

**FINAL COMPREHENSIVE REPORT
THE MATERNAL AND CHILD HEALTH RESEARCH PROGRAM**

Variations in the Relationship among Maternal Depression, Contextual Factors, and Child development
by Race/Ethnicity and Nativity: Findings from Nationally Representative ECLS-B Study

I. Introduction

I.A. Nature of the research problem

Focusing on a cohort of US mothers, the proposed study examined the maternal (nativity, social-economic) factors and contextual (family-, community-) factors on child's physical (obesity) and social (attachment) development. Specifically we reported on the following topics: 1) trend of maternal depression among mothers of different race and nativity background (*manuscript 1*), 2) maternal depression, maternal sensitivity, and child attachment security for Asian and Hispanic American mothers and how these associations vary by mothers' nativity status (*manuscript 2*), 3) childhood obesity among Asian Americans (*manuscript 3*), and 4) association between non-resident father's participation and overall child development among children born to teenage mothers (*manuscript 4, working paper*).

I.B. Purpose, scope, and methods of the investigation

The secondary analysis were conducted using 3 waves (at 9-months, 2 years, and 4 years) of the Early Childhood Longitudinal Study - Birth Cohort data. As a nationally representative, longitudinal dataset that emphasizes the study of immigrant families, ECLS-B provides a valuable resource for exploring research questions regarding contextual influences as mediators/moderators of maternal depression and social-emotional development of immigrant children in the US.

I.C. Nature of the findings

The main finding includes: 1) The association between maternal depression, sensitivity, and child attachment are culturally specific; 2) Variations exist among racial and ethnicity groups in chronic and acute maternal depression prevalence and child obesity prevalence; 3) Non-residential father's participation did not shown to be associated with early child development of children born to teenage mothers.

II. Review of the Literature

Maternal depression and child development:

Decades of research show that maternal depression is among the most consistent risk factors for childhood anxiety and disruptive behavior disorders [1, 2]. Infants and toddlers of depressed mothers can develop serious emotional disorders such as infant depression and attachment disorders [3]. Older children of mothers who were depressed during the child's infancy are also more likely to exhibit poor self-control, aggression, poor peer relationships, and difficulty in school [4]. Increasingly, the contextual factors at family-, neighborhood-, and community-levels accompanying parental depression have been viewed as exerting influences on the developing child [5]. However, there is a lack of knowledge on how these contextual factors moderate or mediate the impact of maternal depression in immigrant families.

Immigrant families:

Collectively, the percentage of children living in the U.S. with at least one foreign-born parent rose from 15% in 1999 to 20% in 2002 [6]. Today's children of immigrants also represent a wide range of linguistic and cultural/ethnic backgrounds, with 84% of children from immigrant families that have origins in either Latin America or Asia [7]. Studies have shown that the dynamics of the immigration experience have served as both protective and risk factors for the mental health of immigrant women [8]. Meanwhile, immigrants are less likely than non-Hispanic whites to use mental health services. For example, when specialty mental health care is received, Asian Americans tend to be more distressed

than other racial/ethnic groups [9-12]. This is particularly relevant to maternal depression where the incidence is high, yet the majority of cases go undetected or untreated [13]. Therefore it is essential to describe the role of protective resources in immigrant families, including cultural values, household composition, and coping skills that may buffer the effects of maternal depression and other adverse event.

Childhood obesity among Asian Americans

According to the U.S. Census Bureau, Asian Americans currently make up about 5% of the population and are projected to increase to 8% or higher by 2050.^{5,6} In addition, as the U.S. population grows, the percentage of children belonging to ethnic minorities is expected to increase disproportionately.⁷ In the midst of an epidemic of childhood obesity with far-reaching implications for the nation's health and economy,⁸ it is thus increasingly important to understand which children of Asian origin are at particular risk of becoming obese and suffering from the consequences of obesity during childhood and adulthood. It is particularly critical to understand obesity risk in young children, before obesity and poor habits become irreversible and when parents are most influential.^{9,10} In addition, if some subgroups of children seem relatively protected from weight gain despite living in an obesity-promoting environment, their eating and activity behaviors may point toward feasible and successful strategies for preventing obesity more broadly. Until recently, national surveys have not included large enough samples of Asian American children for meaningful analysis of obesity risk by Asian ethnicity (country of origin). The Early Childhood Longitudinal Study—Birth Cohort (ECLS-B) is a nationally representative, longitudinal study of children born in the U.S. in 2001 which over-sampled Asian American young children, thus enabling analysis of obesity prevalence by Asian country of origin. Using the ECLS-B, we estimated the prevalence of obesity among young Asian American children by their mothers' Asian ethnicity, generational status, and family socioeconomic factors.

III. Study Design and Methods

III.A. Study Design

The data used in this study are derived from the first (9-months), second (24-months), and third (4 years) waves of the Early Childhood Longitudinal Study – Baseline Cohort (ECLS-B). The ECLS-B is a multi-source, multi-method study that focuses on the early home and educational experiences of a nationally representative cohort of children born in 2001 (National Center for Education Statistics, 2007). The utility of the ECLS-B was enhanced by over-sampling American Indian, certain Asian and Pacific Islander ethnic groups, twins, and low birth weight populations. Its sample size was designed to produce survey estimates with specific precision targets representative of both the overall child population of the U.S. in 2001, and for the following race/ethnicities: American Indian, Chinese, Other Asian or Pacific Islander, Hispanic, non-Hispanic Black, and non-Hispanic White. Thus, the ECLS-B study provides us with an unprecedented opportunity to study unique developmental processes within minority racial/ethnic groups.

III.C. Sample selection

Subjects were excluded from the current analyses if (a) the respondent for both parent interviews (wave I and II) was not the child's biological or foster/adoptive mother; (b) the child attachment measure (wave II) was not available; or (c) mother's race/ethnicity and nativity status was not US-born non-Hispanic White, US-born Non-Hispanic Black, Hispanic, or Asian. Few participants (1.0% of wave I, 2.2% of wave II) were excluded because the parent interview was not completed by the mother, thus making it impossible to assess maternal depression or maternal sensitivity. In addition, 4.1% of children were excluded from the study due to missing the attachment assessment at 24 months, and 9.9% were excluded because mothers did not belong to any of the race/ethnicity groups of interest in this study. As a result, approximately¹ 8,300 mother-child pairs (84.2% of those who participated in wave II) were

¹ NCES requires that all unweighted sample sizes be rounded to the nearest 50.

included in this study. This study was approved by the Institutional Review Board of Georgetown University.

III.D. Instruments used

Child attachment. Child attachment was measured using the Toddler Attachment Sort-45 instrument (TAS-45), a modified version of the Attachment Q-Sort (AQS), which is a commonly used observational measure of children's attachment style. Maternal depression. At wave I (9 months) the ECLS-B included a modified 12-item version of the *self-report CES-D*, which was validated in the Head Start Family and Child Experiences Survey (FACES)(Administration for Children and Families, 1997). In wave II (2 year) the ECLS-B survey switched to using the *Composite International Diagnostic Interview Short Form Instrument* (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998) developed for use in the National Health Interview Survey (NHIS) to evaluate psychiatric diagnosis according to the definition and criteria of the DSM-IV (American Psychiatric Association, 1994). Maternal sensitivity. Mother-child interaction quality was measured using the Two Bags Task rating system applied to a 10-minute video-taped, semi-structured parent-child interaction. Child obesity was measured by US CDC standardized BMI for children. Non-residential father's participation was based on answers from the non-residential father questionnaire.

III.E. Statistical techniques employed

SUDAAN software (Shah, Barnwell, & Bieler, 2001) was used to generate all parameter estimates and related standard errors which account for the complex sample design involving stratification, clustering and multi-stage sampling. Weighted frequencies on demographic characteristics as well as the prevalence of maternal depression and insecure attachment are presented accompanied with their 95% confidence intervals (calculated from standard errors) stratified by race/ethnicity and nativity group.

IV. Detailed Findings

1. Variation in Maternal Depression and Child Attachment by Mothers' Race/ethnicity and Nativity.

U.S.-born non-Hispanic Black mothers are the most likely to have more severe depression symptoms at 9 months (wave I). There is a significant difference in rates of depressive symptoms by nativity status at 9 and 24 months for Hispanic mothers but not Asian mothers, with Foreign-born Hispanics being less likely than their U.S.-born counterparts to experience depression. Longitudinal patterns of depression indicate that non-Hispanic Black mothers are most likely to have chronic depression. There are no other significant differences in the prevalence of depression patterns by race/ethnicity or nativity.

When observer ratings of 2 year-olds were used to classify children's attachment styles, U.S.-born Asian mothers were most likely to have children with a secure attachment style, while a significantly lower percentage of children of foreign-born Asian mothers had secure attachment. Interestingly, however, nativity showed the opposite pattern within the Hispanic population, with a significantly higher percentage of children of Foreign-born mothers exhibiting a secure attachment style compared to children of U.S.-born Hispanic mothers. Among insecure attachment types, U.S.-born Hispanic mothers were most likely to have children with disorganized attachment, and children of U.S.-born Black mothers were most likely to be classified with avoidant attachment.

2. Relationship of Maternal Depression and Sensitivity to Child Attachment Style

Family income, maternal education, and childcare arrangement were independently and significantly associated with child attachment style. Relative to families with the highest income, children whose family income was in the lowest quintile were 61% more likely to be insecurely attached (OR=1.61, 95% CI=1.24-2.010). The lower the level of education mothers attained, the more likely their children were to be insecurely attached. Children whose mothers didn't finish high school were twice as likely to be insecurely attached (OR=1.99, 95% CI=1.42-2.78) compared to those whose mothers

attended graduate or professional school. Children in relative care were 25% more likely to be insecurely attached (OR=1.25, 95% CI=1.04-1.49) than children in parental care only.

When maternal depression pattern was added to the model, the effects of demographics remained the same, and maternal chronic depression exhibited a significant association with child attachment. Children of chronically depressed mothers were more than twice as likely to be insecurely attached than children whose mothers were never depressed (OR=2.15, 95% CI=1.03-4.47). Maternal sensitivity reduced the significant effect of maternal depression and contributed to a 23% reduction in risk for insecure attachment (OR=0.77, 95% CI=0.71-0.83). Results of a one-way ANOVA (not shown) revealed significant differences in maternal sensitivity by depression pattern with mothers who were never depressed having the highest scores, and mothers who experienced depression at 9 months only rated lowest on sensitivity. This set of findings meets criteria for mediation in that maternal depression was significantly associated with lower maternal sensitivity and higher rates of child insecure attachment; lower maternal sensitivity was also associated with child insecure attachment; and the association between maternal depression and child insecure attachment was reduced to non-significance once maternal sensitivity was added to the model.

3. Variations in Associations among Maternal Depression, Sensitivity and Child Attachment Style by Mothers' Race/Ethnicity and Nativity.

Family demographics and childcare arrangement did not significantly predict child insecure attachment for either Hispanic or Asian mothers. The results also indicated that nativity status had opposite effects within these racial/ethnic groups. Among Hispanic mothers, those who were Foreign-born were 31% less likely than U.S.-born mothers to have a child who was insecurely attached (OR=.69, 95% CI=.51-.95), whereas Foreign-born Asian mothers were more than twice as likely to have an insecurely attached child (OR=2.65, 95% CI=1.70-4.11) compared to their U.S.-born counterparts.

Maternal depression was significantly associated with child attachment security for Hispanic but not Asian mothers. Surprisingly, Hispanic mothers who experienced later onset depression were almost 70% less likely to have insecurely attached children than Hispanic mothers who were never depressed (OR=.32, 95% CI=.12-.88). There was also evidence of the hypothesized risk of Hispanic mothers' chronic depression for child insecure attachment, but this association was reduced to non-significant when maternal sensitivity, also a non-significant predictor, was added in the final model.

For Hispanic mothers, there was no significant difference in maternal sensitivity across maternal depression patterns, $F(3, 1024) = 1.14$ ($p=.33$). Although non-significant, probably due to skewed sample sizes across depression groups, there was a trend suggesting Hispanic mothers who were chronically depressed exhibited less sensitivity ($M=4.07$, $SD=.45$) than those who were classified as never depressed ($M=4.48$, $SD=.04$). Taken together, these findings do not support the hypothesized mediation among Hispanic mothers because maternal depression was not significantly associated with maternal sensitivity, which was not significantly associated with child insecure attachment.

On the other hand, maternal sensitivity significantly protected children of Asian mothers from insecure attachment (OR=.62, 95% CI=.48-.80). An ANOVA testing differences in maternal sensitivity by depression pattern among Asians was non-significant, $F(3, 715) = .71$ ($p=.51$), probably due in part to the small number ($n=2$) of chronically depressed Asian mothers with maternal sensitivity data. For Asian mothers, there was no evidence of mediation because maternal depression did not significantly predict child insecure attachment or maternal sensitivity.

Finally, we tested whether nativity status moderated the associations of maternal depression and maternal sensitivity with child insecure attachment (results not shown). Interaction terms for nativity x never depressed and nativity x maternal sensitivity were entered simultaneously in a fifth model of the logistic regressions in Tables 4 and 5. Neither of these interaction terms were significant for Hispanic or Asian mothers. Thus, there was no evidence that nativity moderated the associations between Hispanic or Asian mothers' depression, sensitivity, and child insecure attachment.

4. Variations in child obesity and overweight prevalence among different Asian ethnic groups and generation status.

Obesity prevalence by Asian Ethnicity

Twenty-six percent of Asian American 4-year olds are obese or overweight, and 13% are obese according to current U.S. standards. Although Asian American children overall were at lower risk of obesity and overweight compared to Whites, there was considerable variation by Asian ethnicity. The prevalence of both obesity and overweight among Whites was 18% (each), with 36% of White 4 year olds either overweight or obese and only 26% with BMI's below the 50th percentile for age and gender (Table 2). Among Asians, Chinese American children were at significantly lower risk of overweight or obesity (23.5%) compared to Whites, and Indian American children were the least likely to be overweight or obese (15.6%). At 35%, Vietnamese American children approached the prevalence of obesity and overweight seen among Whites; they also exhibited the highest prevalence of obesity at 24%, though not statistically significantly different than Whites. Asian American children overall were more likely than Whites to be underweight. In particular, Asian Indian children were the most likely to be underweight with a prevalence of 10%. In the bivariate analysis of Asians alone (Table 3), rates of obesity and overweight did not differ significantly among children of different Asian ethnicities.

Generational effects

The bivariate analysis in table 2 shows that, when Whites and Asian Americans are considered together, a child whose mother was foreign born is *more* likely to be obese or overweight compared to children of U.S. born mothers (40% vs 34%). Among Asian Americans only (Table 3), there is no significant association between mothers' nativity status and child's risk of overweight and/or obesity according to the bivariate analysis.

Socioeconomic status and overweight or obesity

When considering Asian American and White children together, higher levels of maternal education confer protection from obesity and overweight. Children of mothers with less than a high school education had the highest rates of obesity or overweight (44.3%). Similarly, the families at the highest income levels had a significantly lower risk of obesity and overweight compared to those living below 100% poverty. Similar trends were seen for Asians alone (Table 3), though small numbers of children in each subgroup limited the stability and statistical significance of the results.

Multivariate analysis of risk for obesity among Asian American children

Results of the multivariate analysis are shown in Table 4 with Chinese American children as the reference group because they constituted the largest Asian American sub-sample in the ECLS-B. Compared to Chinese American 4 year olds, Vietnamese American and Other Asian/ Pacific Islanders were at increased risk of obesity. Other Asian/Pacific Islanders' heightened odds ratios lessened slightly after controlling for mother's nativity status and family socioeconomic factors, but Vietnamese American children and Other Asian/Pacific Islander American children remained at triple and double the risk compared to Chinese American children, respectively. Across Asian ethnicities, having a mother who was *not* born in the US was protective against the development of obesity; i.e. the risk of obesity among second generation Asian American children was almost half that of higher generations when controlling for Asian ethnicity, maternal education, and household poverty status. In addition, an Asian American mother with less than a high school education had more than double the risk of her 4-year old being obese compared to the reference group of mothers with post-bachelor's education. Unlike maternal education level, family poverty status was not an independent predictor of obesity risk for Asian American children. We added interaction terms between Asian ethnicity and mothers' nativity status in a fourth step of the model (results not shown), but no interaction terms proved statistically significant. Similar multivariate analyses were performed for the outcome of overweight or obese (BMI \geq 85th %ile for age and gender) resulting in similar trends that were not statistically significant (data not shown but available upon request).

V. Discussion and Interpretation of Findings

V.A. Conclusions to be drawn from findings

1. Maternal depression and child development

As the first report on the prevalence of maternal depression patterns and insecure child attachment among White, Black, Hispanic and Asian Americans, and first study to explore the associations among maternal depression, maternal sensitivity, and child attachment, by mothers' nativity status, we found that the prevalence of child attachment insecurity varied by mothers' race/ethnicity and nativity status. Among the full sample of mothers, we found evidence that decreased maternal sensitivity mediates the association between chronic depression and child insecure attachment; however, stratified analyses of Hispanic and Asian mothers did not support the hypothesized mediation. Instead, subgroup analyses revealed distinct implications of mothers' nativity status for child attachment within these two racial/ethnic groups.

Overall, children of U.S.-born Hispanic and U.S.-born Black mothers were least likely to be securely attached, and children of U.S.-born Asian mothers were most likely to be securely attached. Mothers' nativity status was significantly associated with child insecure attachment among both Hispanics and Asians; however, the directions of the relationship were opposite. Mothers' foreign-born status was protective against insecure child attachment for Hispanic mother but was a risk factor for Asians.

In addressing our second research question regarding the association between maternal depression and insecure child attachment, we found that in the full sample chronic depression was a significant risk factor even after accounting for other socio-demographic risk factors (i.e., less than \$20,000 annual income, less than a post-bachelors degree, relative childcare). Children whose mothers were depressed at both 9 and 24 months were twice as likely to be categorized as insecurely attached relative to children whose mothers were not depressed at either wave. This finding corroborates other reports that chronic depression in particular is a risk factor for insecure attachment (Toth et al., 2006). There was also a significant protective effect of maternal sensitivity, which accounted for a small portion of the variance in child attachment explained by maternal depression. Maternal depression, particularly chronic depression, was significantly associated with less maternal sensitivity, further supporting previous assertions that maternal sensitivity mediates the association between maternal depression and child insecure attachment (NICHD Early Child Care Research Network, 1999; Tomlinson et al., 2005).

Our results suggest that the risk of child insecure attachment associated with chronic maternal depression for Hispanic mothers is much higher than for Asians. In fact, the risk of insecure attachment for children of depressed Hispanic mothers is eight times that of children born to non-depressed Hispanic mothers once socio-demographics including mothers' nativity status are controlled. Also contrary to results among Asians, for children born to Hispanic mothers, mothers' nativity showed a relatively small, yet significant protective effect. Taken as a whole, these findings suggest that mothers' immigration status is a stronger risk factor than depression for insecure child attachment among Asian Americans. Whereas, for Hispanic Americans, mothers' immigration status is somewhat protective, and chronic maternal depression is a strong risk factor.

An important similarity in findings across these racial/ethnic groups is that mothers who experienced depression at 9 months only were no more likely to have children who were insecurely attached than mothers who never experienced depression. This finding replicates results from Campbell and colleagues' (2004) report based on the NICHD Study of Early Childcare. These authors suggest that mothers' whose depression symptoms decrease or resolve early in their children's lives may be more sensitive on average over time than mothers who are chronically depressed. Results of one-way ANOVAs among Hispanic and Asian mothers tend to support this proposition, yet sample size constraints limited power to detect significant differences. Future research is needed to determine how timing of depression affects mothers' abilities to be sensitive towards their children (Campbell et al., 2004) and how these processes may differ cross-culturally.

With regard to maternal sensitivity, we found that it significantly reduced the odds of Asian American children being insecurely attached by more than half. Maternal sensitivity was also protective for children born to Hispanic American mothers, but the odds ratios were not significant. Some researchers have raised questions about the cross-cultural validity of the link between maternal sensitivity and secure child attachment. On one hand, this association has been documented in other cultures such as Colombians (Posada et al., 2002) and the Dogon ethnic group in Mali (True et al., 2001). On the other hand, researchers have argued that maternal sensitivity is culturally constructed. For example, Carson and Harwood (2003) assert that traditional definitions of maternal sensitivity focus on warmth and responsiveness, and following the child's lead. However, in cultural groups that strongly value interdependence over individual autonomy, and respectful behavior of children, the concept of maternal physical control and strong limit-setting is an important component of maternal sensitivity. In fact, they found that high physical control was associated with secure attachment in Puerto Rican mother-child dyads, but was associated with insecure attachment in Anglo dyads. These authors and others (Rothbaum et al., 2000) do not dispute the underlying theory about the importance of maternal sensitivity as an antecedent of attachment, but rather assert that the meaning, and therefore the measurement, of maternal sensitivity must vary across cultures. This argument may in part explain our finding that maternal sensitivity was not significantly associated with child attachment security among Hispanic Americans, a group that is itself ethnically diverse.

Furthermore, our hypothesis that maternal sensitivity explains the association between maternal depression and child insecure attachment was not supported for Hispanic or Asian mothers, despite corroborative results in the full sample. Instead, the findings for Hispanic and Asian American mothers more closely align with the assertion of Campbell and colleagues (2004) that maternal depression and decreased sensitivity operate as a "dual risk" for child insecure attachment because the odds of Asian and Hispanic American children being insecurely attached were lowest when mothers were not depressed and were more sensitive. Campbell et al. (2004) found that preschoolers (36 months old) of depressed mothers, particularly those who had experienced elevated depressive symptoms across the 6- to 36-month study period, only experienced increased risk of insecure attachment relative to never-depressed mothers if the mother also exhibited below average sensitivity. Because the focus of our paper was on potential variation in the mediational process across racial/ethnic groups, we did not explore the interaction between maternal depression and sensitivity in predicting child attachment, yet this is a fruitful next step in this line of research.

Finally, we did not find evidence that mothers' nativity significantly moderated the associations of maternal depression and sensitivity with child attachment. There were notable differences in the prevalence of maternal depression and child insecure attachment based on mothers' nativity, as noted above, but nativity did not influence the extent to which maternal depression or sensitivity was associated with child attachment. This finding suggests that the process by which maternal depression, sensitivity and child attachment are linked do not vary based on mothers' immigration experiences, but instead the implications of immigration depend on the culture from which mothers come. More detailed information about acculturation and generational status may better elucidate the potentially interactive effects of race/ethnicity and nativity.

2. Childhood obesity among Asian mothers.

Most young Asian American children have a lower prevalence of obesity (12.5%) and overweight (13.7%) compared to other racial/ethnic groups in the U.S., but estimates for Asian American children as a group, like those for Asian American adults and adolescents, obscure a great deal of biological and cultural heterogeneity within the "Asian" designation. Furthermore, despite being at lower risk compared to Whites, Asian American children are still at substantial risk of obesity and overweight even as early as the preschool ages. The prevalence of obesity and overweight is high among Vietnamese American young children, resembling rates seen in White children. At age four, Vietnamese American children have more than triple the risk of obesity compared to Chinese American children, even after controlling for maternal education, household poverty status, and mothers' nativity status, a proxy for child generational status. Children who fall into the "Other Asian/ Pacific Islander" designation are also

at elevated risk although this remains a category that subsumes small numbers of children from diverse backgrounds.

This study found that preschool-age Asian Indian children have the lowest prevalence of obesity and overweight, and the highest rates of underweight. Indian and Chinese American children have significantly lower rates of obesity and overweight compared to Whites. A national study of adolescents reported lower rates of obesity among Chinese and Filipino teens compared to Whites, and higher rates for other Asians.¹⁷ However, previous nationally representative studies were not able to distinguish between Asian subgroups besides Chinese and Filipinos, precluding comparisons among Asians.

Irrespective of Asian ethnicity, generational status itself was a strong predictor of risk of obesity; in contrast to Whites, Asian American young children were protected from becoming obese if their mothers were born outside the U.S. To our knowledge, this is the first study to show that maternal immigrant status can protect children from becoming obese even in the first few years of life irrespective of Asian ethnicity, maternal education, and household poverty status.

V.B. Explanation of study limitations

1. Maternal depression and child development

By presenting data on a nationally representative sample of children, this study makes important contributions to the literature on cross-cultural patterns of maternal depression, sensitivity and child attachment. However, there are a few limitations of the data that must be considered when drawing inferences from our results. First, maternal depression was measured using two different screening tools, which do not necessarily reflect clinical diagnosis, and mothers' experiences with depression prior to 9 months and during the interim period before 24 months were not assessed. Being diagnosed and/or treated for clinical depression, experiencing postpartum depression prior to 9-months, or experiencing depression up to but that remits before 24 months may have stronger and more distinct implications than the patterns of depression we could categorize with the available data. Also, being in treatment for depression may ameliorate the effects on mothers' sensitivity, explaining the insignificance of this association in our results. Second, there are inherent sampling biases in any large survey studies despite concerted efforts to recruit representative samples. For example, participating foreign-born Asian mothers may be a select sample of those who were comfortable responding to telephone recruitment calls. This may in part explain why there were so few chronically depression Asian mothers, which hindered some of our stratified analyses.

Finally, as discussed above, the cultural validity of the measures used to assess maternal depression, sensitivity, and child attachment security may not be equally valid across racial/ethnic and nativity groups. However, the Attachment Q-Sort has been validated in both Asian (Chaimongkol & Flick, 2006) and Latin American (Posada et al., 2002) samples. While the current study in part addresses the cross-culturally validity of presumed associations between these constructs, it is an overview.

2. Childhood Obesity Among Asian American study

Although the ECLS-B over-sampled Asian Americans allowing for differentiation of risk by Asian ethnicity to a greater degree than other studies, the numbers of Asian American children were still too small to allow for more detailed multivariable analysis or stratification by important variables such as parents' weight status. Thus, though similar trends were seen for risk of overweight as for obesity, results did not reach statistical significance for the former. Furthermore, selection bias may have affected the results. Chinese children were overrepresented, for example, allowing for more stable estimates of outcomes and variables for Chinese Americans compared to other Asians. As phone messages were used to recruit participants, families with landlines were overrepresented, potentially skewing the results toward families of higher socioeconomic status although telephone coverage bias has not been shown to alter estimates of the variables of interest.²⁵ Furthermore, the main outcome variable of child's weight status was derived from direct measurements and the main independent variable of mother's ethnicity corroborated from birth certificates.

Perhaps the main limitation of the current study was the use of maternal race/ethnicity for the child's ethnic classification and maternal birthplace as a proxy for the generational status of the child. In our data, 8% of children were missing information on fathers' ethnic classification. Of those with father data, seventy-four percent of Asian American children's parents were of the same ethnicity, although this also varied by mothers' Asian ethnicity. Asian Indian children were very likely to have parents of the same ethnicity at 97%, while only 27% of Japanese American children had both a Japanese mother and father. Including children with one Asian parent in the Asian American sample may have skewed results toward more similarity with Whites as most of the unmatched fathers were White.

V.C. Comparison with findings of other studies

1. *Maternal depression and child attachment study*

The association between mothers' nativity and child attachment may reflect cultural differences in the validity of the attachment construct. There is considerable controversy in the attachment literature about the validity of attachment as a universal, cross-cultural construct. Bowlby (1969) originally posited that attachment is a universal phenomenon that has an evolutionary basis. More recent researchers, particularly Rothbaum and colleagues (Rothbaum et al., 2000), have disputed that assertion, arguing that core components of attachment theory are based on Western values and conceptions of caregiving, and are not necessarily applicable across cultures. However, in their review of cross-cultural attachment research, van IJzendoorn and Sagi (1999) argue that, while specific behaviors may vary, the basic patterns of attachment and the predominance of secure attachment are found in studies across disparate cultures, and they conclude that attachment theory is universally valid. Even more recent studies among economically disadvantaged families in developing countries such as Mali, South Africa, and Indonesia have found secure attachment in the majority of children assessed, as well as a relationship between maternal caregiving and child attachment security (Tomlinson et al., 2005; True et al., 2001; Zevalkink, Riksen-Walraven, & Cornelis, 1999).

2. *Childhood obesity among Asian American study.*

Studies in adults, adolescents, and older children have also found that generational status is an important predictor of obesity rates,^{1,3,11,17} which generally increase with the length of time living in the U.S. and the adoption of mainstream eating, activity and television habits. However, one small study of Chinese American children in California found that a low level of parental acculturation among recent immigrants was a risk factor for obesity, potentially related to a lower level of physical activity among Chinese American children compared to their White and African American counterparts.¹⁸ A recent report from the 2003 National Survey of Children's Health (NSCH) found that first generation (foreign-born) 10-17 year old Asian American children had a higher prevalence of obesity than Whites, and the second generation children the lowest prevalence at 6.3%.³ As all the younger children in our study were born in the U.S., there were no first generation Asian American children included for comparison. For our nationally representative sample of preschoolers, however, the prevalence of obesity among second generation Asian American children was also significantly lower than among Whites, but substantially higher at 14% than the results of the NSCH. Although the NSCH is also a national survey that was weighted according to age, sex and racial/ethnic categories, weighting was done at the state level and groups that comprised less than 4.5% of the sample were merged with larger groups for weighting purposes. In addition, child height and weight were reported by respondents rather than measured directly as in the ECLS-B. Lastly, there was no differentiation of children by Asian ethnicity in the NSCH. For these reasons, our higher estimates of obesity in preschool-aged children are likely accurate and perhaps signify a later stage of the obesity epidemic, with higher estimates of obesity prevalence even in children that are much younger and in a relatively low risk group by virtue of their Asian ethnicity.

Studies in adults show that despite lower BMI's, Asian Americans can have higher adiposity, visceral adiposity, and cardiovascular risk compared to their White counterparts.¹⁹⁻²² In other words, BMI as a proxy for adiposity may be a particularly poor measure of obesity and its risk for Asians, including children. Thus, although we found markedly lower rates of obesity among children of certain Asian ethnicities, we may be underestimating true adiposity by using a BMI-dependent measure to define obesity; a proportionately lower rate of obesity-related consequences may not necessarily follow. Also, in our data, Asian Indian children seem to have a remarkably low prevalence of obesity at 4 years of age, yet they could conceivably turn out to have elevated rates of adiposity and cardiovascular disease as adults, which other studies^{23, 24} have documented. Perhaps prevention between preschool age and adulthood is especially important for these children.

V.D. Possible application of findings to actual MCH health care delivery situations

1. *Maternal depression and child attachment study*

Our findings also suggest that the association between maternal depression and sensitivity may be culturally specific, thus clinicians working with depressed mothers will need to consider cultural differences in treatment needs.

2. *Childhood obesity among Asian mothers.*

The United States is often called a “melting pot” as it is not a single culture but a country of immigrants from every part of the world, arriving at varying times in our national history. Immigrants are projected to outnumber Whites soon; percentages of many non-White ethnicities, including Asian Americans are increasing.⁶ Unlike some other immigrant groups, Asian Americans have been considered success stories in that they fare well in our educational system and often thrive in terms of both socioeconomic status and health. Our study describes a worrisome trend, however, that even as Asian Americans assimilate to our society, they may also be assuming a higher risk of obesity and its complications. Should this trend continue for Asians or other growing immigrant groups who arrive relatively protected from obesity, the implications for the health costs, quality of life and mortality of Americans would be enormous. Our study shows that the loss of the immigrant’s protective shield against obesity may be starting as young as the preschool age, underscoring the need for early family-based prevention efforts.

V.E. Policy implications

1. *Maternal depression and child attachment study*

Our findings suggest that the association between maternal depression and sensitivity may be culturally specific, thus clinicians working with depressed mothers will need to consider cultural differences in treatment needs.

2. *Childhood obesity among Asian mothers.*

Our results point to opportunities to study and adopt the healthful eating and activity practices of Chinese and Indian American families in particular so that all American children, irrespective of race/ethnicity, may benefit.

V.F. Suggestions for further research

Our finding on maternal depression and its association to child social development calls for future research examining the experiences of immigrant mothers as well as the effects of mothers’ acculturation on their mental health and parenting. In order to better understand these processes across cultural groups we must progress beyond the first step to further investigate the role of cultural values and beliefs about parenting, experiences of migration and acculturation, and culturally-based meanings of behavior, in the development of early caregiving relationships.

VI. List of manuscripts

1. Huang, ZJ, Goetter D, Zhang J, Yu SM. Trend of maternal depression among mothers of different race and nativities. Manuscript to be submitted to *Journal of Maternal and Child Health*.

J. Huang,

2 Huang ZJ, Mitchell, Lewin A, Zhang. Variations in the Relationship between Maternal Depression, Maternal Sensitivity, and Child Attachment by Race/Ethnicity and Nativity: Findings from a Nationally Representative Cohort Study. Submitted to *Development and Psychopathology*.

3 Jain A, Mitchell S, Chirumamilla R, Horn I, Lewin A, Huang ZJ. Are Asian American Children Obese?, submitted to *Pediatrics*.

4 Lewin A, Michiell S, Huang ZJ. Non-resident father's participation and overall child development among children born to teenage mothers. *Manuscript in preparation*.