Maternal Depressive Symptoms and Attained Size Among Children in the First 2 Years of Life

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ABSTRACT

OBJECTIVE: To evaluate the relation of maternal depressive symptoms with attained size and whether it is stronger for young children in low-income families.

METHODS: Secondary analysis was performed of longitudinal data from enrollment and parents surveys from the Healthy Steps for Young Children National Evaluation among 4745 children who made at least one visit to a Healthy Steps site. Length and weight data from medical records were converted to *z* scores and percentiles for length for age and weight for length at 6, 12, and 24 months using 2000 Centers for Disease Control and Prevention growth standards. Analyses evaluated the relation of maternal depressive symptoms at 2 to 4 months using a modified 14-item Center for Epidemiologic Depression Scale with attained size and child, maternal, and family characteristics. Regression models estimated the relation of symptoms with *z* scores and logistic regression the relation for short stature (below 10th percentile for length for age), adjusted for covariates.

RESULTS: Maternal depressive symptoms were associated with *z* scores for length for age at 6, 12, and 24 months and short stature at 6 and 24 months for children in low/middle-income families. The *z* scores at 24 months remained significantly lower for children in low/middle-income families whose mothers reported depressive symptoms, after adjustment for covariates. The odds of short stature were significantly increased at 6 months in the total sample and among low/middle-income families for children whose mothers reported symptoms. Other measures of attained size were not associated with depressive symptoms.

CONCLUSIONS: The link between maternal symptoms and young children's risk of short stature reinforces recommendations for increased screening for postpartum depressive symptoms and for clinicians to review growth charts with parents for impaired/unfavorable patterns.

KEYWORDS: depressive symptoms; growth; maternal; young children

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WHAT'S NEW

Short stature is increased in young children whose mothers experience postpartum depressive symptoms, particularly in low/middle-income families, highlighting the role of clinicians in reviewing growth charts with parents for impaired/unfavorable growth patterns and related risk factors.

DEPRESSION IS COMMON among US women, with an estimated lifetime prevalence of 20% and postpartum prevalence of 10% to 15% for major depressive disorders,[1] depending on the population studied.[2] Figures are even higher if depressive symptomatology is assessed.[3] Maternal depressive symptoms negatively affect mother–child interactions and parenting behavior,[4] including depressed mothers talking less to their infants,[5] showing less positive physical affection,[6] seeking less preventive care for their young children,[7] and adopting less favorable feeding practices.[8,9]

Several studies show an association of socioeconomic and psychosocial factors with growth faltering, as measured by reduced weight or stature. Children from disadvantaged environments are more likely to experience impaired growth.[10–14] Recent studies in developing countries indicate a relation of depressive symptoms to children's growth faltering or failure to thrive.[11] Most previous studies have evaluated growth faltering, as measured by weight for age or weight gain, rather than stunting or stature.[11–13] An increased risk of faltering has been associated with depressive symptoms, but the results for faltering are mixed in developed countries.[10,15]

The findings for stature in developing countries are mixed,[11–13] as they are in developed countries.[10,15–18] Two US studies[17,18] show conflicting findings that suggest possible differences in the association of maternal depressive symptoms with stature in young children by socioeconomic status. While Ertel et al[17] reported a positive association of postpartum depressive symptoms with height-for-age *z* scores among 3-year-olds in an advantaged US sample, Surkan et al[18] noted increased odds of being below the 10th percentile for height for age among 4- and 5-year-old children whose mothers reported maternal depressive symptoms at 9 months in a nationally representative US sample.

Prevalence estimates of failure to thrive or short stature among US children are limited,[19] although select groups, such as poor children[10,20] and children of mothers with depressive symptoms,[18,21] may be at increased risk. Early impaired growth, especially short stature, is associated with low educational performance, reduced adult size, and increased morbidity and mortality.[22] Victora et al[22] noted that height for age at 2 years was the best predictor of human capital, as measured by schooling and economic productivity in adults in low/middle-income countries. Their conclusion that impairment in early life may have long-lasting effects argues for identifying children early who are at risk of reduced stature in order to avert long-term consequences.

The objective of our study was to evaluate whether maternal depressive symptoms are associated with children's growth, particularly reduced stature, in the first 2 years of life and whether the association is stronger among children in lower-income families. We used longitudinal data from a large national cohort followed from birth to age 2 with repeated measures of length and weight. An ecological model framed the study, positing that children's nutritional status is affected by environmental and family factors.[23] It enabled us to capture the richness of available data about children's family and socioeconomic environment and feeding practices, infant behavior, and health that have not been evaluated simultaneously in previous studies of growth and maternal depressive symptoms.

METHODS

STUDY DESIGN

The study was a secondary analysis of data from the Healthy Steps (HS) for Young Children National Evaluation conducted at 24 pediatric sites throughout the United States. HS was designed to promote parenting practices to improve the health and development of children from birth to 3 years. Children and their families were followed to age 32 months using a randomization design at 6 sites and a quasi-experimental design at 18 sites (9 intervention and 9 control sites).[24] The evaluation consecutively enrolled 5565 infants/families at the study sites between September 1996 and November 1998.

Children were eligible for the current study if they completed at least one visit before 30 months of age, as recorded in their medical record, to one of the HS sites and if their mothers reported about depressive symptoms at 2 to 4 months; 4745 eligible children made at least one visit (range, 1–74 visits) during which length or weight was recorded for a total of 66,015 observations from September 1996 and April 2001.

Other data sources included parent enrollment questionnaires and telephone interviews at 2 to 4 months. Enrollment forms completed by mothers by 28 days postpartum provided data about infant, maternal, paternal, and family characteristics; maternal and paternal health behaviors; and the child's sex, birth weight, and length of nursery stay. Telephone interviews conducted in English or Spanish at 2 to 4 months with mothers (99%) included information about the child's general health status, hospitalization, and behavior since birth; demographic characteristics (marital status, education, home ownership, and race/ethnicity); parenting behaviors; infant feeding practices (breast-feeding; introduction of cereal, water, and juice); interactions with the infant; smoking; father's help with infant feeding; and family income.

A modified 14-item Center for Epidemiologic Depression Scale (CES-D) measured maternal depressive symptoms (reliability coefficient of 0.85); the CES-D evaluates depressive symptoms during the past week on a 4-point Likert scale ranging from 0 (rarely or never) to 3 (most or all the time).[25] The cutoff for presence of depressive symptoms was a score of 11, calibrated relative to the score of 16 used for the 20-item scale[7]; use of a cutoff value of 16 showed similar findings.

The weight and length data abstracted from the medical records were cleaned and edited. The data for each child by age in months based on date of visit were converted to *z* scores and percentiles for weight for age, length for age, and weight for length. The 2000 US Centers for Disease Control and Prevention (CDC) growth charts[26] were used to determine *z* scores and percentiles because of similarity of demographic characteristics of the HS sample with the standard population, including the percentage of low-birth-weight (LBW) infants (6.5%). CDC used these standards for recent analysis of National Health and Nutrition Examination Survey data for US children,[27] as did Ertel et al[17] in their US sample. Most pediatricians in clinical practice use the CDC standards to track children's growth.

STATISTICAL ANALYSIS

Bivariate analyses assessed the association of maternal depressive symptoms with growth and with child, maternal, and family characteristics. The *z* scores and percentiles for each child were calculated at 3 ages: 6, 12 or 24 months. These ages are when most children made well-child visits to the HS sites and when both length and weight were recorded. We evaluated *z* scores for length for age and weight for length using analysis of variance and percentiles using the chi-square test for independence. Weight for age was strongly influenced by length for age; as a result, only height for age and weight for length were included in regression analyses. Weight for length is preferable to weight for age because it is independent of length but also captures children who are underweight or overweight for age.