SUPPLEMENTARY INFORMATION

Developmental Correlates of Accelerated Molar Eruption in Early Childhood

McDermott *et al.*

Supplemental Methods

MRI Data Acquisition. Imaging was performed at the Center for Advanced Magnetic Resonance Imaging and Spectroscopy (CAMRIS) at the University of Pennsylvania. Scanning was performed using a Siemens MAGNETOM Prisma 3-Tesla MRI scanner with a 32-channel head coil. A whole-brain T2-weighted sampling perfection with application optimized contrast using different angle evolutions (SPACE) structural image was acquired (acquisition parameters: TR = 3200 ms, TE = 4.06 ms, variable flip angle, voxel size = 1 mm isotropic, matrix size = 256 x 256, 176 sagittal slices, FOV = 256 mm).

Molar Eruption Rating Criteria. In stage 1, the molar along with the follicular space is fully within the alveolar bone. In stage 2, the molar is partially erupted but submerged within the soft tissues, and the follicular space is reduced. In stage 3, the molar is partially erupted into the oral cavity but is not yet in occlusion. In stage 4, the molar is fully erupted and in occlusion (i.e., the maxillary and mandibular molars are in contact), and there is no evidence of remaining follicular space. Example images for each stage can be found in McDermott et al. (2021).

Supplemental Tables and Figures

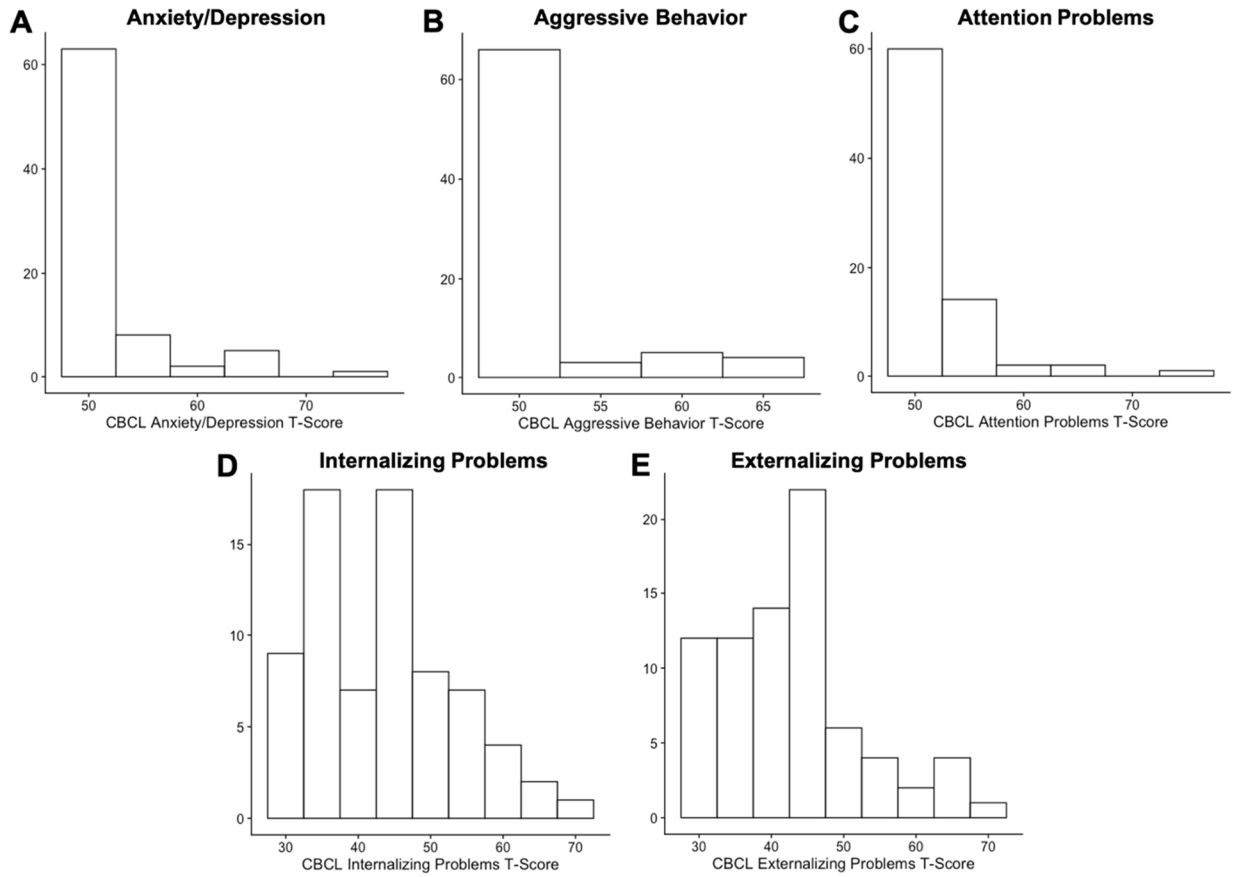

Figure S1. Distribution of T-scores on the three 'AAA' subscales of the Child Behavior Checklist: (A) Anxiety/Depression, (B) Aggressive Behavior, and (C) Attention Problems. Due to the skewed distribution of these subscales, we elected to instead analyze T-scores for the two CBCL composite scales, (D) Internalizing Problems, and (E) Externalizing Problems.

	N	Mean (SD)	Range
Age (years)	117	5.6 (0.9)	4.1 - 7.3
Family Income (thousands of dollars)	108	80 (67)	2.5 - 2000
Adverse Childhood Experiences	111	1 (1.3)	0 - 7
WPPSI Matrix Reasoning (Scaled Score)	116	10.5 (3.4)	3 - 18
WPPSI Picture Memory (Scaled Score)	106	10.2 (3.5)	1 - 17
WPPSI Bug Search (Scaled Score)	76†	10.2 (2.5)	4 - 15
WPPSI Information (Scaled Score)	115	10.6 (3.3)	1 - 19
Key Math Numeration (Scaled Score)	80††	10.5 (3.7)	1 - 19
CBCL Internalizing Problems (T-Score)	74†	43 (10)	29 - 68
CBCL Externalizing Problems (T-Score)	77†	43 (10)	28 - 68
	N	**Percent**	
Gender			
Female	64	55%	
Male	53	45%	
Race			
Black	48	41%	
White	36	31%	
Hispanic	14	12%	
Asian	5	4%	
Multiracial and Other	14	12%	

Table S1. Descriptive statistics.

†Sample sizes for WPPSI Bug Search and the CBCL questionnaire are smaller as these were only administered in one of the two samples included in this study.
††Sample size for Key Math Numeration is smaller as this test is only standardized for children ages 5 years and up.

	Age	Stress Risk Factor Score	Matrix Reasoning	Picture Memory	Bug Search	Information	Numeration	Internalizing Problems	Externalizing Problems
Age	-								
Stress Risk Factor Score	0.052 0.576 117	-							
Matrix Reasoning	0.002 0.987 116	-0.422 <0.001*** 116	-						
Picture Memory	-0.120 0.220 106	-0.325 <0.001*** 106	0.414 <0.001*** 106	-					
Bug Search	-0.212 0.066~ 76	-0.133 0.251 76	0.234 0.042* 76	0.270 0.023* 70	-				
Information	0.033 0.724 115	-0.582 <0.001*** 115	0.447 <0.001*** 115	0.472 <0.001*** 105	0.194 0.094~ 76	-			
Numeration	0.107 0.343 80	-0.482 <0.001*** 80	0.468 <0.001*** 80	0.553 <0.001*** 74	0.322 0.012* 60	0.650 <0.001*** 80	-		
Internalizing Problems	0.048 0.685 74	0.139 0.238 74	0.142 0.227 74	-0.050 0.690 66	-0.031 0.802 68	-0.169 0.149 74	0.063 0.651 54	-	
Externalizing Problems	0.248 0.030* 77	0.127 0.272 77	-0.032 0.784 77	-0.093 0.445 69	0.001 0.993 71	-0.116 0.316 77	-0.075 0.577 57	0.681 <0.001*** 73	-
Adjusted Molar Eruption	-	0.337 <0.001*** 117	-0.331 <0.001*** 116	-0.227 0.019* 106	0.057 0.623 76	-0.318 <0.001*** 115	-0.169 0.135 80	0.150 0.202 74	0.304 0.007** 77

Table S2. Correlations between measures. Stress risk is extracted from the one-factor exploratory factor analysis of family income, exposure to Adverse Childhood Experiences, and racial/ethnic minority status. Scaled scores are used for all cognitive tests, and T-scores are used for CBCL scales. Molar eruption is adjusted for age and gender in all correlations, and thus the correlation between molars and age is not reported. Top values are Spearman's *rho* statistics, middle values are *P* values, bottom values are *N*s. ~$P < 0.1$; *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$

Model	Molars	Age	Gender	Stress Risk
Externalizing Problems ~ Molars + Age + Gender	0.55 (0.21) 0.013* 0.027* $\eta_p^2 = 0.081$	-0.25 (0.21) 0.252	0.23 (0.24) 0.333	-
Externalizing Problems ~ Molars + Age + Gender + Stress Risk	0.50 (0.23) 0.034* 0.069~	-0.20 (0.23) 0.393	0.24 (0.24) 0.323	0.07 (0.12) 0.583
Internalizing Problems ~ Molars + Age + Gender	0.28 (0.24) 0.239 0.239 $\eta_p^2 = 0.020$	-0.21 (0.23) 0.365	-0.28 (0.25) 0.258	-
Internalizing Problems ~ Molars + Age + Gender + Stress Risk	0.23 (0.25) 0.370 0.370	-0.16 (0.25) 0.528	-0.27 (0.25) 0.278	0.08 (0.13) 0.532

Table S3. Associations between molar eruption status and mental health. Standardized effect sizes and standard errors are in the top row, and raw *P*-values are in the second row. FDR-corrected *P*-values for molar eruption are in the third row. FDR-correction is applied across both subscales, separately for each model. Partial eta-squared effect sizes for the molar eruption variable are reported in the fourth row. ~$P < 0.1$; *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$

Model	Molars	Age	Gender	Stress Risk
Fluid Reasoning ~ Molars + Age + Gender	-0.71 (0.17) <0.001*** <0.001*** $\eta_p^2 = 0.128$	0.60 (0.17) <0.001***	-0.21 (0.19) 0.253	-
Fluid Reasoning ~ Molars + Age + Gender + Stress Risk	-0.56 (0.18) 0.002** 0.011*	0.48 (0.17) 0.006**	-0.23 (0.18) 0.216	-0.24 (0.09) 0.011*
Working Memory ~ Molars + Age + Gender	-0.46 (0.19) 0.020* 0.033* $\eta_p^2 = 0.052$	0.31 (0.19) 0.109	-0.17 (0.20) 0.394	-
Working Memory ~ Molars + Age + Gender + Stress Risk	-0.28 (0.20) 0.173 0.289	0.17 (0.19) 0.374	-0.18 (0.20) 0.357	-0.24 (0.10) 0.020*
Processing Speed ~ Molars + Age + Gender	0.05 (0.21) 0.816 0.816 $\eta_p^2 = 0.001$	-0.25 (0.21) 0.224	0.15 (0.25) 0.546	-
Processing Speed ~ Molars + Age + Gender + Stress Risk	0.10 (0.22) 0.643 0.643	-0.30 (0.22) 0.167	0.14 (0.25) 0.562	-0.09 (0.12) 0.465
Crystallized Knowledge ~ Molars + Age + Gender	-0.63 (0.18) <0.001*** 0.001** $\eta_p^2 = 0.105$	0.59 (0.17) <0.001***	0.06 (0.19) 0.769	-
Crystallized Knowledge ~ Molars + Age + Gender + Stress Risk	-0.40 (0.17) 0.020* 0.049*	0.40 (0.16) 0.017*	0.02 (0.17) 0.918	-0.40 (0.09) <0.001***
Math Performance ~ Molars + Age + Gender	-0.34 (0.18) 0.062~ 0.078~ $\eta_p^2 = 0.045$	0.39 (0.17) 0.023*	-0.23 (0.24) 0.358	-
Math Performance ~ Molars + Age + Gender + Stress Risk	-0.12 (0.17) 0.491 0.614	0.23 (0.16) 0.145	-0.17\8 (0.22) 0.430	-0.43 (0.11) <0.001***

Table S4. Associations between molar eruption status and cognition. Standardized effect sizes and standard errors are in the top row, and raw *P*-values are in the second row. FDR-corrected *P*-values for molar eruption are in the bottom row. FDR-correction is applied across all five tests, separately for each model. Partial eta-squared effect sizes for the molar eruption variable are reported in the fourth row. Note that age is not independently associated with scaled scores, but becomes significant in some cases when molar eruption is included in the same model. For a given stage of molar eruption, being at an older age reflects being less biologically mature, which is associated with higher cognition. ~$P < 0.1$; *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$