**APPENDIX 1: SUPPLEMENTARY MATERIAL**

**Description of Caregiver-Child Dyads.** At the five year follow-up, children and their primary caregivers participated in a 15-minute semi-structured parent-child interaction (PCI). Of the caregivers that participated in the PCI, 133 (95.0%) were mothers and 7 (5.0%) were fathers. Reasons for fathers attending the assessment and participating in the PCI included: father had sole custody of the child (*n*=1); parents were separated and had shared custody of the child, but the father was the only English-speaking parent (*n*=1); and child was being raised in a two-parent household but the mother was unable to take time off work to attend the appointment (*n*=5). There was no difference in the proportion of children born very preterm (VPT) and children born full-term (FT) that participated in the PCI with their mother or father (*x*2=2.57, *p*=0.14). Importantly, there were no differences in PCI ratings between mothers and fathers (Table S1).

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| **Table S1.** Maternal and Paternal Parenting Behavior at the Five Year Follow-up Assessment (*n*=140). | | | | |
| *M (SD)* | **Mothers (*n*=133)** | **Fathers (*n*=7)** | **Welch statistic** | ***p*** |
| Sensitivity | 4.05 (1.1) | 4.14 (0.9) | 0.08 | .79 |
| Intrusiveness | 1.63 (0.9) | 1.29 (0.5) | 2.94 | .12 |
| Positive Regard | 3.76 (1.1) | 3.43 (1.3) | 0.45 | .52 |
| Negative Regard | 1.28 (0.7) | 1.00 (0.0) | - | - |
| Stimulation of Cognition | 3.20 (1.1) | 2.57 (0.5) | 1.37 | .28 |
| *Note.* Welch Robust Test of Equality of Means *p*-values reported for two-sample *t*-test with unequal samples and equal population variances not assumed. Welch *p*-value could not be calculated for Negative Regard because there was no variance for father ratings (*i.e*., all seven fathers received rating of 1). Of the dyads that returned for follow-up (*n*=154), there was 9.1% (*n*=14) missing PCI data (technical failure of video equipment) that could not be estimated when using two-sample *t*-tests. | | | | |

There were also no significant differences between mothers and fathers in terms of mean depression symptoms, anxiety symptoms, ADHD symptoms, or social-communication interaction problems. Mothers did, however, report higher levels of parenting stress than fathers (Table S2).

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| **Table S2.** Maternal and Paternal Psychosocial Background Factors (*n*=117). | | | | |
| *M (SD)* | **Mothers (*n*=112)** | **Fathers (*n*=5)** | **Welch statistic** | ***p*** |
| Depression symptoms | 6.49 (8.3) | 4.20 (4.0) | 1.36 | .29 |
| Anxiety symptoms | 33.44 (10.3) | 33.60 (18.0) | <0.01 | .99 |
| ADHD symptoms | 42.63 (11.2) | 43.60 (10.4) | 0.04 | .85 |
| Social-communication interaction problems | 47.84 (10.1) | 44.00 (6.8) | 1.16 | .35 |
| Parenting stress percentiles | 35.14 (33.5) | 11.10 (7.3) | 27.04 | <.001 |
| *Note.* Welch Robust Test of Equality of Means *p*-values reported for two-sample *t*-test with unequal samples and equal population variances not assumed. Data shown for parent sample (*i.e*., excluding duplicate parental psychosocial measure values of sibling children from multiple preterm birth) with PCI data. | | | | |

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| **Table S3**. Summary of Principal Component Analysis on Dimensions of Parenting Behavior (*n*=140). | | |
|  | **Factor 1** | **Factor 2** |
| Variance explained (%) | 57.09 | 21.93 |
| Eigenvalues (Total) | 2.85 | 1.10 |
| Parenting Dimension Loadings |  |  |
| Negative Regard | .88 |  |
| Intrusiveness | .88 |  |
| Stimulation of Cognition |  | .88 |
| Positive Regard |  | .81 |
| Sensitivity |  | .70 |
| *Note.* Extraction method: PCA, Rotation method: Varimax with Kaiser Normalization | | |

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| **Table S4**. Markers of Neighborhood Disadvantage Included in Area Deprivation Index Percentiles. a | |
| **Demographics** | * Percent of the population aged 25 and older with less than 9 years of education * Percent of the population aged 25 and older with at least a high school diploma * Percent of single-parent households with children less than 18 years of age * Percent employed persons aged 16 and older in white-collar occupations * Percent of civilian labor force population aged 16 years and older who are unemployed |
| **Income/poverty** | * Median family income in USA dollars * Income disparity * Percent of families below federal poverty level * Percent of the population below 150% of the federal poverty threshold |
| **Housing** | * Median home value in USA dollars * Median gross rent in USA dollars * Median monthly mortgage in USA dollars * Percent of owner-occupied housing units * Percent of households with more than 1 person per room |
| **Basic necessities** | * Percent of households without a motor vehicle * Percent of households without a telephone * Percent of occupied housing units without complete plumbing |
| a Kind AJH, Buckingham W. Making Neighborhood Disadvantage Metrics Accessible: The Neighborhood Atlas. *New England Journal of Medicine*, 2018. 378: 2456-2458. DOI: 10.1056/NEJMp1802313. PMCID: PMC6051533. See also: https://www.neighborhoodatlas.medicine.wisc.edu/ | |

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| **Table S5.** Bivariate Correlations between Parental Psychosocial Adversity Measures. | | | | | |
|  | **1.** | **2.** | **3.** | **4.** | **5.** |
| **1.** Depression symptoms | - |  |  |  |  |
| **2.** Anxiety symptoms | .63 \*\*\* | - |  |  |  |
| **3.** ADHD symptoms | .49 \*\*\* | .54 \*\*\* | - |  |  |
| **4.** Social-communication interaction problems | .56 \*\*\* | .59 \*\*\* | .55 \*\*\* | - |  |
| **5.** Parenting stress percentiles | .54 \*\*\* | .65 \*\*\* | .51 \*\*\* | .55 \*\*\* | - |
| *\*\*\* p* ≤ .001 *Note.* Spearman Rho reported. Data shown for parent sample (*i.e*., excluding duplicate parental psychosocial measure values of sibling children from multiple preterm birth). Correlation *n* range: 125 – 109 depending on missing data across measures. Correlations were not adjusted for children’s birth-group because there were no significant between-groups differences on parental psychosocial measures (see Table 1 main body of the manuscript). | | | | | |

**Associations between Infant Clinical Factors and Executive Function Ability at Age Five Years in Children Born VPT**

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| **Table S6.** Bivariate Correlations between Infant Clinical Factors and Executive Function Ability (*n*=86). | | | | |
|  | **1.** | **2.** | **3.** | **4.** |
| **1.** Executive Function Component Score | - |  |  |  |
| **2.** Gestational age a | -.17 | - |  |  |
| **3.** Birthweight a | -.06 | .76 \*\*\* | - |  |
| **4.** Infant clinical risk index b | .03 | -.54 \*\*\* | -.55 \*\*\* | - |
| a Pearson correlation reported. b Spearman Rho reported. Description of infant clinical risk index provided in main manuscript. *\*\*\* p* ≤ .001 | | | | |

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| **Table S7.** Comparison of Executive Function Ability between Children born VPT with None, Mild or Moderate/Severe Neonatal White Matter Abnormalities (*n*=57) | | | | | |
|  | **Non (*n*=19)** | **Mild (*n*=22)** | **Moderate/**  **Severe (*n*=16)** | ***F*** | ***p*** |
| Executive Function Component Score, *m (SD)* | -0.33 (1.09) | -0.45 (0.98) | -0.39 (0.83) | .07 | .93 |
| *Note.* White matter abnormalities were assessed from term-equivalent postmenstrual age MRI using the qualitative scoring system described in: Kidokoro, H., Neil, J. J., & Inder, T. E. (2013). New MR imaging assessment tool to define brain abnormalities in very preterm infants at term. *American Journal of Neuroradiology*, *34*(11), 2208–2214. DOI: org/10.3174/ajnr.A3521 | | | | | |

**Age, Educational Setting, and Child Executive Function.** At the five year follow-up, information from parent- and teacher- reports was collected to determine whether children were in an early childhood education setting (day-care and pre-kindergarten) or in a primary school setting (kindergarten and grade school, collectively referred to elementary school in the USA). As shown in Table S8, most of the children in this study were in a primary school setting at the time of their follow-up assessment (64%). Children born FT (86%) were more likely to be in a primary school setting compared to children born VPT (59%). However, as shown in Table S9, school setting was not significantly related to EF ability (*p*=.41) over and above the effect of preterm birth (*p*=.001), and there was no interaction between birth group and school setting on EF ability (*p*=.37). When taken together, these results suggest that schooling at this age did not explain birth-group differences in EF performance. Interestingly, we note that these findings are consistent with our finding that age at assessment was not correlated with EF performance (*r*=.11, *p*=.25).

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| **Table S8.** Rates of Early Childhood and Primary Education for Children Born VPT and Children Born FT (*n*=141). | | | | | |
|  | **All Children** | **VPT Group** | **FT Group** | ***X2*** | **VPT vs. FT *p*** |
| Early childhood education, % *(n)* | 29.8 (42) | 41.0 (34) | 13.8 (8) |  |  |
| Primary school, % *(n)* | 70.2 (99) | 59.0 (49) | 86.2 (50) | 12.05 | .001 |
| *Note.* School information was unable to be obtained for 13 (VPT=5, FT=8) children due to parent unwilling to provide school contact information. Missing school data could not be estimated in chi-square analysis. | | | | | |

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| **Table S9.** Associations between Birth Group and School Setting on Executive Function Ability at Age Five Years (*n*=154). | | | |
|  | **Estimate** | **Standard Error** | ***p*** |
| Birth group | 0.78 | 0.23 | .001 |
| School setting | -0.22 | 0.26 | .41 |
| Interaction: Birth group with School setting | -0.44 | 0.49 | .37 |
| *Note.* Estimates from linear mixed-effect models shown. Family membership included to account for sibling correlation. Birth Group coded FT=0, VPT=1. School Setting coded Early Childhood Education=1, Primary School=2. For linear mixed-effect models conducted in SPSS, the highest value of a categorical factor is used as the reference group. | | | |

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| **Table S10**. Bivariate Associations between Parental Background Factors and Parenting Behavior Component Scores. | | | |
|  | **Estimate** | **Standard Error** | ***p*** |
| **Positive Parenting Component Score** |  |  |  |
| Parent depression symptoms | 0.01 | 0.103 | .92 |
| Parent anxiety symptoms | -0.12 | 0.093 | .20 |
| Parent ADHD symptoms | -0.13 | 0.095 | .18 |
| Parent social-communication interaction problems | -0.24 | 0.094 | .01 |
| Parenting stress percentiles | -0.19 | 0.091 | .04 |
| Socioeconomic Adversity Composite a | -0.16 | 0.091 | .08 |
| Maternal demographic stressor index | -0.18 | 0.090 | .05 |
| Income-to-Needs Ratio | 0.12 | 0.088 | .18 |
| Area Deprivation Index | -0.16 | 0.090 | .07 |
| **Negative Parenting Component Score** |  |  |  |
| Parent depression symptoms | 0.21 | 0.077 | .006 |
| Parent anxiety symptoms | 0.10 | 0.069 | .16 |
| Parent ADHD symptoms | 0.12 | 0.069 | .08 |
| Parent social-communication interaction problems | 0.35 | 0.062 | <.001 |
| Parenting stress percentiles | 0.18 | 0.068 | .009 |
| Socioeconomic Adversity Composite a | 0.29 | 0.061 | <.001 |
| Maternal demographic stressor index | 0.28 | 0.064 | <.001 |
| Income-to-Needs Ratio | -0.21 | 0.066 | .002 |
| Area Deprivation Index | 0.25 | 0.060 | <.001 |
| *Note.* Standardized estimates from linear mixed-effect models shown. Birth-group and family membership included in all models to account for children born very preterm and sibling correlation.  a Socioeconomic Adversity Composite Score based upon summation of maternal demographic stressor index, Income-to-Needs Ratio (reversed scored), and Area Deprivation Index percentile *z*-scores. | | | |

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| **Table S11.** Between-Groups Differences in Parenting Quality Component Scores by Demographic Stressor Factor | | | | |
| **Dependent variable, *M (SD)*** | **Independent variable, Demographic Stressor** | **Stressor present** | **Stressor absent** | ***p*** |
| Positive Parenting Component Score | Young mother at delivery (≤ 18 years) | -0.90 (0.93) | 0.04 (0.83) | .04 |
| Racial minority population | -0.07 (0.85) | 0.05 (0.85) | .53 |
| No High School degree | -0.24 (0.90) | 0.05 (0.84) | .40 |
| Single parent | -0.21 (0.85) | 0.20 (0.85) | .03 |
| Public health insurance | -0.16 (0.83) | 0.22 (0.83) | .04 |
| Negative Parenting Component Score | Young mother at delivery (≤ 18 years) | 0.18 (0.76) | -0.09 (0.68) | .44 |
| Racial minority population | 0.06 (0.68) | -0.20 (0.68) | .06 |
| No High School degree | 0.62 (0.70) | -0.13 (0.66) | .003 |
| Single parent | 0.20 (0.64) | -0.27 (0.64) | <.001 |
| Public health insurance | 0.22 (0.63) | -0.35 (0.64) | <.001 |
| *Note.* Estimated means and standard errors from linear mixed-effect models shown. Birth-group and family membership included in all models to account for child prematurity and sibling correlation. See Table 1 of main manuscript for *n* for each demographic stressor factor. | | | | |

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| **Table S12**. Bivariate Associations between Socio-environmental Background Factors and Executive Function Component Scores. | | | |
|  | **Estimate** | **Standard Error** | ***p*** |
| Positive Parenting Component Score | 0.01 | 0.100 | .90 |
| Negative Parenting Component Score | -0.31 | 0.108 | .005 |
| Parental involvement in home learning | 0.27 | 0.102 | .01 |
| Parent depression symptoms | -0.40 | 0.118 | .001 |
| Parent Anxiety Symptoms | -0.24 | 0.091 | .009 |
| Parent ADHD symptoms | -0.01 | 0.110 | .95 |
| Parent social-communication interaction problems | -0.20 | 0.132 | .14 |
| Parenting stress percentiles | -0.14 | 0.094 | .14 |
| Parent FSIQ score | 0.34 | 0.095 | .001 |
| Child FSIQ score | 0.58 | 0.091 | <.001 |
| Socioeconomic Adversity Composite a | -0.42 | 0.085 | <.001 |
| Maternal demographic stressor index | -0.38 | 0.091 | <.001 |
| Income-to-needs ratio | 0.28 | 0.087 | .002 |
| Area Deprivation Index | -0.41 | 0.080 | <.001 |
| *Note.* Standardized estimates from linear mixed-effect models shown. Birth-group and family membership included in all models to account for children born very preterm and sibling correlation. FSIQ, Full Scale Intellectual Quotient. a Socioeconomic Adversity Composite Score based upon summation of maternal demographic stressor index, Income-to-Needs Ratio (reversed scored), and Area Deprivation Index percentile *z*-scores. | | | |

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| **Table S13.** Domain-Specific Associations between PCIRS Subscales and Executive Function Ability (*n*=154). | | | | | |
| **PCIRS Subscales** | **EF Component Scores** | **Working Memory Accuracy** | **Inhibition Efficiency** | **Shifting Efficiency** | **Executive control Efficiency** |
| **Sensitivity** | 0.14 (0.09) | 2.79 (0.80) \*\*\* | 0.01 (0.03) | 0.03 (0.02) | 0.02 (0.02) |
| **Cognitive Stimulation** | 0.02 (0.09) | 1.70 (0.76) \* | 0.02 (0.03) | 0.01 (0.02) | -0.02 (0.02) |
| **Positive Regard** | 0.06 (0.09) | 1.25 (0.78) | -0.01 (0.03) | 0.02 (0.02) | 0.02 (0.02) |
| **Intrusiveness** | -0.34 (0.12) \*\* | -3.36 (0.94) \*\*\* | -0.08 (0.04) \* | -0.07 (0.02) \*\* | -0.07 (0.03) \* |
| **Negative Regard** | -0.47 (0.18) \*\* | -3.21 (1.3) \* | -0.06 (0.05) | -0.09 (0.03) \*\* | -0.11 (0.04) \* |
| *\* p* ≤ .05 *\*\* p* ≤ .01 *\*\*\* p* ≤ .001 *Note.* Estimates from linear mixed-effect models shown. Birth-group and family membership included in all models to account for children born very preterm and sibling correlation. | | | | | |

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| **Table S14**. Associations Between Psychosocial Risk Factors and Executive Function Ability Adjusted for Parent and Child Intellectual Quotient (*n*=154). | | | | | |
| ***Models with parental depression symptoms*** | | | ***Models with parental anxiety symptoms*** | |  |
|  | **Estimate *(SE)*** | ***p*** |  | **Estimate *(SE)*** | ***p*** |
| Birth group | 0.27 (0.18) | .13 | Birth group | 0.26 (0.17) | .13 |
| Parental depression symptoms | -0.24 (0.11) | .03 | Parental anxiety symptoms | -0.22 (0.07) | .003 |
| Socioeconomic Adversity Composite a | -0.25 (0.11) | .03 | Socioeconomic Adversity Composite a | -0.27 (0.11) | .01 |
| Child FSIQ score | 0.47 (0.11) | <.001 | Child FSIQ score | 0.46 (0.10) | <.001 |
| Parent FSIQ score | 0.04 (0.12) | .73 | Parent FSIQ score | 0.06 (0.11) | .59 |
| *Note.* Standardized estimates from linear mixed-effect models shown. Family membership included in all models to account for sibling correlation. *SE*, Standard Error. FSIQ, Full Scale Intellectual Quotient. Birth Group coded FT=0, VPT=1. For linear mixed-effect models conducted in SPSS, the highest value of a categorical factor is used as the reference group.  a Socioeconomic Adversity Composite Score based upon summation of maternal demographic stressor index, Income-to-Needs Ratio (reversed scored), and Area Deprivation Index percentile *z*-scores. | | | | | |