Supplemental Information

Details of literature search. We review all child/adolescent neuroimaging studies of emotional reactivity/regulation that incorporated a *direct* measure of parenting behavior, including questionnaire and observational measures of ERSB behaviors and parenting style/quality that were accepted to for publication before January 2019. Neuroimaging studies that examined associations between emotional processing and parental availability using images of parents' facial expressions as stimuli during a functional MRI scan (e.g., viewing pictures of mothers vs. female strangers) or those that compared youth's brain activation when completing fMRI paradigms with mother present vs. alone were not included. Additionally, studies had to include a measure(s) of brain volume, morphology, and structural connectivity or functional connectivity and activation in brain regions implicated in ER-related processes (amygdala, hippocampus, striatal regions, OFC, ACC, and PFC; Phillips et al., 2008). Using the search terms "MRI/diffusion tensor imaging/brain structure/brain development", "child/adolescent functional connectivity/resting state connectivity/DTI", and "child/adolescent fMRI, neuroimaging in combination with "parent/parenting behaviors/maternal behaviors", we identified 34 empirical studies investigating associations between *normative variations* in parenting behavior and brain structure/functional activation/structural and functional connectivity (see Table 1). All searches were conducted using PsychInfo, PubMed, and Google Scholar; reference sections from included studies were also reviewed to ensure that we did not miss relevant studies. Reference sections from included studies were also reviewed to ensure that relevant work was not missed.

Supplemental Information: Table 1. Summary of key findings from empirical studies of associations between parenting behavior and neuroimaging indices of youth's emotional reactivity and regulation processes

STUDY	SAMPLE (YOUTH) CHARACTERISTICS	PARENTING MEASURE	PARENTAL ERSB	NEUROIMAGING MEASURE & TASK PARADIGM	NEURAL REGIONS/ CIRCUITRY	PARENTING-NEURAL SUBSTRATE ASSOCIATIONS	MODERATORS
STRUCTURAL STUDIES							
Avants et al., 2015	Children: N=52, healthy (sample recruited for high SES stress) -parenting measure at age 4y (M=4.1) and 8y (M=8.4) -brain measure at late adolescence (M=19.16)	Home-based interview of parenting quality (mothers only): Nurturance and environmental stimulation scales from the Home Measurement of the Environment (HOME)	N/A (parenting style/quality)	Resting state, structural volume	cortex, PFC and temporal regions	↑environmental stimulation, ↓cortical thickness in temporal cortex and PFC	
Bernier et al., 2018	Children: N=33, healthy -parenting measures at age 1y (M=13.02mos); -brain measure at age 10-11y (M=11.67)	Observed maternal behavior (sensitivity): Care, accessibility, and availability scales from the Maternal Behavior Q-Sort (MBQS)	N/A (parenting style/quality)	Resting state, structural volume	amygdala, hippocampus	-↑maternal accessibility/availability, ↓right amygdala volume -↑maternal positivity, ↓bilateral hippocampal volume	
Buss et al., 2007	Adults: N=44, healthy (born small for gestational age) -multi-wave parenting assessment -brain measure at age 23y (M=23.32)	"Youth"-report (retrospective, over first 16 years of life) of maternal behaviors: Care from the Parental Bonding Inventory (PBI)	N/A (parenting style/quality)	Resting state, structural volume	hippocampus	<u>Moderation</u>: ↓maternal care, ↓hippocampal volume only for females who were small for gestational age	sex, birthweight
Kim et al., 2010	Adults: N=26; age 19-47y (M=32.7)	"Youth"-report of (retrospective, first 16 years of life) maternal behaviors: Care subscale from the Parent Bonding Behavioral Instrument (PBI)	N/A (parenting style/quality)	Resting state, structural volume	superior and middle frontal gyrus, orbital gyrus, fusiform gyrus, superior temporal gyrus hippocampus	↑maternal care, ↑GM volume in superior/middle frontal gyri, orbital gyrus, superior temporal gyrus and fusiform gyrus	

Kok et al., 2015	Children: N=191, healthy -parenting measure at ages 1y, 3y, and 7y; -brain measure at age 8y (M=8.04)	Observed parenting (mother and father) quality: Sensitivity coded during free play and challenging task (for the child)	N/A (parenting style/quality)	Resting state, structural volume & gray matter volume	precentral, postcentral, caudal middle frontal, and rostral middle frontal gyrus	↑parental sensitivity, ↑total structural volume, GM volume, and cortical thickness in the precentral, postcentral, caudal middle frontal, and rostral middle frontal gyrus	
Little et al., 2015	Adolescents: N=174, sampled for an even distribution of temperamental risk for depression; age 11-13y (M = 12.7)	Observed maternal behavior: Aggressive and positive parenting coded during event planning and problem-solving parent-adolescent discussion tasks	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	hippocampus	Moderation: ↓positive parenting, ↓hippocampal volume for youth with S-alleles of 5HT gene Note: This association is predicted with MDD symptoms 6 yrs later	GxE interaction (5HT S allele associated with risk for depression)
Luby et al., 2012	Children: N=92, healthy & elevated depressive symptoms -parenting measure at age 3-5y -brain measure at age 7-13y (M=9.34)	Observed maternal behavior: Support coded during frustrating challenge (for the child)	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	hippocampus	↑maternal support, ↑hippocampal volume Moderation: positive association is greater in non-depressed vs. depressed children	Youth depression status
Luby et al., 2013	Children: N=145, healthy & elevated depressive symptoms -parenting measure at age 4-7y -brain measure at age 6-12y (M=9.78)	Observed maternal behavior: Support and hostility coded during frustrating challenge (for the child)	N/A (parenting style/quality)	Resting state, structural volume (gray and white matter)	hippocampus	-↓support/↑ hostility, ↓white matter, cortical GM, and hippocampal and amygdala volumes -association between ↑poverty and ↓hippocampal volume mediated by negative parenting style	
Luby et al., 2016	Children: N=127, healthy & elevated depressive symptoms -parenting measure at ages 3-6y and 6-12y -brain measure at age 6-12y (M=10.56), with two more neuroimaging assessments 1.5y and 3y later	Observed maternal behavior: Supportive behaviors coded during mild stressful tasks (for child)	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	hippocampus	Moderation: ↑maternal support at preschool age (vs. school age), ↑growth in hippocampal volume	Developmental timing of parenting experience

Narita et al., 2010	Adults: N=50, healthy; age 20-29y (M=24.8)	"Youth"-report of (retrospective, first 16 years of life) maternal behaviors: Overprotection/control and care subscales from the Parent Bonding Behavioral Instrument (PBI)	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	dlPFC	↑parental care, ↑left dlPFC volume; ↑parental overprotection, ↓left dlPFC volume	
Narita et al., 2012	Adults: N=40, healthy; age 18-35y (M=27.2)	"Youth"-report (retrospective, first 16 years of life) of maternal behaviors: Overprotection/ control and care subscales from the Parent Bonding Behavioral Instrument (PBI)	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	hippocampus	No association between PBI parenting style measures & hippocampal volume Note: ↑overprotection, ↓HPA axis reactivity and ↓HPA axis reactivity, ↓hippocampal volume	
Rao, et al., 2010	Adolescents: N=49 (all African-American), prenatal exposure to cocaine -parenting measure at ages 4y and 8y -brain measure at age 13-16y (M=14.2)	Observed + home-based interview of parenting behavior of mothers and paternal figures: Nurturance and environmental stimulation scales from the Home Measurement of the Environment (HOME)	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	hippocampus	<u>Moderation</u>: ↑Parental nurturance at age 4, ↓hippocampal volume; No association between parental nurturance at age 8 & hippocampal volume	Developmental timing of parenting experience
Rifkin-Graboi et al., 2015	Children: N=32, in-utero exposure to cocaine; age 6 months *(24 with useable neuroimaging data)*	Observed maternal behavior: Sensitivity coded during free play	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	hippocampus, amygdala	↓maternal sensitivity, ↑hippocampal volume	
Schneider et al., 2012	Adolescents: N=64, healthy; age 14y (M=14.24)	Mother-report of interpersonal style: Love/affiliation subscale from the Inventory of Interpersonal Problems (IIP)	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	hippocampal and orbitofrontal gray matter density; ventral striatum volume	↑maternal interpersonal affiliation style, ↑ density in hippocampus and OFC ↑maternal affiliation, ↑ventral striatal volume	Sex

Sheikh et al., 2014	Children (all female): N=45, healthy -parenting measure at age 3y -brain measure at age 6y (M=6.13)	Observed parental emotion Positive and negative affect coded during parent-child interactions (from Teaching Tasks Battery) using the Qualitative Ratings for Parent–Child Interactions Note: no details regarding how paternal vs. maternal behaviors were separately assessed and/or analyzed	Parental emotional expression	Resting state, white matter volume and connectivity Fractional anisotropy (FA) <u>Paradigm:</u> resting-state	left thalamus, right anterior ACC, right superior frontal gyrus white matter microstructure adjacent to limbic regions	<u>Moderation</u>: high stress-reactive females, ↑parental positive affect, ↑FA (white matter) in regions adjacent to the left thalamus, right ACC, and right superior frontal gyrus (showing white matter structure more similar to that of low stress-reactive females) ↑positive parental affect, ↑FA (white matter) in regions adjacent to the rACC and superior frontal gyrus (sFG) <u>Moderation</u>: Females with ↑cortisol reactivity had ↓FA values (vs. girls with ↓cortisol reactivity) in white matter microstructure adjacent to the left thalamus, the rACC, and sFG	Youth cortisol (stress) reactivity
Whittle et al., 2009	Adolescents: N=113, sampled for an even distribution of temperamental risk for depression; age 11-13y (M=12.5)	Observation of maternal mothers' responses to youth's emotion: Mothers' punishing responses coded during event planning and problem-solving parent-adolescent discussion tasks	Parental response to child emotion	Resting state, structural volume (gray matter)	dorsal ACC, OFC, amygdala	-↑maternal punishing responses to adolescent positive affect, ↑left dACC and bilateral OFC volumes <u>Moderation</u>: for boys, ↑maternal punishing responses to adolescent positive affect, ↑right amygdala volumes.	Sex
Whittle et al., 2014	Adolescents: N=188, sampled for an even distribution of temperamental risk for depression; age 11-13y (M=12.62)	Observed maternal behaviors: Positive behavior coded during event planning and problem-solving parent-child discussion tasks	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	amygdala, right ACC, right and left orbitofrontal cortices	-↑positive maternal behavior, ↓volumetric growth in the right amygdala <u>Moderation:</u> -↑positive maternal behavior, ↑cortical thinning in bilateral OFC -↑positive maternal behavior, ↑cortical thinning in the right ACC	Sex

Whittle et al., 2016	Adolescents: N=166 (86 females) sampled for an even distribution of temperamental risk for depression -parenting measure at age 12y (M=12.79) -brain measure at ages 12y (M=12.79), 16y (M=16.70), & 19y (19.08)	Observed maternal behavior: Aggressive behavior coded during event planning and problem-solving parent-adolescent interaction tasks	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	cortex, nucleus accumbens,	<u>Moderation</u>: all associations significant only for males -↑maternal aggressive behavior, ↑increases in cortical thickness in the superior frontal gyrus, superior parietal lobe and supramarginal gyrus from early to late adolescence -↓maternal aggressive behavior, ↓decrease in nucleus accumbens volume from early to mid-adolescence whereas ↑aggression, ↓decrease in nucleus accumbens volume from early to late adolescence.	Sex, developmental timing of brain measure
Whittle et al., 2017	Adolescents: N=166, healthy (86 females), sampled for an even distribution of temperamental risk for depression -parenting measure at 11-13y (M=12.79) -brain measure at ages 11-13y and at 4y and 6y later	Observed maternal parenting behavior: Positive parenting during event planning and problem-solving parent-adolescent interaction tasks	N/A (parenting style/quality)	Resting state, structural volume (gray matter)	OFC, dorsal frontal cortex, amygdala	<u>Moderation</u>: ↑positive maternal behavior, ↑growth in left amygdala volume for adolescents whose parents reported high-status occupations for females & males -↑positive maternal behavior, ↓cortical thinning in lateral OFC and dorsal frontal cortex, only for males who experienced greater neighborhood disadvantage (i.e., neurodevelopmental trajectories more closely resembled those with low levels of disadvantage) -↑positive maternal behavior, ↑growth in amygdala volume for males with high SES stress	Sex; SES-related stress (neighborhood economic status)
Yang et al., 2018	Adults: N=181, healthy; undergraduates (M=22.39y)	Youth-report of maternal behaviors: Warmth subscale from the *Egna Minnen Beträffande Uppfostran (EMBU-C)*	N/A (parenting style/quality)	Resting state, gray matter volume	PFC	↑maternal emotional warmth ↓dmPFC and lateral rostral PFC volume	
FUNCTIONAL STUDIES							

Barbosa et al., 2018	Children, N=90 (46 female), healthy; age 8-9y (M=9.42)	Parent-report of 5 parenting styles: 1) involvement, 2) positive reinforcement practices, 3) poor monitoring/supervision, 4) inconsistent discipline, and 5) corporal punishment from the Alabama Parenting Questionnaire (APQ-PR) Note: no details regarding how paternal vs. maternal behaviors were separately assessed and/or analyzed	N/A (parenting style/quality)	Emotional processing (reactivity & regulation) <u>Paradigm</u>: Viewing of emotional facial expressions <u>Emotion</u>: Happy, angry, fearful <u>Contrast</u>: Emotional (happy, angry, fearful) vs. calm face	ROI analysis of frontal and subcortical regions	↓parental monitoring/supervision, ↓left vmPFC activation to fear faces <u>Moderation</u>: ↑parental corporal punishment, ↓vlPFC activation to fearful faces for relatively late-pubertal females, but ↑vlPFC activation for late-pubertal males -↑parental corporal punishment, ↓left dlPFC, frontal pole, and anterior insula activation to happy faces for late-pubertal females and ↓activation in left dlPFC, frontal pole, and anterior insula for late-pubertal males -↑parental corporal punishment, ↓hippocampal activation to happy faces for late-pubertal females *and* males	Sex, Pubertal (Adrenarche status)
Butterfield et al., 2019	N=120 anxious and healthy youth (71 female), age 9-14y (M=11.56) Note: 114 mothers, 1 grandmother, 4 fathers	Observed parental engagement-oriented coping socialization (e.g., encouragement of youth to use problem-solving, to approach challenges, and try cognitive reframing) during anxiety-eliciting parent-youth discussion tasks (discussion of a recent worry, preparation for a public speech)	Parental emotion coaching	Emotional processing (reactivity & regulation) <u>Paradigm</u>: Viewing/Rating of emotional and non-emotional words <u>Emotion</u>: Positive, Threat (physical & social threat), Neutral <u>Contrast</u>: Physical threat vs. baseline, accounting for ROI activations from neutral vs. baseline contrast	ROI analysis of amygdala, anterior insula, sgACC, pgACC, rostral cingulate, and vlPFC	<u>Moderation</u> For anxious youth: ↑parental engagement-oriented coping socialization, ↑bilateral anterior insula and pgACC activation to threat words. Note: Association between ↑parental engagement-oriented coping socialization and ↓avoidant coping partially mediated by increased neural activation For healthy youth: ↑parental engagement-oriented coping socialization, ↓bilateral anterior insula and pgACC activation to threat words	Youth anxiety diagnosis

Casement et al., 2014	N=120 (all female), healthy (oversampled for high SES stress) -parent measure at age 11-12y (11.81) -brain measure at age 15-16y (15.26)	Parent-report of parenting behavior: Warmth subscale from the Parent-Child Rating Scale Note: no details regarding how paternal vs. maternal behaviors were separately assessed and/or analyzed	N/A (parenting style/quality)	Emotional processing (reactivity & regulation): Anticipation of monetary reward <u>Paradigm</u>: Guessing Task <u>Emotion</u>: Reward (Gain) vs. Loss <u>Contrast</u>: Reward anticipation vs. Baseline	ROI analysis of striatum, dmPFC, OFC, and amygdala	↓parental warmth, ↑dmPFC and ventral striatum activation during reward anticipation Note: Association between ↓parental warmth and later youth depressive symptoms mediated by adolescent dmPFC activation	
Chaplin et al., *in press*	Adolescents: N=66 (32 female), healthy; age 12-14y (M=12.59)	Observed maternal parenting behaviors: Warmth and negative (criticisms, harsh tone, interrupts adolescent) parenting coded during two challenging parent-adolescent discussion tasks using the Parent-Adolescent Interaction Task (PAIT) Coding System	Parental emotional expression	Emotional processing (reactivity & regulation) <u>Paradigm</u>: Viewing of images with negative, neutral, and positive emotional valence (IAPS) <u>Emotion</u>: Negative, Positive <u>Contrast</u>: Negative vs. Neutral, Positive vs. Neutral	ROI analysis of bilateral amygdala, ACC, and vmPFC; exploratory whole-brain analysis	<u>Moderation</u>: For girls: ↑maternal negative parenting, ↑right ACC activation to negative emotional images For boys: ↑maternal negative parenting, ↓bilateral anterior insula activation and left ACC activation to negative emotional images Note: for girls only, ↑left anterior insula activation associated with substance use symptoms and ↑bilateral ACC activation associated with depressive symptoms	Sex
Farber et al., 2017	Adolescents: N=232 (117 females), healthy and youth at high familial risk for depression (N=120); age 12-15y (M=13.59)	Adolescent-report of family-related emotion socialization factors: Affective responsiveness and general functioning subscales from the Family Assessment Device (FAD)	Family emotional climate	Emotional processing (reactivity & regulation) <u>Paradigm</u>: Matching of faces or shapes <u>Emotion</u>: Angry, fearful faces <u>Contrast</u>: Angry vs. Control; fearful vs. Control	ROI analysis of amygdala	<u>Moderation</u>: ↑affective responsiveness, ↑left amygdala activation to angry faces for youth who reported low levels of recent life stressors	Youth perception of recent life stress

Gee et al., 2014	Children: N=23, healthy; age 4-10y (M=7.34) Adolescents: N=30, healthy; age 11-17 (M=14.21)	Youth-report of parenting quality: Attachment scale from the Security Style Questionnaire Note: Youth reported on attachment to their (self-nominated) attachment figure	N/A (parenting style/quality)	Functional connectivity (gPPI) <u>Paradigm</u>: Viewing of alternating blocks mother/female stranger emotional faces <u>Emotion</u>: Happy, neutral <u>Contrast</u>: Mother vs. stranger	amygdala–mPFC circuitry	-Children showed inverse amygdala-dlPFC connectivity patterns to mothers' faces only -Adolescents showed inverse amygdala-dmPFC connectivity patterns to mothers' and strangers' faces Note: Youth with inverse amygdala-dmPFC connectivity patterns had 1) ↓separation anxiety, and 2) ↑attachment to mother (vs. youth with positive functional connectivity patterns)	Developmental timing of brain measure
Kopala-Sibley et al., 2018	Children: N=79, healthy (oversampled for high temperamental negative emotionality/low positive emotionality) -parenting measure at age 3y (M=3.44) -brain measure at age 10y (M=10.27) *(73 with useable neuroimaging data)*	Observed maternal negative emotion and parenting behaviors: Hostility coded during parent-child interactions (from Teaching Tasks Battery) Mother-report of parental behavior: Regulation subscale from the Parenting Styles and Dimensions Questionnaire	N/A (parenting style/quality)	Functional connectivity (PPI) <u>Paradigm 1</u>: viewing emotional facial expressions <u>Emotion</u>: Neutral, sad, happy (control=houses); <u>Contrast</u>: Sad vs neutral; <u>Paradigm 2</u>: Monetary reward task <u>Emotion</u>: Reward (gain), loss <u>Contrast</u>: Reward vs. loss	amygdala–whole brain connectivity during processing of emotional faces; ventral striatum– and ACC–whole brain connectivity during a monetary reward task	-For sad-neutral faces contrast: ↑maternal hostility, ↑inverse right amygdala-right insula connectivity, ↑inverse right amygdala-bilateral dmPFC connectivity, and ↑inverse right amygdala-operculum -For reward-loss contrast: ↑maternal hostility, ↑inverse left ventral striatum-right posterior OFC and ↑inverse left ventral striatum-IFG connectivity -↑maternal regulation, ↑positive ACC-bilateral insula connectivity, ↑positive ACC-bilateral anterior striatum connectivity, and ↑positive ACC-operculum connectivity	

Marusak et al., 2017	Children: N=27, healthy (urban, lower income), ages 9-16y (M=11.96) -parenting measure at age 3y (M=3.44) -brain measure at age 10y (M=10.27) *(73 with useable neuroimaging data)*	"Youth"-report of (retrospective, first 16 years of life) maternal and paternal behaviors: Overprotection/control and care subscales from the Parent Bonding Behavioral Instrument (PBI)	N/A (parenting style/quality)	Emotional processing (reactivity & regulation) <u>Paradigm</u>: Identify whether face stimulus is congruent or incongruent with affect or gender labels <u>Emotion</u>: Fearful, happy faces <u>Non-emotion</u>: Female, male <u>Contrast</u>: Congruent vs. Incongruent in Emotional vs. Non-emotional task condition	ROI analysis of anterior insula, dACC, rACC	↑maternal and ↑maternal control, ↓left anterior insula activation to incongruent emotional stimuli	
Morgan et al., 2014	N=120 (all male), healthy (but oversampled for high SES stress); -parenting measure at ages 1.5y & 2y (preschool) as well as 10y & 11y (adolescence) -brain measure at age 20y	Observed maternal warmth: Global warmth/positive emotion coded during parent-child interaction tasks using the Early Parenting Coding System (early childhood) and using a 9-point global rating scale during challenging parent-child discussion tasks (adolescence)	Parental emotion expression	Emotional processing (reactivity & regulation): Monetary Reward/Loss anticipation & outcome <u>Paradigm</u>: Guessing Task <u>Emotion</u>: Reward (gain), loss <u>Contrast</u>: Reward anticipation vs. baseline; Reward outcome vs. baseline, loss anticipation vs. baseline; loss outcome vs. baseline	ROI analysis of dmPFC, striatum	<u>Moderation (developmental timing)</u>: -↑maternal warmth in early childhood, ↓dmPFC to loss outcome; -↑maternal warmth during adolescence, ↓ dmPFC activation during reward outcome -↑maternal warmth during adolescence, ↓ caudate activation during loss outcome <u>Moderation (maternal depression)</u>: -↓maternal warmth during early childhood, ↓dmPFC, ↑striatal activation to reward anticipation and ↑striatal activation to loss anticipation and reward outcome for boys whose mothers experienced depression -↓maternal warmth during adolescence, ↑caudate activation to reward anticipation for boys whose mothers experienced depression	Developmental timing of parenting experience; maternal history of depression

Pozzi et al., *in press*	Children, N=86 (49 females), healthy -parenting measures at age 8-9y -brain measure at age 9-10.5y (M = 10.01)	Observed maternal positive and negative behaviors during parent-child interaction tasks, i.e., Pleasant Event Schedule and Problem-Solving Interaction	Parental emotion expression; positive parenting style/quality	Functional connectivity (gPPI) Emotional processing (reactivity & regulation) <u>Paradigm</u>: Matching faces or shapes <u>Emotion</u>: Fearful, angry facial expressions <u>Contrast</u>: Emotional (fearful, angry) vs. shape	Fronto-amygdala functional connectivity ROI analysis of amygdala activation; exploratory whole brain analysis	↑maternal negative behavior during problem-solving interaction, ↑(positive) amygdala-and-superior parietal lobe connectivity <u>Note</u>: Positive connectivity between left amygdala and right parietal lobe greater in boys vs. girls ↑maternal negative behavior during problem-solving interaction, ↑amygdala activation to negative (angry, fearful) faces ↑maternal communicative behavior (positive parenting style/quality) during problem-solving and event-planning interactions, ↑ bilateral amygdala <u>Moderation (gender):</u> -for girls: ↑maternal negative behavior during event-planning interaction, ↓lingual gyrus amygdala activation to negative (angry, fearful) faces	Sex
Romund et al., 2016	Adolescents: N=83 (43 females), healthy; age 13-16y (M=14.48)	Adolescent-report of maternal parenting behavior from warmth/support, psychological pressure, and demands/control subscales on the Zurich Brief Questionnaire for the Assessment of parenting behaviors (ZKE)	N/A (parenting style/quality)	Emotional processing (reactivity & regulation) <u>Paradigm</u>: Matching faces or shapes <u>Emotion</u>: Fearful, happy, angry facial expressions <u>Contrast</u>: Emotional (fearful, happy, angry) vs. neutral (e.g., calm) face	ROI analysis of amygdala, hippocampus, fusiform gyrus	↓maternal warmth/support, ↑left amygdala activation to negative (angry, fearful) faces Note: Trend for ↑maternal warmth/support, ↓left amygdala activation to happy faces	
Schneider et al., 2012	Adolescents: N=64, healthy; age 14y (M=14.24)	Mother-report of interpersonal style: Love/affiliation subscale from the Inventory of Interpersonal Problems (IIP)	N/A (parenting style/quality)	Emotional processing (reactivity & regulation): Monetary reward/loss anticipation & outcome <u>Paradigm</u>: Guessing Task <u>Emotion</u>: Reward	ROI analysis of ventral striatum, caudate	<u>Moderation</u> (sex): For girls: ↑maternal affiliation, ↑ventral striatal, caudate activation to reward gain vs. baseline	Sex

				(gain), loss Contrast: Reward gain/loss vs. baseline			
Tan et al., 2014	Adolescents: N=40 (25 female), healthy and MDD (N=14); ages 11-17 (M=14.73y)	Observed maternal negative emotion: Negative affect (second-by-second) coded during a supportive parent-adolescent interaction task using the Specific Affect Coding System (SPAFF)	Parental emotional expression	Emotional processing (reactivity & regulation): Social reward/loss (i.e., peer acceptance/ rejection) Paradigm: Peer Evaluation task (Chat Game) Emotion: Acceptance (reward) vs. rejection Contrast: Peer rejection vs. baseline, peer acceptance vs. baseline	ROI analysis of amygdala, anterior insula, nucleus accumbens, sgACC, and vlPFC	-↑maternal negative affect, ↓amygdala, anterior insula, and left nucleus accumbens activation to peer acceptance -↑maternal negativity, ↓sgACC activation to peer acceptance for depressed youth	Youth depression status
Thijssen et al., 2017	Children: N=124, healthy -parenting measure at age 4y -brain measure at age 6-10y (M=8.04)	Observed maternal, parental, and combined parenting quality: Sensitivity coded during parent-child interactions (from Teaching Tasks Battery) using the Erickson Rating Scale		Paradigm: resting-state functional connectivity Resting-state function neuroimaging (Rs-fMRI)	amygdala-dmPFC (inclusive of MFG, mOFC, and ACC) circuit	-↑child age associated with ↑inverse amygdala-MdPFC functional connectivity, if mothers were low in sensitivity -child age not related to connectivity if mothers were high in sensitivity -↑child age associated with ↑inverse amygdala-ACC functional connectivity if mothers were low in sensitivity -no significant effects found with paternal sensitivity	

Turpyn et al., 2017	Adolescents: N=64 (31 female), healthy; ages 12-14y (M=12.55)	Mother-reported affect: Negative affect from the sadness, anger, fear, and anxiety subscales on the Differential Emotions Scale (DES-R); Mother-reported emotion regulation: Difficulties in Emotion Regulation Scale (DERS)	Parental emotional expression	Emotional processing (reactivity & regulation) Paradigm: Viewing of images with negative, neutral, and positive emotional valence (drawn from the International Affective Picture System) Emotions: Negative, positive Contrast: Negative vs. neutral, positive vs. neutral	ROI analysis of bilateral amygdala, ACC, and vmPFC; exploratory whole-brain analysis	-↑maternal negative emotion, ↑ACC and vmPFC activation to negative and positive emotional images -↑maternal negative emotion, ↑amygdala activation to negative images only Moderation: ↑maternal negative emotion, ↑bilateral amygdala and vmPFC to negative emotional stimuli for mothers with emotion regulation difficulties	Maternal emotion regulation

Notes. ACC=anterior cingulate cortex; PFC=prefrontal cortex; OFC=orbitofrontal cortex; sFG=superior portion of the fusiform gyrus; dACC=dorsal anterior cingulate cortex; rACC=rostral anterior cingulate cortex; mACC=medial anterior cingulate cortex; pgACC= pregenual anterior cingulate cortex; sgACC=subgenual anterior cingulate cortex; dmPFC=dorsomedial prefrontal cortex; dlPFC=dorsolateral prefrontal cortex; vmPFC=ventromedial prefrontal cortex; vlPFC=ventrolateral prefrontal cortex; IFG= inferior frontal gyrus; GM=gray matter; WM=white matter; HPA= hypothalamic-pituitary-adrenal axis; ROI=Region-of-interest.

If study included only broader measure(s) of parenting quality, style, or parent-child relationship quality, we describe the parental ERSB(s) that might be theoretically related to the broader parenting index.

Supplemental Information: Table 2. Glossary of key neuroscience terms

brain volume - measurement of the size of the brain or a specific anatomical structure within the brain

diffusion tensor imaging - neuroimaging technique that measures white matter structural integrity by detecting how water travels along the white matter tracts in the brain

functional connectivity - the temporal correlation of neural activity (i.e., measured using the blood-oxygen-level-dependent (BOLD) signal) between brain regions in response to a stimulus or while at-rest (i.e., not stimulus dependent)

gray matter - structural component of the central nervous system that contains the cell bodies (i.e., soma), dendrites and axon terminals of neurons

gray matter volume - the amount of gray matter that lies between the grey-white interface and the pia mater within a specific brain structure or region

gray matter thinning - atrophy of neuronal cell bodies due to the loss of synapses, resulting in reduced gray matter levels or thickness

morphology - the study of the form or structure of the brain

neural circuitry - synaptic connections between populations of neurons that are structurally and functionally defined

neural network - anatomically-defined brain regions that are functionally connected, in response to a particular type of stimulus or while at-rest

structural connectivity - indicates levels of white matter integrity via fractional anisotropy, which is a measure of axonal myelin insulation of the white matter tracts

white matter - structural component of the central nervous system comprised of myelinated axons which connect neuronal cell bodies (i.e., soma); a collection of axons is referred to as tracts