodological relevance to diverse disciplines, including social epidemiology, population health, cross-cultural psychology, and human development and aging. A primary contribution of this study is that it demonstrates the importance of distinguishing, not just conceptually but also operationally, the construct of culture from the related constructs of ethnicity, acculturation, and socioeconomic context. Direct examination of cultural factors, and how they interact with sociodemographic and other contextual factors, highlights important sources of within-group variability and provides a more nuanced understanding of health disparities and how they might be reduced, particularly in resource-poor environments. These findings may suggest demand for individual- and community-level interventions that promote health across multiple generations through maintenance or cultivation of nonmaterial resources. Future research consisting of quantitative and qualitative data collection methods, comprehensive measures of culture, and larger, disaggregated ethnic subgroups, is needed to advance knowledge of cultural determinants of health as well as the related theoretical and measurement issues discussed throughout this paper. Future research is also needed to evaluate the applicability of findings, such as those of the present study demonstrating the capability of nonmaterial cultural resources to

reduce health disparities, to diverse contexts and populations elsewhere in the world, including within the context of developing-world poverty as well as contexts in which lower social status is associated with threats to livelihood in addition to unfair treatment and systematic disadvantage.

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