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The Influence of Children's Cognitive Delay and Behavior Problems on Maternal Depression

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Objective To determine the impact of children's cognitive delay and behavior on maternal depressive symptoms using a large national cohort of US families.

Study design Data were drawn from 2 waves of the nationally representative Early Childhood Longitudinal Study, Birth Cohort (n = 7550). Cognitive delay was defined at age 24 months by the lowest 10th percentile of the Bayley Short Form–Research Edition. At age 4 years, the children's behavior was assessed using the Preschool and Kindergarten Behavior Scales, administered to mothers and primary nonparental child care providers, and maternal depressive symptoms with the Center for Epidemiological Studies Depression Scale. Weighted generalized estimating equation models examined whether the children's behavior mediated the relationship between their cognitive delay status at 24 months and 4-year maternal depressive outcomes.

Results At age 4 years, 26.9% of mothers of children with cognitive delay reported high depressive symptoms, compared with 17.4% of mothers of typically developing children ($P < .0001$). When the children's behavior was accounted for, the effect of cognitive delay on maternal depressive symptoms decreased by 36% ($P < .0001$). These findings remained significant when the children's behaviors were assessed by their primary nonparental care providers.

Conclusion Caring for a child with a cognitive delay influences maternal depressive symptoms in part through the child's behavior problems. Preventive interventions to ameliorate adverse outcomes for children with cognitive delay and their families should consider the impact of the children's behavior. *(J Pediatr 2015;167:679-86)*.

Caring for a child with a cognitive delay has a significant impact on parents, especially in terms of psychosocial outcomes. Research has consistently demonstrated that mothers of children with cognitive and intellectual disabilities report lower levels of happiness, self-esteem, and self-efficacy[1]; worse physical health[2]; impaired sleep[3]; and higher rates of depression,[4-6] anxiety,[6] mental health problems,[7,8] and stress[3,9] compared with mothers of typically developing children. Such outcomes likely are associated with the excessive caretaking and financial burdens faced by these families.[6,10-12] Another potential influencing factor is children's behavior problems. Children with cognitive delay are more likely than their typically developing peers to have mental health and behavioral problems,[13-16] with rates of comorbidity in children and adolescents ranging between 30% and 50%.[13]

Mental health problems among parents of children with cognitive delay and related developmental disabilities are more strongly associated with the children's behavior problems than with their disabilities per se.[17] Parents of children with intellectual disabilities and comorbid behavior problems report difficulties with coping and with raising and managing their children. Compared with parents of children with intellectual disabilities without such behavior problems, they are more likely to consider their children a heavy burden.[10] Furthermore, the effect of children's behavior problems on maternal mental health has been shown to be stronger in families of children with cognitive delay than in families of children without cognitive delay.[4] This relationship has been well studied using convenience samples of families of children and young adults with cognitive delay,[2,8,10,18-22] but not in a representative or national sample of children with cognitive delay. Moreover, existing research on this topic has relied heavily on maternal reports.[3] It is possible that a mother's mental health may influence her judgment when reporting on her child's behavior.

The objective of the present population-based cohort study was to determine whether children's behavior problems underlie the association between their early cognitive status and subsequent depressive symptoms in their mothers. This study advances the current knowledge base by using a representative na-

BSF-R	Bayley Short Form–Research Edition
BSID-II	Bayley Scales of Infant Development, Second Edition
CESD	Center for Epidemiological Studies Depression Scale
ECLS-B	Early Childhood Longitudinal Study, Birth Cohort
NCES	National Center for Education Statistics
PKBS-2	Preschool and Kindergarten Behavior Scales–Second Edition
SES	Socioeconomic status

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tional sample of US families and by including child behavior assessed from both mothers and children's primary nonparental care providers. We hypothesized that mothers of children with cognitive delay would be more likely than mothers of typically developing children to report high depressive symptoms, and that children's behavior would contribute to this risk.

Methods

Data were drawn from the nationally representative Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), a longitudinal cohort study of nearly 10 700 children born in 2001 and their parents. The ECLS-B selected a probability sample of the approximately 4 million children born in 2001, with oversampling of minority groups, twins, and those born at low and very low birth weight, from births registered in the National Center for Health Statistics vital statistics system.[23] The sampling framework excluded births to mothers under age 15 years and children who were adopted or deceased before the initial collection wave.

Parents of children participating in the ECLS-B provided informed consent, and the data collection procedures were approved by National Center for Education Statistics (NCES) as ensuring confidentiality. We obtained a license agreement with the NCES for analysis of the ECLS-B's restricted data, and report all unweighted sample sizes as rounded to the nearest 50 to comply with NCES guidelines.[23] The Partners Human Research Committee at MassGeneral Hospital for Children considered this study exempt from review.

Our data for this study are drawn from the children's birth certificates and 2 waves of data collection, which occurred when children were aged ~24 months and 4 years. Data were collected from direct developmental assessments of the children and from parents via interviews and self-administered questionnaires. During the 4-year data collection wave, mothers were asked whether their child was receiving nonparental child care on a regular basis for 10 or more hours per week, and if so, to provide contact information for the care provider. These nonparental care providers were subsequently contacted by ECLS-B personnel and interviewed.

Of the original cohort, approximately 8900 children underwent a complete cognitive assessment at age 24 months. Our study sample included 7550 of these children and their mothers with complete covariate data who remained in the ECLS-B for the 4-year data collection wave. Information collected from the nonparental care provider was available for approximately 5100 of these children.

Measures

Cognitive delay was defined at age 24 months using the mental scale of the Bayley Short Form–Research Edition (BSF-R),[23] a screening instrument comprising a subset of items from the revised Bayley Scales of Infant Development, Second Edition (BSID-II).[24] BSF-R items were selected from the BSID-II using item response theory modeling to approximate full BSID-II results and to facilitate comparisons of BSF-R and BSID-II scores. The ECLS-B data file included estimated BSID-II scores (predicted number of correct item responses), derived from the BSF-R. The item response theory reliability coefficient was 0.88.[25] The NCES converted raw scores to age-normed T scores (mean ± SD, 0 ± 10) by standardizing them relative to the weighted ECLS-B sample. For these scores, the age at administration for preterm children was recorded as chronological age adjusted for the number of weeks preterm. Consistent with previous research,[14,26] we considered falling within the lowest 10th percentile of these age-normed scores to indicate cognitive delay.

Maternal depressive symptoms were measured at child age 4 years using the 12-item Center for Epidemiological Studies Depression Scale (CESD).[27] The self-administered CESD asked respondents to report the frequency of 12 events during the previous week, such as "I felt lonely," and "I could not get going." Each item was coded on a Likert scale from 0 (never) to 3 (often). Responses to individual CESD items were combined to create a raw symptom score (range, 0-36), with higher scores representing more depressive symptoms. A cutpoint of >9 (comparable with a score of ≥ 16 on the full CESD) was used to denote high depressive symptoms.[28]

Child behavior was assessed at age 4 years by a modified version of the Preschool and Kindergarten Behavior Scales–Second Edition (PKBS-2),[29] completed by the child's mother and, if applicable, the child's primary nonparental care provider. The PKBS-2 is a standardized instrument designed to evaluate social skills and problem behaviors of children aged 3-6 years. Respondents were asked to report the frequency of behaviors observed in the previous 3 months. Items included how often (0, never to 4, very often) the child: (1) was physically aggressive; (2) was restless or fidgety; (3) acted impulsively; (4) was overly active; (5) paid attention well (reverse-coded); (6) was angry/had temper tantrums; (7) had difficulty concentrating; (8) bothered or annoyed other children; and (9) destroyed things or disrupted others. A summary score (range, 0-36) was calculated as the sum of the 9 PKBS-2 items, with higher scores indicating worse behavior (Cronbach $\alpha = 0.81$). Scores were standardized to a mean ± SD value of 10 ± 1.

Birth certificates provided the child's sex, birth weight, and plurality status (eg, singleton vs twin or triplet). Maternal demographic factors assessed at age 24 months included age in years (15-19, 20-24, 25-29, 30-34, or 35+), race/ethnicity (non-Hispanic white, non-Hispanic black, non-Hispanic other race, or Hispanic/Latino), and marital status (married, never married, or divorced, separated, or widowed). Family socioeconomic status (SES) at 24 months was defined by using a composite index (quintiles) generated by the NCES that incorporated parental education, labor force participation, and occupation.[25] Children's primary child care arrangement at age 4 years was classified in the following mutually exclusive categories: parental care only; center-based care; Head