

Parent Behavior and Child Pain Outcomes During Pediatric Venipuncture: The Role of Child Emotion Regulation Capacity

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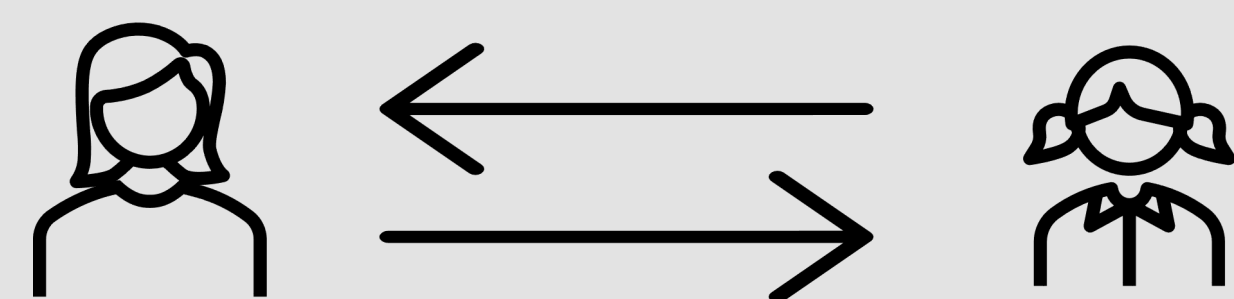
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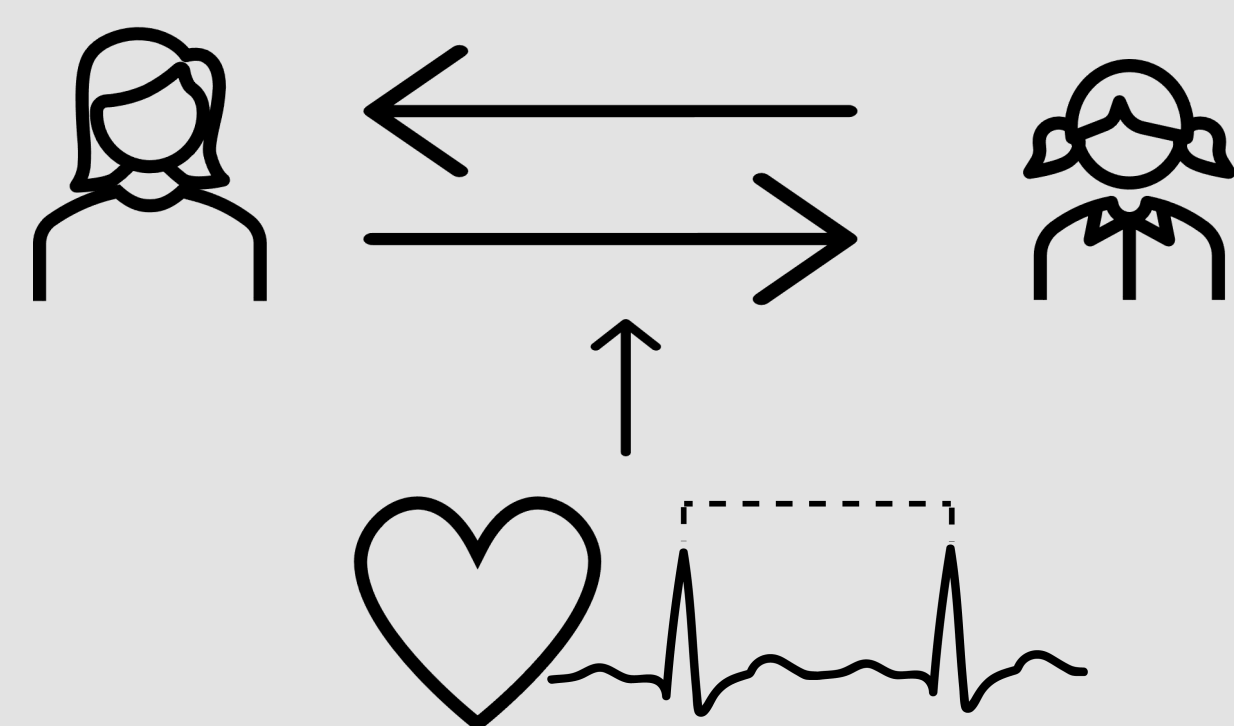
Background

Needle procedures = source of pain, distress, & fear for children & can lead to needle noncompliance and avoidance, if unmanaged.^{5, 9}

Existing research: Parent behaviors relate strongly to children's experiences with needles.^{4, 8}



Gaps in existing research: Does children's emotion regulation capacity, measured via heart rate variability (HRV), affect how parent behaviors relate to child experiences?^{1, 2, 3, 6, 7, 10}



Objectives

#1. Examine how children's HRV relates to their pain experience in the context of venipuncture.

- Hypothesis:** Children w/ lower HRV (i.e., low emotion regulation capacity) will experience more pain, fear, and distress.

#2. Examine whether children's HRV changes how parent distress promoting behaviors relate to child pain experiences.

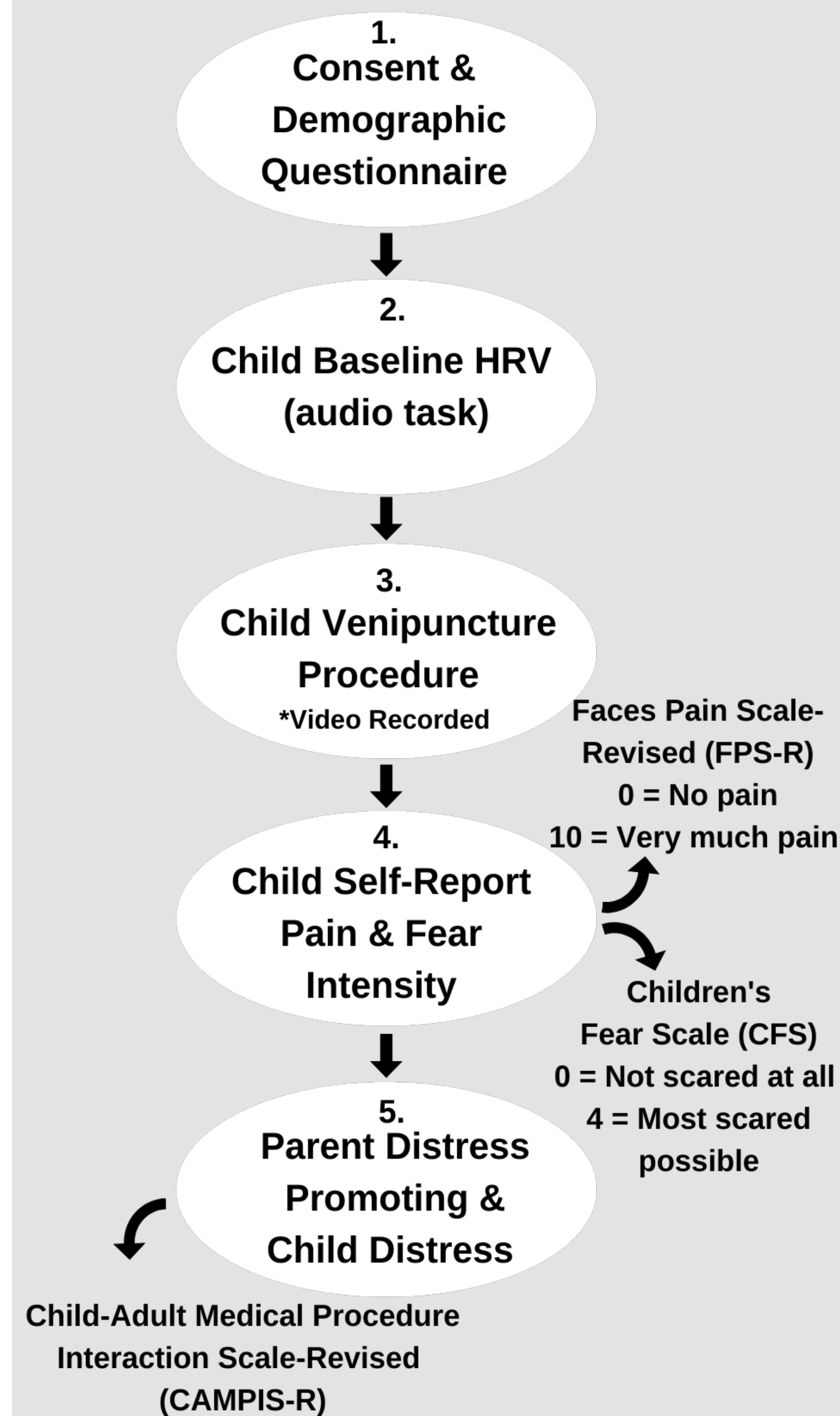
- Hypothesis:** As child HRV decreases, associations between parent distress promoting and child pain, fear, and distress will strengthen.

Methodology

Participants:

- 61 children aged 7-12 years ($M = 9$, $SD = 1.6$, female = 46%) undergoing venipuncture at McMaster's Children's Hospital & primary caregiver ($M = 42$, $SD = 5.8$, female = 80.3%).

Figure 1. Timeline of Study Procedures
(Study is part of a larger RCT, registration: NCT03941717)



Data Preparation:

- HRV quantified in time-domain, as root mean square of successive heart-beat differences (RMSSD; represented in milliseconds).

Results

#1 Bivariate correlations, See Table 1

- Child HRV significantly negatively associated w/ child distress.
- Small, nonsignificant, negative effect found between child HRV & fear, and pain intensity.

#2 Moderations

Model 1: Child distress, See Figure 2

- Parent distress-promoting significantly associated w/ child distress when child HRV low (one standard deviation below mean), $b = 1.29$, CI [0.76, 1.83], $t = 4.89$, $p < .001$, and average (at mean), $b = 0.80$, CI [0.22, 1.38], $t = 2.79$, $p < .01$ but not high (one standard deviation above mean), $b = 0.31$, CI [-0.62, 1.24], $t = .68$, $p = .50$.

Model 2 & 3: Child pain & fear intensity

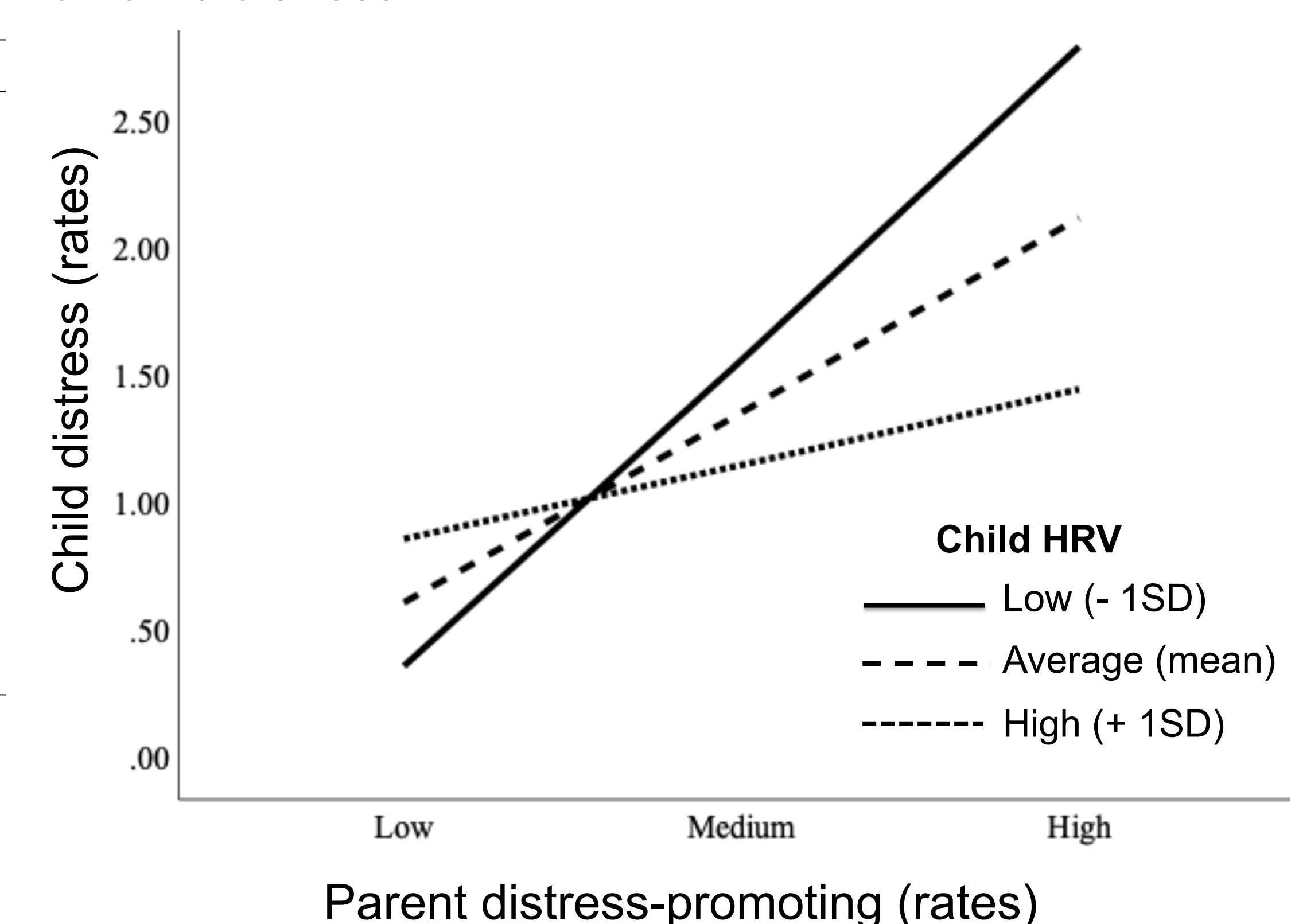
- No significant effect of child HRV, parent distress promoting, or child HRV x parent distress promoting.

Table 1. Mean, standard deviation, median, & correlations

	Mean (SD)	Median	1	2	3	4
1. Child HRV	7.9 (1.4)	7.9				
2. Child pain	2.5 (2.9)	2	-.22			
3. Child fear	0.9 (1.0)	1	-.19	.66**		
4. Child distress	1.8 (1.7)	0.8	-.30*	.36**	.27*	
5. Parent distress promoting	0.9 (0.9)	0.6	-.40**	.40**	.44**	.52**

Notes. Child distress and parent distress promoting = # of distress behaviors during procedure / length of procedure in minutes. * $p < .05$, ** $p < .01$

Figure 2. Child HRV moderates effect of parent behavior on child distress



Discussion

- Obj 1.** Low child HRV = greater distress, but not higher pain/fear, which may be due to measurement differences (behavioral vs. self-report).
- Obj 2.** Low HRV in children may be a risk factor for greater distress during venipuncture when facing parent distress-promoting behaviors.
- Limitation:** Small sample size which impacts ability to detect small effect sizes.
- Future directions:** Increasing baseline HRV may improve venipuncture experiences.

Take away: Children with low HRV have the most difficulty regulating emotional responses when facing parent distress-promoting behaviors, like reassurance, and may rely more on co-regulation.