Does Polygenic Risk Moderate Associations Between Maternal Depression and Infant Neurodevelopment? An EEG Study

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Background

- Maternal depression associated with delays in infant neurodevelopment [1,2,3]
- Electroencephalography (EEG) used to measure brain activity
- Frontal alpha asymmetry (FAA) implicated in depression
- Polygenic risk scores (PRS) implicated in depression [4,5]

Objective

Research Question: Do environmental (maternal depression symptoms and socioeconomic variables) and polygenic risk interact to predict neurodevelopment during infancy?

Hypotheses:

- Environmental risk will predict FAA
- PRS will predict FAA
- PRS will strengthen environmental risk and FAA associations

Method

- 116 samples from Boston Children's Hospital and Children's Hospital LA
- Edinburgh Postnatal Depression Scale (EPDS), maternal education level, neighbourhood income level, child age (months), PRS, FAA

Results

Table 1

Summary of Multiple Regression Analysis for Environmental Risk Variables Predicting FAA

Model	B [95% CI]	SE	β	p
Intercept	0.050 [-0.104, 0.205]	0.078		0.520
Maternal Education	0.002 [-0.015, 0.019]	0.008	0.027	0.808
Neighbourhood Income	0.057 [-0.138, 0.253]	0.098	0.066	0.562
Child Age	-0.029 [-0.086, 0.027]	0.028	-0.113	0.306
Depression Symptoms (EPDS)	0.004 [-0.001, 0.008]	0.002	0.181	0.097

Note. FAA = Frontal Alpha Asymmetry; CI = confidence interval; SE = Standard Error.

Figure 1

Visualizing Whether Polygenic Risk Moderates Associations Between Environmental Risk and FAA
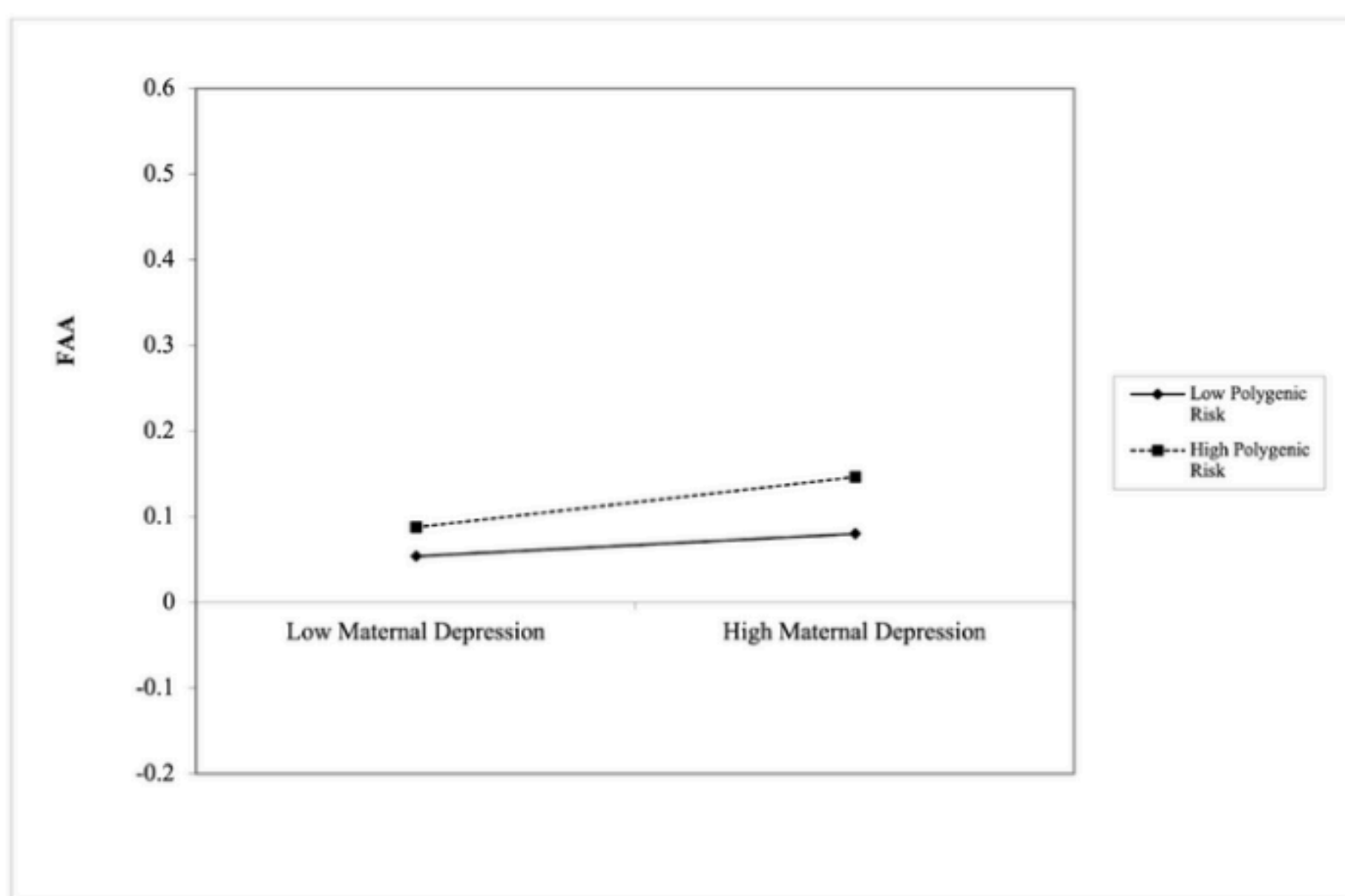
Note. FAA = Frontal Alpha Asymmetry.

Table 2

Summary of Multiple Regression Analysis for Genetic Risk Variables Predicting FAA

Model	B [95% CI]	SE	β	p
Intercept	0.075 [-0.056, 0.205]	0.066		0.257
Polygenic Risk	0.013 [-0.006, 0.032]	0.010	0.142	0.185
Child Age	-0.026 [-0.080, 0.028]	0.027	-0.100	0.350

Note. FAA = Frontal Alpha Asymmetry; CI = confidence interval.

Table 3

Moderator Analysis: Testing Whether Polygenic Risk Moderates Associations Between Environmental Risk and FAA

Effect	B	SE	95% CI		p
			LL	UL	
Constant	0.704	0.079	-0.087	0.227	0.375
Depression Symptoms (EPDS)	0.005	0.002	0.000	0.010	0.048
Polygenic Risk (PRS)	0.018	0.010	-0.003	0.038	0.094
PRS*EPDS	0.002	0.002	-0.003	0.006	0.400
Neighbourhood Income	0.052	0.106	-0.160	0.264	0.626
Maternal Education	0.003	0.009	-0.014	0.020	0.723
Child Age	-0.038	0.029	-0.091	0.026	0.267

Note. FAA = Frontal Alpha Asymmetry; SE: Standard Error; CI = confidence interval; LL = Lower limit; UL = upper limit; EPDS = Edinburgh Postnatal Depression Scale; PRS = Polygenic Risk Score.

Conclusion

- No significant moderation interaction
- Some support for significance of caregiver depression and PRS

Implications

- Strengths in obtaining PRS at 2-months
- May see FAA differences at different time points
- Parietal asymmetry more likely to be seen
- Examining associations across the first year of life provides insight into the complexity of these associations

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