

Supplemental Information

DETAILED PSYCHOMETRICS AND CALCULATION OF RISK AND ASSET INDICES

Familial Risk Index (1–15 Months [Infancy], 24–54 Months [Early Childhood])

Two cumulative familial risk indexes were created by summing across 6 sociodemographic and psychosocial risk factors measured in infancy (1–15 months), and early childhood (24–54 months). First, each risk factor was dichotomized, as described below in each subsection, and then a cumulative index was calculated as an unweighted sum of the dichotomized risk factors for each time period.

Poverty Level

At the 1-month visit, mothers reported detailed demographic and household information, including information on child sex and race, family income and structure, and maternal education (years). At the visits for 1, 6, 15, 24, 36, and 54 months, data were collected on family income and structure. Income-to-needs ratios (INRs) were calculated using poverty threshold values with respect to the year the data were collected and were based on household size and total household income. Next, we created scores that represented poverty levels during infancy (1–15 months) and early childhood (24–54 months). If a household's INR was ≤ 1 at 1, 6, or 15 months, this household was coded

as 1, indicating that they experienced poverty during infancy; INRs >1 were coded as 0 for not impoverished. Similarly, if a household's INR was ≤ 1 at the 24- or 36-month assessment, this household was coded as 1 for poverty in early childhood; INRs >1 were coded as 0 for not impoverished.

Single-Parent Household

At each time of measurement, mothers were asked about their marital status and household composition. Households that were a single-parent nuclear family, single-parent extended or extended and augmented family, or single-parent augmented family were coded as 1 for single-parent households. The remaining household compositions (eg, traditional nuclear family, stepfather family) were coded as 0. This resulted in a binary single-parent household variable for each wave of measurement (1–54 months). Next, we created scores to indicate whether the child lived in a single-parent household during infancy (1–15 months) and early childhood (24–54 months). If the household was a single-parent household at the 1-, 6-, or 15-month assessments, the household was coded as 1, indicating that the child experienced a single-parent household during infancy; all other household structures were coded as 0. Similarly, household structure was coded as 1 if it was a single-parent

household at the 24-, 36-, or 54-month assessment.

Maternal Depression

Maternal depression symptomology was assessed using the Center for Epidemiological Studies Depression scale (CES-D).⁷⁰ The CES-D is the most widely used and validated measure of depressive symptomology among nonclinical samples. Mothers self-reported the frequency with which they had certain feelings about themselves (eg, "I felt depressive," "I thought my life had been a failure") on a 4-point scale (1 = "rarely or none of the time [less than once a week]" to 4 = "most or all of the time [5–7 days a week]"). Items were rescored (1 = 0, 2 = 1, 3 = 2, and 4 = 3) to make the current scores match those used in the literature. Total scores on the CES-D range from 0 to 60, with a cutoff of ≥ 16 , suggesting potential referral for further assessment. Cronbach α for total score was >0.88 at all time points. Intercorrelations among the maternal depression scores were moderate and similar across time (as shown in Supplemental Table 6).

Two steps were taken to prepare the maternal depression scores for the creation of the familial risk indices. In step 1, the maternal depression scores at 1, 6, and 15 months were averaged for each participant to create a mean score for infancy. In step 2, the mean

SUPPLEMENTAL TABLE 6 Intercorrelations Among Maternal Depression Scores Assessed at 1 to 54 Months ($n = 1077$)

	1	2	3	4	5	6
1. Maternal depression, 1 mo	1.00					
2. Maternal depression, 6 mo	0.52***	1.00				
3. Maternal depression, 15 mo	0.44***	0.56***	1.00			
4. Maternal depression, 24 mo	0.41***	0.52***	0.52***	1.00		
5. Maternal depression, 36 mo	0.44***	0.47***	0.50***	0.55***	1.00	
6. Maternal depression, 54 mo	0.42***	0.44***	0.39***	0.50***	0.51***	1.00

*** $P < .001$.

score was dichotomized; scores ≥ 16 (the established cutoff for the CES-D) were coded as 1. Scores < 16 were coded as 0. Similarly, the scores at 24, 36, and 54 months were averaged for each participant to create a mean score for early childhood (step 1); next, the mean score was dichotomized (step 2).

Maternal Health

Maternal health was assessed during the home interview by asking mothers, "How would you describe your health in the last 3 months compared with other women your age," on a scale of 1 = poor, 2 = fair, 3 = good, and 4 = excellent. Intercorrelations among total scores were moderate and consistent across time (Supplemental Table 7). Scores > 75 th percentile, based on the distribution for the current sample, were coded as 1; scores < 75 th percentile were coded as 0.

Two steps were taken to prepare the maternal health scores for the creation of the familial risk indices. In step 1, the health scores at 1, 6, and 15 months were averaged for each participant to create a mean score for infancy. In step 2, the mean score was dichotomized;

scores in the highest quartile (ie, > 75 th percentile), based on the sample distribution, were coded as 1; lower scores were coded as 0. Because this measure does not have preexisting cutoffs for high scores, we used quartile splits to identify the highest scores in a distribution. Similarly, health scores for 24 and 36 months were averaged for each participant (step 1); next, the mean score was dichotomized (step 2).

Maternal Life Event Stress

An index of maternal life event stress when children were 1, 6, 15, and 36 months was created by NICHD SECCYD investigators to represent mothers' reports of stressful life events experienced in the past 3 months.⁷¹ Seven life events were assessed, including death of a relative or close friend, illness of a relative or close friend, job loss of a relative or close friend, maternal job loss, increase of household size, decrease of household size, and household moves. Total possible points ranged from 0 to 7, with higher values indicting greater life event stress. Intercorrelations among total scores were weak to moderate and consistent across time

(Supplemental Table 8). Scores > 75 th percentile, based on the distribution for the current sample, were coded as 1; scores < 75 th percentile were coded as 0.

Two steps were taken to prepare the life event stress data for the creation of the familial risk indices. In step 1, the life event stress scores at 6 and 15 months were averaged for each participant to create a mean score for infancy. In step 2, the mean score was dichotomized; scores in the highest quartile (ie, > 75 th percentile), based on the current sample distribution, were coded as 1; lower scores were coded as 0. Because this measure does not have preexisting cutoffs for high scores, we used quartile splits to identify the highest scores in a distribution. Similarly, the life event stress scores at the 24 and 36 months were averaged for each participant (step 1); next, each mean score was dichotomized (step 2).

Parenting Stress

Parenting stress was assessed using a modified version of the Parent Role Quality Scale,⁷² a 20-item measure in which mothers self-report on their experiences as a

SUPPLEMENTAL TABLE 7 Intercorrelations Among Maternal Health Scores Assessed at 1 to 36 Months ($n = 1077$)

	1	2	3	4	5
1. Maternal health, 1 mo	1.00				
2. Maternal health, 6 mo	0.45***	1.00			
3. Maternal health, 15 mo	0.44***	0.41***	1.00		
4. Maternal health, 24 mo	0.38***	0.39***	0.46***	1.00	
5. Maternal health, 36 mo	0.36***	0.34***	0.39***	0.45***	1.00

*** $p < .001$.

SUPPLEMENTAL TABLE 8 Intercorrelations Among Maternal Life Event Stress Scores Assessed at 1 to 36 Months ($n = 1077$)

	1	2	3	4
1. Life event stress, 1 mo	1.00			
2. Life event stress, 6 mo	0.30***	1.00		
3. Life event stress, 15 mo	0.19***	0.24***	1.00	
4. Life event stress, 36 mo	0.18***	0.22***	0.25***	1.00

*** $p < .001$.

parent that are most rewarding and of greatest concern. This measure was administered at 15, 24, and 36 months. Concern items (10 items; eg, “How much of a concern is having too much to do for your child or children?”) were scored on a 4-point scale from 1 = “not at all a concern” to 4 = “extremely.” Similarly, reward items (10 items; eg, “How rewarding is sharing interests or activities with your child?”) were scored on a 4-point scale from 1 = not at all rewarding to 4 = extremely rewarding. The measure was modified by NICHD SECCYD investigators on the basis of data from a study of 166 parents with children <6 years of age. All 10 reward items were averaged to create a mean reward score; similarly, all 10 concern items were averaged to create a mean concern score. Next, a sum score was created using the following equation,

$$\text{Parenting stress} = (\text{concerns} + (\text{rewards} [\text{reverse coded}])),$$

with higher scores indicating higher parenting stress. Cronbach α was >0.70 at all time points, except for age 15 months when the α was 0.64. Intercorrelations among the parenting stress scores were moderate and similar across time (Supplemental Table 9).

Two steps were taken to prepare the parenting stress data for the creation of the familial risk indices. In step 1, the parenting stress scores at 24 and 36 months were averaged for each participant to create a mean score for early childhood. In step 2, the mean score was

dichotomized; scores in the highest quartile (ie, >75th percentile), based on the sample distribution, were coded as 1; lower scores were coded as 0. Because this measure does not have preexisting cutoffs for high scores, we used quartile splits to identify the highest scores in a distribution. Similarly, the score for parenting stress at 15 months was dichotomized.

Familial Assets Index (1–15 Months [infancy], 24–54 Months [Early Childhood])

Two cumulative familial assets indices were created using 3 sociodemographic, psychosocial, and contextual factors measured between 1 and 15 months (infancy) and 24 and 54 months (early childhood). As described in the subsections below, each of the 3 familial assets were dichotomized; next, a cumulative index was calculated as an unweighted sum of the familial assets for each time period.

Maternal Sensitivity

Maternal sensitivity was assessed from 15 minutes of semistructured, mother-child free play videotaped during a laboratory visit and later coded by trained coders; procedure details are available elsewhere.^{20,21} Mothers’ behavior during the 6-, 15-, and 24-month visits were rated by trained coders on 4-point scales of (1) maternal sensitivity to nondistress, (2) positive regard, and (3) intrusiveness during play (reversed). A total maternal sensitivity score was created by summing the 3 scales. Mothers’ behaviors during the 36- and 54-month visits were rated on 3 conceptually similar, but more

developmentally appropriate 7-point scales as follows: (1) supportive presence, (2) respect for autonomy, and (3) hostility (reversed). Maternal sensitivity total scores at 36 and 54 months were transformed to be equivalent to the 4-point scale used earlier. Interrater reliabilities (intercorrelation coefficients) for the maternal sensitivity composites were >0.80 at all time points. Cronbach α for the maternal composite measures were >0.70 at all time points. Intercorrelations among the maternal sensitivity scores were moderate and similar across time (Supplemental Table 10), with the highest correlation being observed between the 36- and 54-month measures.

Two steps were taken to prepare the maternal sensitivity data for the creation of the familial asset indices. In step 1, the maternal sensitivity composite scores at 6 and 15 months were averaged for each participant to create a mean score for infancy. In step 2, the mean score was dichotomized; scores in the highest quartile (ie, >75th percentile) were coded as 1; lower scores were coded as 0. Because this measure does not have preexisting cutoffs for high scores, we used quartile splits to identify the highest scores in a distribution. Similarly, the 24-, 36-, and 54-month maternal sensitivity composite scores were averaged for each participant (step 1); next, the mean score was dichotomized (step 2).

Home Enrichment

Home enrichment was assessed using the infant and early childhood versions of the Home Observation for Measurement of the

SUPPLEMENTAL TABLE 9 Intercorrelations Among Parenting Stress Scores Assessed at 15 to 36 Months ($n = 1077$)

	1	2	3
1. Parenting stress, 15 mo	1.00		
2. Parenting stress, 24 mo	0.64***	1.00	
3. Parenting stress, 36 mo	0.56***	0.63***	1.00

*** $p < .001$.

SUPPLEMENTAL TABLE 10 Intercorrelations Among Maternal Sensitivity Scores Assessed at 6 to 54 Months ($n = 1077$)

	1	2	3	4	5
1. Maternal sensitivity, 6 mo	1.00				
2. Maternal sensitivity, 15 mo	0.39***	1.00			
3. Maternal sensitivity, 24 mo	0.31***	0.40***	1.00		
4. Maternal sensitivity, 36 mo	0.41***	0.41***	0.49***	1.00	
5. Maternal sensitivity, 54 mo	0.34***	0.34***	0.44***	0.52***	1.00

*** $p < .001$.

Environment (H.O.M.E.) Inventory,^{68,73,74} two widely used assessments of the quality and extent of stimulation and support available to young children in their home environment. The 45-item, infant/toddler version of the H.O.M.E. Inventory (IT-H.O.M.E.) was designed to be administered from birth to 3 years of age and comprises subscales for parent responsiveness, acceptance of the child, parental involvement, organization of the environment, learning materials, and variety in experience. For the NICHD sample, the IT-H.O.M.E. was administered at the 6- and 15-month home visits. At each home visit, using a score sheet containing the IT-H.O.M.E. items (eg, "Caregiver permits child to engage in 'messy' play"), the interviewers checked off during a semistructured interview whether "the behavior [was] observed during the visit or if the parent [reported] that the conditions or events [were] characteristic of the home environment" for each item. Each checked item was coded as 1 (ie, yes); unchecked items were coded as 0 (ie, no). Scores were summed to generate a total score (range, 0–45). The early childhood version of the H.O.M.E. Inventory (EC-H.O.M.E.; 55-items) was similarly administered in the NICHD SECCYD

sample at the 36- and 54-month home visits. The EC-H.O.M.E. was designed to be administered between ages 3 and 6 years and comprises subscales measuring parent responsiveness, acceptance of the child, learning materials, variety in experience, language stimulation, physical environment, academic stimulation, and modeling. The EC-H.O.M.E. was administered and coded similarly to the IT-H.O.M.E.. Both measures have been shown to have considerable overlap in their underlying factor structure,⁷³ making them appropriate for longitudinal analyses. In the NICHD sample, both measures had interrater reliabilities >0.90 . Intercorrelations among the total H.O.M.E. scores were similar across time (Supplemental Table 11), with the highest correlation observed between the 36- and 54-month measures. Two steps were taken to prepare the H.O.M.E. data for the creation of the familial asset indices. In step 1, the H.O.M.E. scores at 6 and 15 months were averaged for each participant to create a mean score for infancy. In step 2, the mean score was dichotomized; scores in the highest quartile (ie, >75 th percentile), based on the sample distribution, were coded as 1; lower scores were coded as 0. Because this measure does not have

preexisting cutoffs for high scores, we used quartile splits to identify the highest scores in a distribution. Similarly, the H.O.M.E. scores at 36 and 54 months were averaged for each participant (step 1); next, the mean score was dichotomized (step 2).

Maternal College Education

Mothers reported their years of education at the 1-month assessment. If years of education ≥ 16 years, maternal education was coded as 1; fewer years of education was coded as 0. This dichotomized score was used for both familial assets indices.

Child Self-Regulation Index (36–54 months [Early Childhood])

A cumulative index for child self-regulation was created on the basis of child performance in 2 behavioral tasks and 1 parental measure designed to assess children's self-regulatory skills. Each of the 3 child self-regulation measures was dichotomized, as described in each subsection below, and then summed to create a cumulative index score.

Toy Self-Control Task

A video-recorded toy self-control task, administered at 36 months of age, assessed children's ability to delay or inhibit play with an appealing toy after having been asked to do so by a trained interviewer. Each child was left alone with the target toy for 150 seconds, and latency to first active engagement was coded; interrater reliability was 0.92. Children who waited ≥ 75 seconds in the toy self-

SUPPLEMENTAL TABLE 11 Intercorrelations Among H.O.M.E. Scores Assessed at 6 to 54 Months ($n = 1077$)

	1	2	3	4
1. H.O.M.E., 6 mo	1.00			
2. H.O.M.E., 15 mo	0.58***	1.00		
3. H.O.M.E., 36 mo	0.50***	0.56***	1.00	
4. H.O.M.E., 54 mo	0.50***	0.53***	0.71***	1.00

*** $p < .001$.

SUPPLEMENTAL TABLE 12 Distribution of Study Variables Among Imputed and Nonimputed Samples

	Imputed Dataset Descriptives	Nonimputed Dataset Descriptives		
	Mean (95% CI)	Mean (95% CI)	No. (Sample Size of Available Data)	% Missing
Sociodemographics				
Child sex, % female	49.7	49.7	1077	0.0
Child race, % ^a				
White (non-Hispanic)	77.5	77.5	835	
Black (non-Hispanic)	11.9	11.9	128	
Other	10.6	10.6	114	
Pubertal status				
Tanner pubertal stage, 11 y	2.2 (2.2–2.3)	2.2 (2.2–2.3)	776	27.9
Familial assets				
Maternal sensitivity				
6 mo	9.2 (9.1–9.3)	9.2 (9.1–9.3)	1047	2.8
15 mo	9.4 (9.3–9.5)	9.4 (9.3–9.5)	1052	2.3
24 mo	9.4 (9.3–9.5)	9.4 (9.3–9.5)	1024	4.9
36 mo	17.2 (17.1–17.4)	17.3 (17.1–17.4)	1020	5.3
54 mo	16.9 (16.8–17.1)	17.0 (16.8–17.2)	937	13.0
H.O.M.E. Inventory				
6 mo	36.6 (36.4–37.0)	36.8 (36.5–37.0)	1053	2.2
15 mo	37.4 (37.1–37.7)	37.4 (37.2–37.7)	1046	2.9
36 mo	41.5 (41.1–42.0)	41.6 (41.2–42.1)	1028	4.5
54 mo	45.9 (45.5–46.2)	46.0 (45.7–46.4)	941	12.6
Maternal education (assessed at 1 mo), y	14.4	14.4	1077	0.0
Child behavioral regulation				
Self-control task at 36 mo, latency to touch, s	92.4 (88.0–96.8)	93.2 (88.8–97.5)	962	10.7
Delay of gratification at 54 mo, % waited for delayed reward	52.3 (48.9–55.7)	54.1 (50.8–57.4)	875	18.8
Inhibitory control at 54 mo, mean	4.7 (4.6–4.7)	4.6 (4.6–4.7)	957	11.1
Familial risk				
Maternal depression				
1 mo	11.1	11.1	1077	0.0
6 mo	8.9 (8.4–9.4)	8.9 (8.4–9.4)	1053	2.2
15 mo	8.9 (8.4–9.4)	8.9 (8.4–9.4)	1053	2.2
24 mo	9.6 (9.0–10.1)	9.4 (8.9–9.9)	970	9.9
36 mo	9.2 (8.7–9.7)	9.1 (8.6–9.7)	1043	3.2
54 mo	9.8 (9.3–10.4)	9.8 (9.2–10.3)	970	9.9
Maternal health status				
1 mo	3.5	3.5	1077	0.0
6 mo	3.3 (3.2–3.3)	3.3 (3.2–3.3)	1054	2.1
15 mo	3.2 (3.2–3.3)	3.2 (3.2–3.3)	1053	2.2
24 mo	3.1 (3.1–3.2)	3.1 (3.1–3.2)	1043	3.2
36 mo	3.1 (3.0–3.1)	3.1 (3.0–3.1)	1053	2.2
Household INR				
1 mo	2.9 (2.7–3.0)	2.9 (2.8–3.1)	1015	5.8
6 mo	3.7 (3.5–3.9)	3.7 (3.6–3.9)	1046	2.9
15 mo	3.7 (3.5–3.9)	3.7 (3.5–3.9)	1047	2.8
24 mo	3.7 (3.5–3.9)	3.8 (3.6–3.9)	1032	4.2
36 mo	3.6 (3.4–3.8)	3.6 (3.4–3.8)	1046	2.9
Maternal life events				
6 mo	1.0 (0.9–1.1)	1.0 (0.9–1.1)	1054	2.1
15 mo	1.1 (1.1–1.2)	1.1 (1.1–1.2)	1053	2.2
24 mo	1.2 (1.1–1.2)	1.2 (1.1–1.2)	1045	3.0
36 mo	1.3 (1.2–1.3)	1.3 (1.2–1.3)	1053	2.2
Parenting stress				
15 mo	34.1 (33.7–34.4)	34.1 (33.7–34.5)	1052	2.3
24 mo	34.4 (33.9–34.8)	34.4 (34.0–34.8)	964	10.5
36 mo	34.3 (33.9–34.6)	34.3 (33.9–34.6)	1042	3.2
Single-parent household, %				
1 mo	13.1 (11.1–15.1)	13.1 (11.1–15.1)	1075	0.2
6 mo	13.4 (11.3–15.4)	12.5 (10.4–14.5)	1048	2.7
15 mo	14.1 (12.1–16.2)	13.4 (11.3–15.5)	1049	2.6

SUPPLEMENTAL TABLE 12 Continued

	Imputed Dataset Descriptives Mean (95% CI)	Nonimputed Dataset Descriptives		
		Mean (95% CI)	No. (Sample Size of Available Data)	% Missing
24 mo	14.2 (12.1–16.3)	13.5 (11.5–15.7)	1042	3.3
36 mo	16.6 (14.3–18.8)	16.2 (13.9–18.4)	1049	2.6
54 mo	16.7 (14.4–19.0)	15.6 (13.3–18.0)	970	9.9

CI, confidence interval.

^a Mothers reported on their child's race and ethnicity using the following categories: (1) American Indian, Eskimo, Aleut; (2) Asian or Pacific Islander; (3) Black or African American; (4) White; and (5) other. They were also asked to indicate whether their child is Hispanic. These data were used to classify children into the following race/ethnic categories: non-Hispanic White, non-Hispanic Black, and other.

control task were scored 1; children who did not wait were scored 0.

Delay of Gratification

At 54 months, children completed a delay of gratification task,¹⁶ a video-recorded assessment of children's ability to control their impulses and wait for a larger reward. In this task, children had the opportunity to choose between an immediate, small food reward (eg, a mini chocolate bar) or a larger, but less immediate reward (eg, a large chocolate bar) that they would have to wait 7 minutes to receive. Children who waited the full 7 minutes were scored 1; children who did not wait were scored 0.

Inhibitory Control

At 54 months, mothers reported on their children's inhibitory control, a temperament-based dimension of self-regulation referring to the ability to suppress dominant responses under instructions or in novel uncertain situations, using the Children's Behavior Questionnaire.⁶⁹ Inhibitory control was measured using 13 items (eg, "[Child] can wait before entering into new activities if s/he is asked to") on a Likert-type scale (1 = extremely untrue to 7 = extremely true); responses were averaged ($\alpha = 0.74$). Because this measure does not have preexisting cutoffs for high scores, we used quartile splits to identify the highest scores based on the current sample's

distribution. Scores in the highest quartile (ie, >75th percentile) were coded as 1; lower scores were coded as 0.

SUPPLEMENTAL REFERENCES

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