

# Mother-Child Bed-Sharing in Toddlerhood and Cognitive and Behavioral Outcomes

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## KEY WORDS

bed-sharing, parenting, socioeconomic status, outcomes

## ABBREVIATIONS

SES—socioeconomic status

EHS—Early Head Start

OR—odds ratio

[www.pediatrics.org/cgi/doi/10.1542/peds.2010-3300](http://www.pediatrics.org/cgi/doi/10.1542/peds.2010-3300)

doi:10.1542/peds.2010-3300

Accepted for publication Apr 12, 2011

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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**FINANCIAL DISCLOSURE:** *The authors have indicated they have no financial relationships relevant to this article to disclose.*

Funded by the National Institutes of Health (NIH).



**WHAT'S KNOWN ON THIS SUBJECT:** In 2005, the American Academy of Pediatrics recommended against bed-sharing during infancy because of its association with sudden infant death syndrome. However, little is known about the consequences of bed-sharing after infancy. A dearth of longitudinal research limits our understanding of the cognitive and behavioral consequences of bed-sharing.



**WHAT THIS STUDY ADDS:** Negative associations between bed-sharing in toddlerhood and behavioral and cognitive outcomes at age 5 years are probably not due to bed-sharing itself but rather to the sociodemographic characteristics of US families who share a bed.

## abstract



**OBJECTIVE:** We examined the predictors and consequences of mother-child bed-sharing at 1, 2, and 3 years of age in a racially/ethnically and geographically diverse sample of low-income families across the United States.

**METHODS:** We analyzed data from 944 low-income families who had children assessed at 1, 2, 3, and 5 years of age.

**RESULTS:** Mothers who were Hispanic and black were more likely to bed-share with children at ages 1, 2, and 3 years than other mothers. Maternal negative regard also predicted bed-sharing. Bed-sharing at ages 1 to 3 years was bivariately associated with poorer behavior and cognition at age 5 years. However, these associations lost significance when child and mother characteristics were controlled.

**CONCLUSION:** There seem to be no negative associations between bed-sharing in toddlerhood and children's behavior and cognition at age 5 years. *Pediatrics* 2011;128:e339–e347

Although bed-sharing, a type of cosleeping in which parents and children sleep in the same bed,<sup>1-3</sup> is a customary sleeping arrangement for children in many countries and cultures,<sup>2</sup> it remains relatively uncommon in the United States.<sup>4,5</sup> Ambivalence toward bed-sharing in the United States may be due in part to different messages about its risks and benefits. A study of 40 US parenting books on sleep, for example, found that while bed-sharing was endorsed in 28% of the books, it was opposed by 40%.<sup>5</sup> The remaining 32% of books abstained from taking a position on bed-sharing. Proponents of bed-sharing argue that it facilitates breastfeeding,<sup>6,7</sup> encourages bonding between a mother and her child,<sup>8</sup> and regulates infant breathing.<sup>9</sup> Yet the American Academy of Pediatrics recommends against bed-sharing during infancy, citing epidemiologic evidence that bed-sharing increases the risk of sudden infant death syndrome under certain conditions (ie, if the mother smokes or is overtired; if the child is younger than 11 weeks).<sup>10</sup> Furthermore, bed-sharing has been found to exacerbate sleep problems in children in addition to distress among parents.<sup>1,11,12</sup> Notably, advice (in favor or against bed-sharing) depends on the age of the child. This study examines bed-sharing at 1 to 3 years of age, when a child is no longer at risk for sudden infant death syndrome.

Little is known about the potential developmental consequences of bed-sharing for toddlers and older children in the United States, where bed-sharing is not the norm.<sup>4</sup> Most studies with US samples have examined sleep problems rather than indicators of cognitive and behavioral development as outcomes. To our knowledge, only 2 longitudinal studies with US families<sup>13,14</sup> have examined the influence of bed-sharing on later cognition or behavior. The first study ( $N = 330$ ) found

no association between bed-sharing at age 2 years and emotional or behavioral problems 1 year later in a community sample.<sup>13</sup> However, a significant proportion of the families with low socioeconomic status (SES) in that study were lost at follow-up. The second study ( $N = 205$ ) also found no association between bed-sharing infancy and early childhood (3, 4, and 5 years) and child behavior at age 6 years.<sup>14</sup> Interestingly, higher cognitive competence scores were found among bed-sharers. However, that sample consisted of relatively well-educated non-Hispanic white families, of which only 6% reported regularly sharing a bed. Given its homogenous sample with a small percentage of bed-sharers, this study has limited generalizability, as black and Hispanic American families are more likely than non-Hispanic white families to practice bed-sharing.<sup>12,15</sup> Because bed-sharing is also more common among lower-SES families in the United States,<sup>13,16</sup> there is a need to examine whether bed-sharing poses an additional risk for the cognitive and behavioral outcomes of children already at risk.<sup>17,18</sup>

This study examined the predictors and consequences of mother-child bed-sharing at 1, 2, and 3 years of age in a racially/ethnically and geographically diverse sample of low-income families across the United States. We began by categorizing families according to how often they reported bed-sharing at these 3 time points (never, 1 time point only, and 2-3 time points), and then predicted membership in these categories based on family sociodemographic characteristics, observed maternal parenting behaviors, and maternal depressive symptoms. These predictors were selected based on past studies identifying child age, parental education, SES, the number of children in the home, maternal

depressive symptoms, and single parent status as correlates of bed-sharing.<sup>1,19-22</sup> We also included maternal parenting behaviors (supportiveness, negative regard, and detachment) that may be associated with bed-sharing. Associations between bed-sharing across ages 1 through 3 years and a range of cognitive and behavioral outcomes at age 5 years were then examined. When bivariate associations were found, multivariate models of those outcomes were used to test whether bed-sharing remains predictive when demographic characteristics, maternal depressive symptoms, and maternal parenting behaviors are controlled.

On the basis of previous studies,<sup>12,15</sup> we expect that bed-sharing will be less prevalent among non-Hispanic whites compared with blacks and Hispanics. We also expect that maternal education will be negatively associated with bed-sharing, and that maternal depressive symptoms will be positively associated with bed-sharing.<sup>21,22</sup>

We expect bed-sharing to be bivariately inversely associated with cognitive and behavioral outcomes owing to the higher prevalence of bed-sharing among lower SES and racial and ethnic minority families. Furthermore, we expect to find associations between bed-sharing and poorer cognitive and behavioral outcomes, even in a multivariate context. Although past research has failed to find such associations,<sup>13,14</sup> bed-sharing is associated with sleep problems, which are themselves associated with behavior and cognitive problems.<sup>23-25</sup> Past studies may have lacked the statistical power necessary to detect associations between bed-sharing and behavior. The large number of bed-sharers in our sample should offer greater statistical power than was available in past studies.

## METHODS

### Participants

This study used data from the Early Head Start (EHS) Research and Evaluation Study, an evaluation of the EHS program that began when the program was authorized in 1996. The study was conducted at 17 EHS programs across the country selected for their geographic and programmatic diversity.<sup>26</sup> Families with incomes at or below the poverty level, with at least 1 child younger than 12 months, were recruited for the study. Of the 3001 families who participated in the evaluation, half were randomly assigned to the program group, which received EHS services, and half were assigned to the control group, in which families were free to obtain services elsewhere. Families were visited at home when children turned 1, 2, and 3 years old, and again when they turned 5 years, ~2 years after the end of EHS services for children in the program group. At the 1-, 2-, and 3-year home visits, mothers reported on family demographic characteristics, child health, child care, maternal mental health, and family routines, including sleep arrangements. Child cognitive and behavioral outcomes were assessed at age 5 years, before kindergarten entrance. The response rate was 75% for the age 1-year time point, 72% for the age 2-year time point, 70% for the age 3-year time point, and 69% for the age 5-year time point.<sup>27</sup>

Our sample is limited to respondents who provided information on their sleeping arrangements at ages 1, 2, and 3 years and who had no missing data on demographic and parenting variables of interest ( $n = 944$ ). Subject numbers in the models of age 5-year outcomes vary according to the number of valid values per outcome. Compared with the full sample, our analytic sample differs somewhat in the percentage of mothers who have more

than a high school education (full: 23%; analytic: 26%;  $P < .05$ ). Our analytic sample also has fewer teen aged mothers compared with the full sample (full: 38%; analytic: 35%;  $P < .05$ ). However, our study sample is similar to the full sample in terms of child gender, poverty status, ethnicity, mother's nativity status, and low birth weight.

### Measures

Demographic variables were all collected at enrollment. The parenting and maternal depression variables in our analyses are from the 1-year home visit. Bed-sharing was assessed at the 1-, 2-, and 3-year home visits in the same manner at each visit. Child cognitive and behavioral outcomes were

collected at the 5-year home visit. These variables are described below.

### Bed-Sharing

At the 1-, 2-, and 3-year home visits, mothers were asked, "Does [child] have a regular place where [he/she] usually sleeps at night?" Mothers who answered "yes" were then asked where the child usually sleeps. Consistent with previous definitions of bed-sharing,<sup>13-15</sup> respondents who indicated that the child usually slept "with parent, in bed" were coded as bed-sharers. A summary variable was then created to reflect whether respondents never bed-shared (52%), bed-shared at any 1 time point only (22%), or bed-shared at 2 or 3 time points

**TABLE 1** EHS Sample Characteristics ( $N = 944$ )

Bed-share, % <sup>a</sup>	
Never bed-share	52.0
Bed-share at 1 time point only	21.9
Bed-share at $\geq 2$ time points	26.1
Child characteristics, %	
EHS program group	53.5
Control group	46.5
Female	47.2
Male	52.8
Low birth weight (<2500 g) child	7.5
Maternal ethnicity, %	
Non-Hispanic white	38.2
Hispanic	25.2
Black	30.9
Other	4.2
Mother is US born, %	81.9
Mother was teenager when child was born, %	35.2
Socioeconomic characteristics	
Below poverty level, %	73.0
Adult male head of household, %	43.8
No. of children in household, mean (SD)	2.04 (1.54)
Mother's education, %	
Less than high school	10.0
Some high school	31.4
High school graduate only/GED	28.5
More than high school	26.4
Mothering characteristics, mean (SD)	
Mother detachment <sup>b,c</sup>	1.55 (0.96)
Mother negative regard <sup>b,d</sup>	1.41 (0.76)
Mother supportiveness <sup>b,d</sup>	4.01 (1.06)
Mother's depressive symptoms, mean (SD) <sup>b,e</sup>	12.50 (9.35)

GED indicates General Educational Development Test.

<sup>a</sup> Measured at 1, 2, and 3 years when child was 1, 2, and 3 years of age.

<sup>b</sup> Measured at the 1-year home visit.

<sup>c</sup> Range: 1 to 6.

<sup>d</sup> Range 1 to 7.

<sup>e</sup> Mothers indicated the frequency of each symptom over the previous week on a 4-point scale (0 = rarely, 3 = most of the time); scores for the current sample ranged from 0 to 56.

(26%). We distinguished bed-sharing at only 1 time point from that at  $\geq 2$  time points to test whether their predictors and sequelae diverged.

### Cognitive Outcomes

Children's math achievement was measured using the Woodcock-Johnson Revised Tests of Achievement<sup>28</sup> applied problems subtest. The letter-word identification subtest assessed early literacy skills.<sup>28</sup> All measures were age-standardized against a national norming sample (mean: 100 [SD: 15]). In the present sample, the mean of the applied problems subtest was 88 (SD: 21) and the mean of the letter-word identification subtest was 89 (SD: 14).

### Behavioral Outcomes

Children's hyperactivity and social skills were measured with scales drawn from the Head Start Family and Child Experiences Survey.<sup>29</sup> Mothers indicated the extent to which each item described their child's behavior on a 3-point scale (0 = not at all true, 3 = very true), and items were then summed. The hyperactivity scale (mean: 1.76 [SD: 1.47]) included 3 items such as "Can't concentrate, can't pay attention for long." The social skills scale included 7 items describing children's cooperation and prosocial skills (mean: 12 [SD: 2]).

### Parenting

Maternal parenting was assessed at the age 1-year home visit using a videotaped semi structured dyadic play activity adapted from Vandell<sup>30</sup> and the National Institute of Child Health and Human Development Study of Early Child Care's Three Box free play assessment.<sup>31</sup> Videos were coded for the following 5 scales of maternal behavior: sensitivity (accurate perception of the child's signals, and prompt and appropriate responses to these signals), positive regard (demonstration of

love, respect, and admiration), cognitive stimulation (teaching or actively trying to expand the child's abilities), detachment (lack of attention to and awareness of the child's cues and absence of engagement in the child), and negative regard (hostility toward or rejection of the child). All scales had 7 points, ranging from very low (1) to very high (7). A measure of supportiveness was created by averaging sensitivity, positive regard, and cognitive stimulation ( $r$  range: 0.59–0.62).<sup>32,33</sup>

### Maternal Depressive Symptoms

The Center for Epidemiologic Studies Depression Scale<sup>34</sup> was completed by mothers at the 1-year home visit. This scale is a 20-item self-report symptom rating scale used to measure depressive symptoms. Mothers indicated the frequency of each symptom over the past week on a 4-point scale (0 = rarely, 3 = most of the time). Scores range from 0 to 60, with higher scores

indicating increased symptoms. Scores for the current sample ranged from 0 to 56 (mean: 12.5 [SD: 9.3]).

### Additional Explanatory Variables

Characteristics as of baseline were selected as additional explanatory variables based on past literature linking them to both bed-sharing and children's behavioral and cognitive outcomes. Program status (1 = EHS, 0 = control), US nativity status (1 = mother is US born), child's gender (1 = female), presence of an adult male head of household (1 = yes), and poverty status (1 = below poverty level) were coded dichotomously. A continuous measure of the number of children in the household was also included.

Categorical measures of mother's ethnicity (white non-Hispanic; black non-Hispanic; Hispanic; and other) and education level (less than high school, high school/General Educational Develop-

**TABLE 2** Multinomial Logistic Regression Results for Predictors of Bed-Sharing: EHS Sample ( $N = 933$ )

	1 Time Point vs Never <sup>a</sup>	$\geq 2$ Time Points vs Never <sup>a</sup>
EHS treatment group	0.84 (0.60–1.19)	0.93 (0.67–1.30)
Child is female <sup>b</sup>	1.15 (0.82–1.62)	1.10 (0.79–1.53)
Low birth weight	0.93 (0.50–1.76)	0.64 (0.34–1.24)
Mother is Hispanic <sup>c</sup>	1.81 (1.04–3.15) <sup>d</sup>	3.94 (2.33–6.65) <sup>e</sup>
Mother is black <sup>c</sup>	2.6 (1.69–4.14) <sup>e</sup>	4.49 (2.88–6.99) <sup>e</sup>
Mother is other ethnicity <sup>c</sup>	1.35 (0.55–3.21)	2.38 (1.00–5.64) <sup>d</sup>
Mother is US born <sup>f</sup>	0.70 (0.39–1.23)	1.24 (0.71–2.16)
Mother was a teenager at child's birth	1.05 (0.69–1.60)	1.27 (0.85–1.88)
Below poverty level <sup>g</sup>	1.31 (0.76–2.26)	1.31 (0.78–2.21)
Male head of household	0.87 (0.60–1.25)	0.80 (0.56–1.14)
No. of children in household	0.92 (0.79–1.08)	1.03 (0.89–1.19)
Mother has less than high school education <sup>h</sup>	1.77 (0.88–3.56)	1.16 (0.60–2.27)
Mother has some high school education <sup>h</sup>	1.43 (0.90–2.28)	1.02 (0.66–1.57)
Mother has more than high school education <sup>h</sup>	1.09 (0.68–1.76)	0.63 (0.39–1.01) <sup>i</sup>
Mother's detachment	1.09 (0.88–1.35)	1.02 (0.83–1.25)
Mother's negative regard	1.41 (1.11–1.79) <sup>j</sup>	1.08 (0.84–1.38)
Mother's supportiveness	0.98 (0.79–1.22)	0.83 (0.67–1.03) <sup>i</sup>
Mother's depressive symptoms	1.01 (0.99–1.03)	1.01 (1.00–1.03)
$R^2$ (Cox and Snell)	0.15	0.15

Values are given as OR (95% confidence interval).

<sup>a</sup> The reference category is never bed-shared.

<sup>b</sup> The reference category is male.

<sup>c</sup> The reference category is white, non-Hispanic.

<sup>d</sup>  $P < .05$ .

<sup>e</sup>  $P < .001$ .

<sup>f</sup> The reference category is foreign born.

<sup>g</sup> The reference category is  $\geq 100\%$  of the poverty line.

<sup>h</sup> The reference category is high school graduate.

<sup>i</sup>  $P < .10$ .

<sup>j</sup>  $P < .01$ .

ment Test, and more than high school) were collected at enrollment. Mothers were indicated as being teen-aged if they were younger than 20 years at the focal child's birth.

### Analyses

First, we estimated a multinomial logistic regression model predicting bed-sharing patterns (bed-sharing at 1 time point versus never, and bed-sharing at  $\geq 2$  time points versus never). Predictor variables included maternal depression, maternal parenting scales, and all sociodemographic controls. The distinction was made between bed-sharing at only 1 time point versus  $\geq 2$  time points to allow the possibility that their predictors diverged. Next, we used 1-way analysis of variance to inspect bivariate associations between our trichotomous measure of bed-sharing (never, 1 time point, and  $\geq 2$  time points) and all the cognitive and behavioral outcomes at age 5 years. Bonferroni post-hoc tests were used to explore statistically significant mean subgroup differences. For those outcomes found to be significantly associated with bed-sharing, we estimated a series of 4 nested ordinary least squares regression models to evaluate whether the association would be maintained after controlling for other child and family characteristics. The first model included 2 indicator variables for the types of bed-sharing (with never bed-sharing as the reference category). The second model adjusted for child characteristics (gender, low birth weight, and ethnicity), EHS program participation status, and mother's nationality at birth. The third model adjusted for SES characteristics (poverty, number of children in the home, and male as head of household) and maternal education levels. The final model added measures of parenting (detachment, negativity, and supportiveness) and maternal depression.

## RESULTS

Demographic and descriptive information on the sample is reported in Table 1. Approximately half of the children were female (47%). Of the 944 mothers in our sample, 31% identified as black, 25% as Hispanic, 38% as white non-

Hispanic, and 4% as other. Most of the sample was born in the United States ( $n = 773$ ). Of the 171 mothers who indicated they were foreign born, 134 (78%) were Hispanic. By design, this sample was poor, with 73% of the families ( $n = 689$ ) living below the poverty

**TABLE 3** Bed-Sharing at Different Time Points and Mean (SD) Differences in Age 5 Years Outcomes: EHS Sample

	Never Bed-Share	Bed-Share at 1 Time Point Only	Bed-Share at $\geq 2$ Time Points	<i>n</i>	<i>F</i>
Behavioral outcomes					
Social skills	12.10 (1.83) <sup>a</sup>	11.76 (2.14) <sup>a</sup>	11.68 (2.13) <sup>b</sup>	824	3.77 <sup>c</sup>
Hyperactivity	1.71 (1.49) <sup>a</sup>	1.86 (1.47) <sup>a</sup>	1.80 (1.44) <sup>a</sup>	821	0.76
Cognitive outcomes					
Letter-word identification	90.80 (13.26) <sup>a</sup>	87.84 (14.18) <sup>a</sup>	86.75 (13.94) <sup>b</sup>	720	6.32 <sup>d</sup>
Applied problems	90.25 (20.80) <sup>a</sup>	85.53 (20.89) <sup>b</sup>	83.39 (21.29) <sup>b</sup>	719	7.46 <sup>d</sup>

<sup>a</sup> Values that do not share a common superscript across rows differ from each other significantly at the .05 level.

<sup>b</sup> Mean is significantly different from "never" at the .05 level.

<sup>c</sup>  $P < .05$ .

<sup>d</sup>  $P < .01$ .

**TABLE 4** Nested Ordinary Least Squares Regression Results for Predictors of Age 5 Years Social Skills: EHS Sample ( $N = 823$ )

	Model 1	Model 2	Model 3	Model 4
Bed-share				
1 time point only	-0.33 (0.17) <sup>a</sup>	-0.20 (0.17)	-0.19 (0.17)	-0.11 (0.17)
$\geq 2$ time points	-0.41 (0.17) <sup>b</sup>	-0.32 (0.17) <sup>a</sup>	-0.31 (0.17) <sup>a</sup>	-0.24 (0.17)
Child characteristics				
EHS treatment group	—	0.51 (0.13) <sup>c</sup>	0.50 (0.13) <sup>c</sup>	0.47 (0.13) <sup>c</sup>
Child is female	—	0.48 (0.13) <sup>c</sup>	0.49 (0.13) <sup>c</sup>	0.43 (0.13) <sup>d</sup>
Low birth weight	—	-0.59 (0.24) <sup>b</sup>	-0.60 (0.24) <sup>b</sup>	-0.57 (0.24) <sup>b</sup>
Ethnicity				
Mother is Hispanic <sup>e</sup>	—	-0.16 (0.21)	-0.08 (0.21)	-0.08 (0.21)
Mother is black <sup>e</sup>	—	0.13 (0.17)	0.11 (0.17)	0.28 (0.18)
Mother is other ethnicity <sup>e</sup>	—	0.12 (0.35)	0.07 (0.35)	0.04 (0.34)
Mother is US born	—	1.15 (0.22) <sup>c</sup>	1.01 (0.23) <sup>c</sup>	0.97 (0.23) <sup>c</sup>
Socioeconomic characteristics				
Below poverty level <sup>f</sup>	—	—	0.13 (0.20)	0.10 (0.20)
Male head of household	—	—	-0.10 (0.14)	-0.12 (0.14)
No. of children in family	—	—	-0.03 (0.06)	-0.02 (0.06)
Maternal education				
Less than high school <sup>g</sup>	—	—	-0.43 (0.28)	-0.34 (0.28)
Some high school <sup>g</sup>	—	—	0.20 (0.17)	0.24 (0.17)
More than high school <sup>g</sup>	—	—	0.18 (0.17)	0.09 (0.18)
Parenting behaviors at 1 y				
Mother's detachment	—	—	—	-0.14 (0.09) <sup>a</sup>
Mother's negative regard	—	—	—	-0.16 (0.10)
Mother's supportiveness	—	—	—	0.11 (0.09)
Mother's depressive symptoms				
Constant	12.10 <sup>c</sup>	10.68 <sup>c</sup>	10.81 <sup>c</sup>	10.77 <sup>c</sup>
<i>R</i> <sup>2</sup>	0.01	0.09	0.11	0.13

Values are given as  $\beta$  (SE). — indicates that association was not tested as part of the model.

<sup>a</sup>  $P < .10$ .

<sup>b</sup>  $P < .05$ .

<sup>c</sup>  $P < .001$ .

<sup>d</sup>  $P < .01$ .

<sup>e</sup> The reference category is white, non-Hispanic.

<sup>f</sup> The reference category 100% or more.

<sup>g</sup> The reference category is high school graduate.



line. Forty-one percent of the mothers in this sample did not graduate from high school ( $n = 390$ ), and more than one-third of mothers were teenagers when their child was born ( $n = 332$ ). Nearly half (48%) of the families in this sample indicated they had shared their bed at least at 1 time point. Specifically, at age 1 year, 30% of families bed-shared; at age 2 years, 26% of families bed-shared; and at age 3 years, 21% of families bed-shared.

As shown in Table 2, ethnicity and parenting were the only characteristics that significantly predicted bed-sharing at 1 time point and at  $\geq 2$  time points in a multivariate context. Specifically, blacks (odds ratio [OR]: 2.64,  $P < .001$ ) and Hispanics (OR: 1.81;  $P < .05$ ) were more likely than non-Hispanic whites to bed-share at 1 time point. Hispanics (OR: 3.94;  $P < .001$ ) and blacks (OR: 4.49;  $P < .001$ ) were both more likely than non-Hispanic whites to bed-share at  $\geq 2$  time points. Although negative regard significantly predicted bed-sharing at 1 time point (OR: 1.41;  $P < .01$ ), it was not significantly associated with bed-sharing at  $\geq 2$  time points. No other characteristics or maternal behaviors were associated with the odds of bed-sharing at the  $P < .05$  level of significance.

Bed-sharing was bivariately associated with only 1 of our 2 behavioral outcomes at age 5 years. As Table 3 shows, bed-sharing was significantly associated with children's social skills ( $F_{2,822} = 3.77$ ;  $P = .02$ ). Specifically, children who bed-shared at  $> 1$  time point had significantly lower mean scores on social skills than children who never bed-shared (11.68 vs 12.10). There were no significant differences on mean hyperactivity scores according to bed-sharing.

Bed-sharing was significantly associated with both cognitive outcomes at age 5 years (Table 3). Children who bed-shared at  $\geq 2$  time points had lower mean scores ( $F_{2,718} = 6.32$ ;  $P = .002$ )

**TABLE 5** Nested Ordinary Least Squares Regression Results for Predictors of Age 5 Years Letter-Word Identification: EHS Sample ( $N = 719$ )

	Model 1	Model 2	Model 3	Model 4
<b>Bed-share</b>				
1 time point only	-2.96 (1.28) <sup>a</sup>	-2.56 (1.26) <sup>a</sup>	-2.11 (1.23) <sup>b</sup>	-1.65 (1.22)
$\geq 2$ time points	-4.05 (1.23) <sup>c</sup>	-3.70 (1.23) <sup>c</sup>	-2.84 (1.21) <sup>a</sup>	-2.13 (1.19) <sup>b</sup>
<b>Child characteristics</b>				
EHS treatment group	—	0.44 (0.99)	0.54 (0.96)	0.19 (0.94)
Child is a female	—	4.65 (0.98) <sup>d</sup>	4.69 (0.96) <sup>d</sup>	4.03 (0.95) <sup>d</sup>
Low birth weight	—	-4.21 (1.85) <sup>a</sup>	-3.56 (1.81) <sup>a</sup>	-3.24 (1.77) <sup>b</sup>
<b>Ethnicity</b>				
Mother is Hispanic <sup>e</sup>	—	-5.06 (1.49) <sup>c</sup>	-3.67 (1.49) <sup>a</sup>	-3.09 (1.48) <sup>a</sup>
Mother is black <sup>e</sup>	—	2.59 (1.21) <sup>a</sup>	3.15 (1.21) <sup>c</sup>	4.91 (1.26) <sup>d</sup>
Mother is other ethnicity <sup>e</sup>	—	0.38 (2.54)	-0.20 (2.48)	-0.60 (2.43)
Mother is US born	—	2.09 (1.62)	-0.43 (1.67)	-1.10 (1.64)
<b>Socioeconomic characteristics</b>				
Below poverty level <sup>f</sup>	—	—	-2.92 (1.46) <sup>a</sup>	-3.18 (1.44) <sup>a</sup>
Male head of household	—	—	1.68 (1.02)	1.71 (1.00) <sup>b</sup>
No. of children in family	—	—	-1.70 (0.42) <sup>d</sup>	-1.55 (0.42) <sup>d</sup>
<b>Maternal education</b>				
Less than high school <sup>g</sup>	—	—	-5.40 (2.06) <sup>c</sup>	-4.24 (2.03) <sup>a</sup>
Some high school <sup>g</sup>	—	—	0.02 (1.20)	0.67 (1.18)
More than high school <sup>g</sup>	—	—	3.62 (1.28) <sup>c</sup>	2.69 (1.27) <sup>a</sup>
<b>Mothering behaviors at 1 y</b>				
Mother's detachment	—	—	—	-0.46 (0.59)
Mother's negative regard	—	—	—	0.14 (0.68)
Mother's supportiveness	—	—	—	2.69 (0.62) <sup>d</sup>
Mother's depressive symptoms	—	—	—	-0.02 (0.05)
Constant	90.80 <sup>d</sup>	87.05 <sup>d</sup>	93.05 <sup>d</sup>	82.86 <sup>d</sup>
$R^2$	0.02	0.10	0.16	0.20

Values are given as  $\beta$  (SE). — indicates that association was not tested as part of the model.

<sup>a</sup>  $P < .05$ .

<sup>b</sup>  $P < .10$ .

<sup>c</sup>  $P < .01$ .

<sup>d</sup>  $P < .001$ .

<sup>e</sup> The reference category is non-Hispanic white.

<sup>f</sup> The reference category is  $\geq 100\%$ .

<sup>g</sup> The reference category is high school graduate.

on letter-word identification than children who never bed-shared (86.75 vs 90.80). Children who bed-shared also had significantly lower scores on applied problems compared with children who never bed-shared ( $F_{2,718} = 7.46$ ;  $P = .002$ ). Specifically, children who bed-shared at only 1 time point (mean: 85.53) and children who bed-shared at  $\geq 2$  time points (mean: 83.39) had lower mean scores compared with children who never bed-shared (mean: 90.25).

To assess whether bed-sharers' lower scores on social skills and both the cognitive outcomes were in fact due to bed-sharing—and not ethnicity or parenting, which were associated with

bed-sharing—we ran 4 nested regression models for each outcome. The negative association between bed-sharing and social skills was no longer significant once controls for child gender, low birth weight, EHS program participation, ethnicity, and mother's nativity status were added in model 2 (Table 4). The negative association between bed-sharing and letter-word identification remained significant after adding these controls. However, once socioeconomic characteristics and maternal education were accounted for in model 3, the association between bed-sharing at 1 time point and letter-word identification (Table 5) was no longer significant. Inclusion of

**TABLE 6** Nested Ordinary Least Squares Regression Results for Predictors of Age 5 Years Applied Problems: EHS Sample (*N* = 718)

	Model 1	Model 2	Model 3	Model 4
Bed-share				
1 time point only	−4.72 (1.97) <sup>a</sup>	−2.13 (1.93)	−1.29 (1.90)	−0.50 (1.87)
≥2 time points	−6.86 (1.89) <sup>b</sup>	−4.30 (1.88) <sup>a</sup>	−2.76 (1.86)	−1.76 (1.83)
Child characteristics				
EHS treatment group	—	4.10 (1.50) <sup>c</sup>	4.41 (1.47) <sup>c</sup>	4.24 (1.45) <sup>c</sup>
Child is female	—	4.39 (1.50) <sup>c</sup>	4.44 (1.48) <sup>c</sup>	3.15 (1.47) <sup>a</sup>
Low birth weight	—	−8.21 (2.83) <sup>c</sup>	−7.20 (2.78) <sup>a</sup>	−6.75 (2.72) <sup>a</sup>
Ethnicity				
Mother is Hispanic <sup>d</sup>	—	−8.03 (2.27) <sup>b</sup>	−6.21 (2.30) <sup>c</sup>	−5.44 (2.27) <sup>a</sup>
Mother is black <sup>d</sup>	—	−5.80 (1.85) <sup>c</sup>	−4.61 (1.86) <sup>a</sup>	−2.34 (1.93)
Mother is other ethnicity <sup>d</sup>	—	−1.78 (3.88)	−3.11 (3.81)	−3.62 (3.73)
Mother is US born	—	9.12 (2.48) <sup>b</sup>	7.03 (2.56) <sup>c</sup>	6.64 (2.52) <sup>c</sup>
Socioeconomic characteristics				
Below poverty level <sup>e</sup>	—	—	−1.67 (2.25)	−1.48 (2.21)
Male head of household	—	—	4.93 (1.57) <sup>c</sup>	4.62 (1.54) <sup>c</sup>
No. of children	—	—	−1.15 (0.65) <sup>f</sup>	−0.72 (0.64)
Maternal education				
Less than high school <sup>g</sup>	—	—	−5.55 (3.18) <sup>f</sup>	−4.36 (3.12)
Some high school <sup>g</sup>	—	—	−0.04 (1.84)	0.73 (1.81)
More than high school <sup>g</sup>	—	—	7.59 (1.96) <sup>b</sup>	5.77 (1.95) <sup>c</sup>
Mothering behaviors at 1 y				
Mother's detachment	—	—	—	1.23 (0.91)
Mother's negative regard	—	—	—	−1.17 (1.05)
Mother's supportiveness	—	—	—	4.15 (0.95) <sup>b</sup>
Mother's depressive symptoms	—	—	—	−0.20 (0.08) <sup>a</sup>
Constant	90.25 <sup>b</sup>	81.24 <sup>b</sup>	81.74 <sup>b</sup>	66.20 <sup>b</sup>
<i>R</i> <sup>2</sup>	0.02	0.11	0.16	0.20

Values are given as  $\beta$  (SE). — indicates that association was not tested as part of the model.

<sup>a</sup> *P* < .05.

<sup>b</sup> *P* < .001.

<sup>c</sup> *P* < .01.

<sup>d</sup> The reference category is white, non-Hispanic.

<sup>e</sup> The reference category is ≥100%.

<sup>f</sup> *P* < .10.

<sup>g</sup> The reference category is high school graduate.

mothering characteristics and maternal depressive symptoms in model 4 rendered the association between bed-sharing at 2 time points and letter-word identification insignificant. The association between bed-sharing and applied problems was no longer significant once controls for child gender, low birth weight, EHS program participation, ethnicity, mother's nativity status, socioeconomic characteristics, and maternal education were added in model 3 (Table 6). Although not shown in our tables, we also tested for the possibility of moderated associations by nativity status (Hispanic × US born) and EHS participation (EHS participation × bed-sharing “dose”). We found no support for such effects.

## DISCUSSION

Consistent with previous literature, our study found that blacks and Hispanics in the United States are more likely to bed-share than non-Hispanic whites. In contrast to previous studies, we did not find an association between maternal depressive symptoms and bed-sharing, which may be because studies that have found an association between maternal mood and bed-sharing have generally focused on younger children's sleep (ie, those aged 0–24 months) and maternal mood closer to the postpartum period,<sup>22,25</sup> whereas our study examined bed-sharing between the ages of 1 and 3 years.

The findings from this study suggest that there is no association between bed-sharing between the ages of 1 and 3 years and cognitive and behavioral outcomes at 5 years of age. Bivariate negative association between bed-sharing and social skills, as well as bed-sharing and applied problems, lost significance once we controlled for gender, EHS program participation, ethnicity, and mother's nativity status. The negative association between bed-sharing and letter-word identification was attributable to the socioeconomic characteristics, maternal education, and mothering practices of those who bed-shared, rather than bed-sharing itself. The negative bivariate associations we found between bed-sharing and cognitive outcomes conflict with the positive association of Okami et al<sup>14</sup> between bed-sharing (between the ages of 5 months to 6 years) and cognitive competence. However, the authors lacked an explanation for that finding and acknowledged that it may have been due to chance. Our finding of a null association between bed-sharing and behavioral outcomes is consistent with findings from a previous study of 2- and 3-year-olds.<sup>13</sup> We extend this literature by using a larger, more ethnically diverse sample of children from across the United States, with a much larger percentage of bed-sharers.

There are several limitations to this study. First, our measure of bed-sharing was reported once each year at child ages 1, 2, and 3 years. It is unknown whether mothers' reports reflected regular bed-sharing or temporary arrangements around the time of the home visit. Second, this study did not ask mothers about their reasons for bed-sharing at ages 1, 2, or 3 years. For example, some mothers may freely choose to bed-share, while others may do so out of necessity because of household crowding.

Some research suggests that the outcomes of bed-sharing may depend on whether mothers choose to bed-share<sup>22</sup> or whether bed-sharing occurs in reaction to a child's sleep problems.<sup>35,36</sup> Unfortunately, the present study did not capture that information, because it was not explicitly designed to study sleep habits. Future longitudinal research is needed to test whether associations between bed-sharing in toddlerhood and child behavior and cognition in preschool vary according to the reason for bed-sharing, maternal satisfaction with sleeping arrangement, and the quality of both the child's and the mother's sleep. The age of our data also highlight the need for more recent data collection on this understudied topic.

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## CONCLUSION

These findings suggest that the negative association between bed-sharing between the ages of 1 and 3 years and later behavioral and cognitive outcomes is likely not due to bed-sharing itself but rather to the sociodemographic characteristics of those who are more likely to bed-share.

## ACKNOWLEDGMENTS

This work was supported by grant R21HD060208 (to Dr Hale) from the Eunice Kennedy Shriver National Institute of Child Health and Human Development. The data were drawn from the EHS Research and Evaluation Project, funded by the Administration for Children and Families, US Department of Health and Human Services. The proj-

ect was designed and conducted by the EHS Research Consortium. Research institutions in the consortium include the following: Administration for Children and Families; Catholic University of America; Columbia University; Harvard University; Iowa State University; Mathematica Policy Research; Medical University of South Carolina; Michigan State University; New York University; University of Arkansas; University of California, Los Angeles; University of Colorado Health Sciences Center; University of Kansas; University of Missouri-Columbia; University of Pittsburgh; University of Washington School of Education; University of Washington School of Nursing; and Utah State University.

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