

Table S1: Results

Authors, year	Title	Journal	Study design & Sample Size	Population	Age range	Types of Neuroimaging Used	Category
Bhat et al., 2019	Exploring cortical activation and connectivity in infants with and without familial risk for autism during naturalistic interactions: A preliminary study	Infant Behavior and Development	Cross-sectional; N = 15	ASD-HR (n = 9) and ASD-LR (n = 6) infants	6 - 9 months	fNIRS	Descriptive
Blasi et al., 2015	Atypical processing of voice sounds in infants at risk for autism spectrum disorder	Cortex	Cross-sectional; N = 33	ASD-HR (n = 15) and ASD-LR (n = 18) infants	4 - 7 months	fMRI	Descriptive
Braukamann et al., 2018	Diminished socially selective neural processing in 5-month-old infants at high familial risk of autism	European Journal of Neuroscience	Cross-sectional; N = 29	ASD-HR (n = 16) and ASD-LR (n = 13) infants	5 months	fNIRS	Descriptive
Cardenas-de-la-Parra et al., 2021	A voxel-wise assessment of growth differences in infants developing autism spectrum disorder	Neuroimage: Clinical	Longitudinal; N = 503	ASD-HR+ (n = 56), ASD-HR- (n = 285), and ASD-LR (n = 162) infants	6, 12, & 24 months	MRI	Diagnostic
Damiano-Goodwin et al., 2017	Developmental sequelae and neurophysiologic substrates of sensory seeking in infant siblings of children with autism spectrum disorder	Developmental Cognitive Neuroscience	Longitudinal; N = 40	ASD-HR+ (n = 6), ASD-HR- (n = 14), and ASD-LR (n = 20) infants	18 & 36 months	EEG	Diagnostic
Darki et al., 2021	T1-Weighted/T2-Weighted ratio mapping at 5 months captures individual differences in behavioral development and differentiates infants at familial risk for autism from controls	Cerebral Cortex	Cross-sectional; N = 46	ASD-HR (n = 29) and ASD-LR (n = 17) infants	~5 months	MRI	Descriptive
Dickinson et al., 2021	Multivariate neural connectivity patterns in early infancy predict later autism symptoms	Society of Biological Psychiatry	Longitudinal; N = 65	ASD-HR (n = 36) and ASD-LR (n = 29) infants	3 & 18 months	EEG	Diagnostic

Edwards et al., 2017	Differences in neural correlates of speech perception in 3 month olds at high and low risk for autism spectrum disorder	Journal of Autism and Developmental Disorders	Cross-sectional; N = 38	ASD-HR (n = 21) and ASD-LR (n = 17) infants	3 months	fNIRS	Descriptive
Elison et al., 2013	White matter microstructure and atypical visual orienting in 7- month olds at risk for autism	American Journal of Psychiatry	Longitudinal; N = 97	ASD-HR+ (n = 16), ASD-HR- (n = 40), and ASD-LR (n = 41) infants	7 & 25 months	DTI	Diagnostic
Elsabbagh et al., 2015	Infant neural sensitivity to dynamic gaze relates to quality of parent-infant interaction at 6-8 months in infant at risk for autism	Journal of Autism and Developmental Disorders	Cross-sectional; N = 92	ASD-HR (n = 45) and ASD-LR (n = 47) infants	7 months	EEG	Descriptive
Finch et al., 2017	Lateralization of ERPs to speech stimuli and handedness in the early developmental of autism spectrum disorder.	Journal of Neurodevelopmental Disorders	Longitudinal; N = 163	ASD-HR+ (n = 23), ASD-HR- (n = 67), and ASD-LR (n = 73) infants	EEG at 12 months; behavioral assessment at 36 months	EEG	Diagnostic
Finch, Tager-Flusberg, & Nelson, 2018	Neural responses to linguistic stimuli in children with and without autism spectrum disorder	European Journal of Neuroscience	Cross-sectional; N = 134 (85 contributed usable EEG)	ASD-HR+ (n = 14), ASD-HR- (n = 29), and ASD-LR (n = 42) infants	36 months	EEG	Diagnostic
Gabard-Durnam et al., 2015	Alpha asymmetry in infants at risk for autism spectrum disorders	Journal of Autism and Developmental Disorders	Longitudinal; N = 108	ASD-HR (n = 57) and ASD-LR (n = 51) infants	6, 12, & 18 months	EEG	Descriptive
Guy et al., 2017	Neural correlates of face processing in etiologically-distinct 12-month-old infants at high-risk of autism spectrum disorder	Developmental Cognitive Neuroscience	Cross-sectional; N = 57	ASD-LR (n = 21), ASD-HR (n = 21), and infants with Fragile X Syndrome (n = 15)	12 months	EEG	Descriptive
Haarsten et al., 2019	Functional EEG connectivity in infants associates with later restricted and repetitive behaviours in autism; a replication study	Translational Psychiatry	Longitudinal; N = 101	ASD-HR+ (n = 13), ASD-HR- (n = 47), ASD-HR showing atypical development (n = 21), and ASD-LR (n = 47) infants	14 months old (13 - 18 months)	EEG	Diagnostic

Hazlett et al., 2012	Brain volume findings in 6-month-old infants at high familial risk for autism	American Journal of Psychiatry	Cross-sectional; N = 134	ASD-HR (n = 98) and ASD-LR (n = 36) infants	6 months	MRI	Descriptive
Hazlett et al., 2017	Early brain development in infants at high risk for autism spectrum disorder	Nature	Longitudinal; N = 435	ASD-HR+ (n = 70), ASD-HR- (n = 248), and ASD-LR (n = 117) infants	6, 12, & 24 months	MRI	Diagnostic
Jones et al., 2016	Reduced engagement with social stimuli in 6-month-old infants with later autism spectrum disorder: A longitudinal prospective study of infants at high familial risk	Journal of Neurodevelopmental Disorders	Longitudinal; N = 88	ASD-HR (n = 43) and ASD-LR (n = 45) infants	6, 12, 18, & 24 months	EEG	Diagnostic
Jones et al., 2017	Parent-delivered early intervention in infants at risk for autism spectrum disorder: Effects on electrophysiological and habituation measures of social attention	Autism Research	Longitudinal; N = 33	ASD-HR infants (n = 33)	EEG at 6, 12, & 18 months; intervention between 9 - 11 months	EEG	Descriptive
Keehn et al., 2013	Functional connectivity in the first year of life in infants at-risk for autism: A preliminary near-infrared spectroscopy study	Frontiers in Human Neuroscience	Longitudinal; N = 64	ASD-HR (n = 27) and ASD-LR (n = 37) infants	3,6,9, & 12-months	fNIRS	Descriptive
Keehn et al., 2015	Atypical hemispheric specialization for faces in infants-at-risk for autism spectrum disorder	Autism Research	Longitudinal; N = 95 (60 with longitudinal data/diagnostic outcomes)	ASD-HR+ (n = 10), ASD-HR- (n = 24), and ASD-LR (n = 26) infants	6 & 12 months	EEG	Diagnostic
Key & Stone, 2012	Processing of novel and familiar faces in infants at average and high risk for autism	Developmental Cognitive Neuroscience	Cross-sectional; N = 35	ASD-HR (n = 15) and ASD-LR (n = 20) infants	9 months	EEG	Descriptive
Key & Stone, 2012	Same but different: Nine-month-old infants at low and high risk for autism look at the same facial features but process them	Autism Research	Cross-sectional; N = 35	ASD-HR (n = 15) and ASD-LR (n = 20) infants	9 months	EEG	Descriptive

	using different brain mechanisms						
Key et al., 2015	Positive affect processing and joint attention in infants at high risk for autism: An exploratory study	Journal of Autism and Developmental Disorders	Longitudinal; N = 31	ASD-HR (n = 16) and ASD-LR (n = 15) infants	9-15 months	EEG	Descriptive
Kolesnik et al., 2019	Increased cortical reactivity to repeated tones at 8 months in infants with later autism spectrum disorder	Translational Psychiatry	Longitudinal; N = 143	ASD-HR (n = 116; 14 of which were later ASD-HR+) and ASD-LR (n = 27) infants	8 & 14 months, 2 & 3 years	EEG	Diagnostic
Levin et al., 2017	EEG power at 3 months in infants at high familial risk for autism	Journal of Neurodevelopmental Disorders	Longitudinal; N = 48	ASD-HR (n = 29; 25 with sufficient EEG data, 7 of which were later ASD-HR+) and ASD-LR (n = 19) infants	3, 6, 9, 12, 18, 24, & 36 months	EEG	Diagnostic
Lewis et al., 2017	The emergence of network inefficiencies in infants with autism spectrum disorder	Biological Psychiatry	Longitudinal; N = 260 (116 with longitudinal data)	ASD-HR+ (n = 15), ASD-HR- (n = 66), and ASD-LR (n = 35) infants	6 & 12 months	MRI	Diagnostic
Liu et al., 2020	Emerging atypicalities in functional connectivity of language-related networks in young infants at high familial risk for ASD	Developmental Cognitive Neuroscience	Longitudinal; N = 65	ASD-HR (n = 33) and ASD-LR (n = 32) infants	1.5 - 9 months	fMRI	Descriptive
Liu et al., 2019	Altered lateralization of dorsal language tracts in 6-week-old infants at risk for autism	Developmental Science	Longitudinal; N = 34	ASD-HR (n = 19) and ASD-LR (n = 15) infants	6 weeks, 18 months, & 36 months	DTI	Diagnostic
Lloyd-Fox et al., 2013	Reduced neural sensitivity to social stimuli in infants at risk for autism	Proceedings of the Royal Society B	Cross-sectional; N = 34	ASD-HR (n=18) and ASD-LR (n=16) infants	4 – 6 months	fNIRS	Descriptive
Lloyd-Fox et al., 2018	Cortical responses before 6 months of life associate with later autism	European Journal of Neuroscience	Longitudinal; N = 36	ASD-HR+ (n = 5), ASD-HR- (n = 15), and ASD-LR (n = 16) infants	4 - 6 months; follow-up at 36 months	fNIRS	Diagnostic
Luyster et al., 2011	Neural correlates of familiar and unfamiliar face	Brain Topography	Cross-sectional; N = 56	ASD-HR (n = 32) and ASD-LR (n = 24) infants	12 months	EEG	Descriptive

	processing in infants at risk for autism						
Luyster et al., 2014	Neural measures of social attention across the first years of life: Characterizing typical development and markers of autism risk	Developmental Cognitive Neuroscience	Longitudinal; N = 260	ASD-HR (n = 123) and ASD-LR (n = 137) infants	6 - 36 months	EEG	Descriptive
MacDuffie et al., 2020	Sleep onset problems and subcortical development in infants later diagnosed with autism spectrum disorder	American Journal of Psychiatry	Longitudinal; N = 432	ASD-HR+ (n = 71), ASD-HR- (n = 234), and ASD-LR (n = 127) infants	6, 12, & 24 months	MRI	Diagnostic
McCleery et al., 2009	Atypical face versus object processing and hemispheric asymmetries in 10-month-old infants at risk for autism	Biological Psychiatry	Cross-sectional; N = 40	ASD-HR (n = 20) and ASD-LR (n = 20) infants	10 months	EEG	Descriptive
McKinnon et al., 2019	Restricted and repetitive behavior and brain functional connectivity in infants at risk for developing autism spectrum disorder	Biological Psychiatry	Longitudinal; N = 38	Infants; some meeting criteria for ASD diagnosis (n = 20) and some not meeting the criteria (n = 18)	12 & 24 months	fMRI	Diagnostic
Nair et al., 2021	Altered thalamocortical connectivity in 6-week-old infants at high familial risk for autism spectrum disorder	Cerebral Cortex	Longitudinal; N = 52	ASD-HR (n = 24) and ASD-LR (n = 28) infants	6 weeks; later follow-up	Functional connectivity MRI, DTI	Diagnostic
Orekhova et al., 2014	EEG hyper-connectivity in high-risk infant is associated with later autism	Journal of Neurodevelopmental Disorders	Longitudinal; N = 54	ASD-HR+ (n = 10), ASD-HR- (n = 18), and ASD-LR (n = 28) infants	EEG at 14 months; ASD at 36 months	EEG	Diagnostic
Pecukonis et al., 2021	Exploring the relation between brain response to speech at 6-months and language outcomes at 24-months in infants at high and ASD-LR: A preliminary functional near-infrared spectroscopy study	Developmental Cognitive Neuroscience	Longitudinal; N = 32	ASD-HR+ (n = 5), ASD-HR- (n = 9), and ASD-LR (n = 18) infants	6 & 24 months	fNIRS	Diagnostic

Peterson et al., 2021	Evidence for normal extra-axial cerebrospinal fluid volume in autistic males from middle childhood to adulthood	Neuroimage	Longitudinal; N = 189	Autistic (n = 92) and non-autistic (n = 97) males	3 - 42 years	MRI	Descriptive
Pote et al., 2019	Familial risk of autism alters subcortical and cerebellar brain anatomy in infants and predicts the emergence of repetitive behaviors in early childhood	Autism Research	Longitudinal; N = 50	ASD-HR (n = 24) and ASD-LR (n = 26) infants	4 - 6 months & 36 months	MRI	Diagnostic
Righi et al., 2014	Functional connectivity in the first year of life in infants at risk for autism spectrum disorder: An EEG study	PLOS One	Longitudinal; N = 54	ASD-HR (n = 28) and ASD-LR (n = 26) infants	6 - 12 months	EEG	Diagnostic
Schumann et al., 2010	Longitudinal magnetic resonance imaging study of cortical development through early childhood in autism	The Journal of Neuroscience	Longitudinal; N = 85	Toddlers with ASD symptoms (n = 41) and without ASD symptoms (n = 44)	1.5 - 5 years	MRI	Descriptive
Seery et al., 2013	Atypical lateralization of ERP response to native and non-native speech in infants at risk for autism spectrum disorder	Developmental Cognitive Neuroscience	Longitudinal; N = 108	ASD-HR (n = 62) and ASD-LR (n = 46) infants	6, 9, & 12 months	EEG	Descriptive
Seery, Tager-Flusberg, & Nelson, 2014	Event-related potentials to repeated speech in 9-month-old infants at risk for autism spectrum disorder	Journal of Neurodevelopmental Disorders	Cross-sectional; N = 80	ASD-HR (n = 35) and ASD-LR (n = 45) infants	9 months	EEG	Descriptive
Shen et al., 2013	Early brain enlargement and elevated extra-axial fluid in infants who develop autism spectrum disorder	Brain	Longitudinal; N = 55	ASD-HR (n = 33; 10 of which were later ASD-HR+) and ASD-LR (n = 22) infants	6 - 9 months, 12 - 15 months, & 18 - 24 months	MRI	Diagnostic
Shen et al., 2017	Increased extra-axial cerebrospinal fluid in high-risk infants who later develop autism	Biological Psychiatry	Longitudinal; N = 343	ASD-HR+ (n = 47), ASD-HR- (n = 174), and ASD-LR (n = 122) infants	6, 12, & 24 months	MRI	Diagnostic

Simon et al., 2017	Neural correlates of sensory hypo-responsiveness in toddlers at high risk for autism spectrum disorder	Journal of Autism and Developmental Disorders	Cross-sectional; N = 22	ASD-HR infants (n = 22)	18 months	EEG	Descriptive
Swanson et al., 2017	Subcortical brain and behavior phenotypes differentiate infants with autism versus language delay	Biological Psychiatry	Longitudinal; N = 525	ASD-HR+ (n = 86), ASD-HR- (n = 255), ASD-HR with language delay (n = 41), and ASD-LR (n = 143) infants	6, 12, & 24 months	MRI	Diagnostic
Tierney et al., 2012	Developmental trajectories of resting EEG power: An endophenotype of autism spectrum disorder	PLOS One	Longitudinal; N = 122	ASD-HR (n = 65) and ASD-LR (n = 57) infants	6, 9, 12, 18, & 24 months	EEG	Descriptive
Wilkinson et al., 2019	Reduced frontal gamma power at 24 months is associated with better expressive language in toddlers at risk for autism	Autism Research	Cross sectional; N = 101	ASD HR+ (n = 16), ASD-HR- (n = 42), and ASD-LR (n = 43) infants	EEG at 24 months; ASD assessment between 24-36 months	EEG	Diagnostic
Wilkinson et al., 2019	Use of longitudinal EEG measures in estimating language development in infants with and without familial risk for autism spectrum disorder	Neurobiology of Language	Longitudinal; N = 130	ASD-HR+ (n = 21), ASD-HR- (n = 51), and ASD-LR (n = 58) infants	3 - 24 months	EEG	Diagnostic
Wolff et al. 2012	Differences in white matter fiber tract development present from 6 to 24 months in infants with autism	American Journal of Psychiatry	Longitudinal; N = 92	ASD-HR+ (n = 28) and ASD-LR (n = 64) infants	6, 12, & 24 months	DTI	Diagnostic
Wolff et al., 2015	Altered corpus callosum morphology associated with autism over the first 2 years of life	Brain	Longitudinal; N = 378	ASD-HR+ (n = 57), ASD-HR- (n = 213), and ASD-LR (n = 108) infants	6, 12, & 24 months	DTI & MRI	Diagnostic

Table Key:

Abbreviation:	Definition:
ASD	Autism Spectrum Disorder
ASD-HR	High Risk for ASD (due to familial diagnosis)
ASD-HR+	High Risk for ASD; ASD Diagnosis Confirmed
ASD-HR-	High Risk for ASD; NoASD Diagnosis Received
ASD-LR	Low Risk for ASD
fMRI	Functional Magnetic Resonance Imaging
MRI	Magnetic Resonance Imaging
EEG	Electroencephalography
fNIRS	Functional Near-Infrared Spectroscopy
DTI	Diffusion Tensor Imaging