



Youth Anxiety and Internalizing Symptoms: Correlations with Perceived Parenting Behavior and Error-Related Brain Potentials

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INTRODUCTION

Anxiety can emerge in childhood and affect cognitive control [1, 2]

- Anxiety and cognitive control studied alongside two event-related potentials (ERPs), error-related negativity (ERN) and error positivity (Pe)
- Both neurophysiological markers of cognitive control [3, 4]

Anxious adults display a larger ERN [5, 6], but the anxiety-ERN relationship is unclear in children as the ERN may increase with age [7, 8]

- Anxious older children have larger ERN, but anxious younger children have decreased ERN, suggesting developmental shifts in cognitive control abilities [8]

Pe, being stable over time [9, 10], is important cognitive control marker to study across development

- Anxious adults have smaller Pe [11], meaning reduced awareness to mistakes
- Anxious children may also have smaller Pe

Other important environmental factors, such as parenting [12], help explain individual differences in the development of anxiety [13].

- Positive parenting associated with lower adolescent anxiety symptoms
- Negative parenting was associated with higher risk of anxiety symptoms [14]
- Research supports negative parenting related to larger youth ERN [15]
- Parenting plays a role in the development of childhood anxiety, which may affect cognitive control

Aims and Hypothesis:

What is the relationships between parenting, anxiety/internalizing symptoms, and the ERN and Pe?

Hypothesis: Negative parenting will predict more anxiety/internalizing symptoms in youth, and be presented as an enhanced ERN and diminished Pe

- H1: Anxious children will display larger ERN and smaller Pe
- H2: Negative parenting will predict more anxiety and internalizing symptoms, while positive parenting will predict lower anxiety and internalizing symptoms
- H3: Negative parenting will relate to a larger ERN and smaller Pe

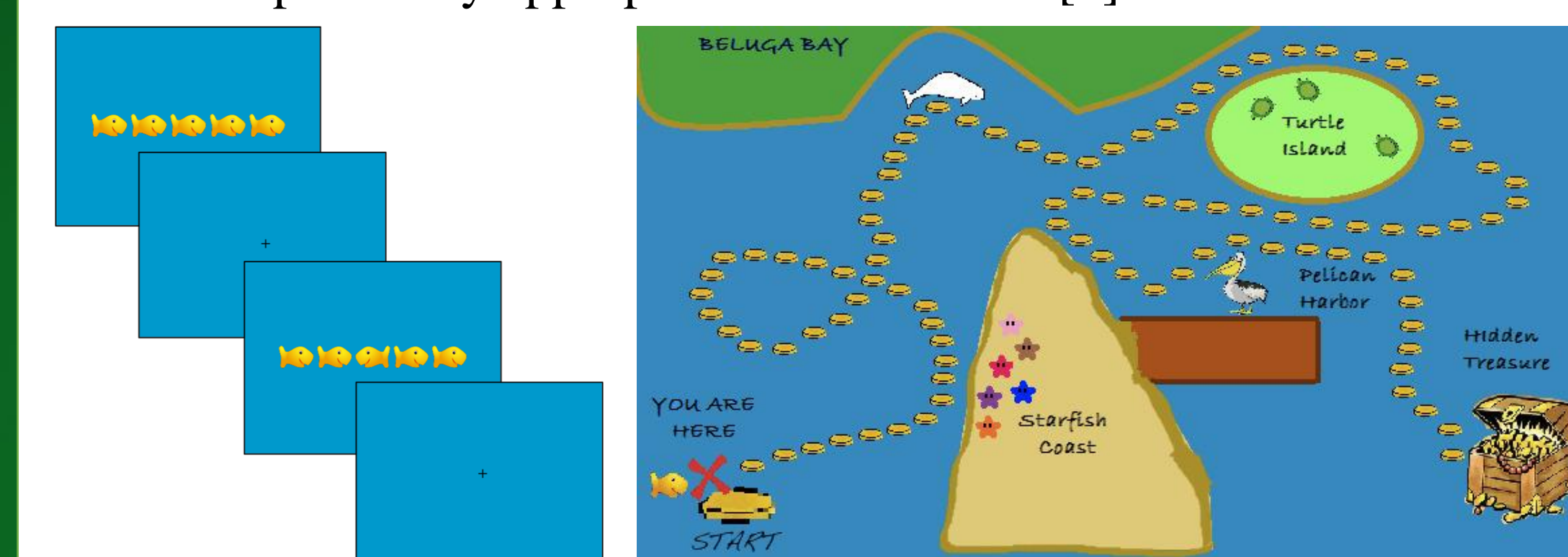
METHODS

Participants

- $n = 143$
- Age: 8-13 years ($M = 10.59$, $SD = 1.68$)
- Recruitment: online advertising site and laboratory database

Materials

- Child report Parent Perception Inventory (PPI; [16])
- Developmentally appropriate Flankers task [8]



- Parent-reported Revised Child Anxiety and Depression Scale (RCADS-P; [18])
 - Assess for anxiety totals
 - Factor scores used to assess overall internalizing symptoms

RESULTS

H1: Anxiety → ERN/Pe

- Not Significant ($p > 0.05$)

H2a: Negative Parenting → More Anxiety/Internalizing

- Negative mom parenting related to children's anxiety ($r = .252$, $p = .007$)

H2b: Positive Parenting → Less Anxiety/Internalizing

- Not Significant ($p > 0.05$)

H3a: Negative Parenting → Larger ERN

- More negative mom parenting → smaller Δ ERN ($r = .234$, $p = .012$)
- More negative dad parenting → smaller Δ ERN ($r = .214$, $p = .023$)

H3b: Negative Parenting → Smaller early Pe

- More negative mom parenting → smaller Δ Pe ($r = -.257$, $p = .006$)
- More negative dad parenting → smaller Δ Pe ($r = -.233$, $p = .013$)

H3c: Negative Parenting → Smaller late Pe

- Negative dad parenting not significant ($p > .05$)
- Negative mom parenting → smaller Δ LPe ($r = -.278$, $p = .003$)
- Positive mom parenting → larger Δ LPe ($r = .207$, $p = .026$)

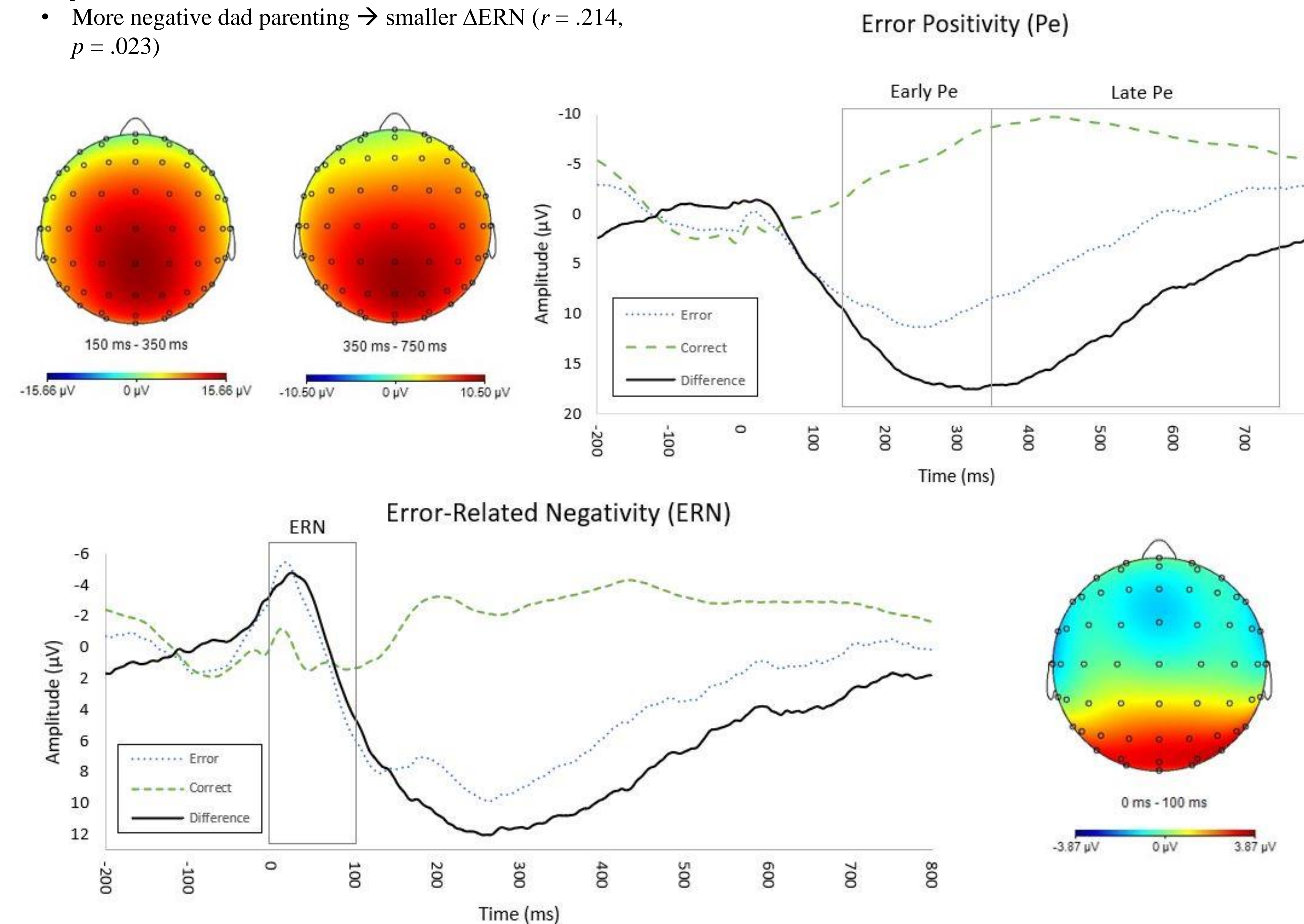


Table 1 Bivariate correlations between ERPs, parenting, anxiety, and internalizing symptoms

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Δ ERN FCz	--										
2. Δ Early Pe CPz	0.069	--									
3. Δ Late Pe CPz	0.234**	0.658**	--								
4. Pos Mom	0.009	0.168	0.207*	--							
5. Neg Mom	0.234*	-0.257**	-0.278**	-0.204*	--						
6. Pos Dad	-0.137	0.103	-0.016	0.477**	-0.093	--					
7. Neg Dad	0.214*	-0.233*	-0.121	-0.032	0.531**	-0.078	--				
8. Anx Mom Report	0.033	-0.004	0.012	-0.011	0.252**	0.087	0.114	--			
9. Int Mom Report	0.038	-0.023	0.034	-0.119	0.264**	-0.001	0.100	0.904**	--		
10. Anx Dad Report	-0.017	0.059	0.127	0.105	-0.066	0.045	0.018	0.441**	0.431**	--	
11. Int Dad Report	-0.019	0.036	0.061	0.021	-0.069	-0.071	0.010	0.345**	0.404**	0.888**	--
M	-1.817	15.624	10.265	3.877	2.048	3.593	2.064	0.493	0.084	0.479	0.155
SD	6.107	8.557	5.911	0.703	0.725	0.857	0.695	0.377	0.86	0.328	0.172

* $p \leq 0.05$

** $p \leq 0.01$

DISCUSSION

H1: Anxiety → ERN/Pe

- Contrary to hypothesis, mom/dad report anxiety did not predict ERN/Pe
- Child anxiety very low
- Anxiety and ERP relationship tenuous in children

H2: Parenting → Anxiety/Internalizing

- Negative mom parenting predicted child anxiety/internalizing
- Dad reported lower anxiety/internalizing compared to mom
- Child report low positive and negative dad parenting

H3: Negative Parenting → ERN/Pe

- Contrary to hypothesis, negative parenting predicted smaller ERN
- Negative parenting environment may impact ERN development
- Negative parenting predicted smaller early Pe
- Early Pe and ERN may reflect similar cognitive processes
- Mom parenting related to Pe
- Positive mom parenting predicted larger late Pe
- Negative mom parenting predicted smaller late Pe
- Child report low positive and negative dad parenting

Limitations

- PPI may not accurately assess parenting behavior
- Cross-sectional design does not account for developmental differences across time
- Parent reported measures may be affected by parent psychopathology [20, 21]
- ERN differences in clinical and non-clinical samples

Future Research

- Explore possible moderating effect of parenting on anxiety-ERP relationship
- Replication using a clinical sample in order to see how children with high levels of anxiety display ERPs as they age

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