

INTRODUCTION

- Emotion regulation (ER)** = the ability to change the experience and expression of emotions [1] predicts adjustment into adulthood [2].
- Respiratory sinus arrhythmia (RSA)** = well-established measure [3,4] of physiological flexibility of the parasympathetic nervous system.
 - Greater resting state RSA predicts better ER during emotional challenges and fewer parent-reported emotional problems [5,6].
 - Greater vagal flexibility, as indicated by the ability to engage the parasympathetic nervous system while at rest and withdraw in response to emotional challenges, is related to higher cognitive processes [7].
- Few studies have examined links between RSA and spontaneous child ER behaviors during an emotional task.
- Hypotheses:**
 - Vagal flexibility (as illustrated by greater RSA suppression) will be associated with positive ER capabilities and can be used to predict spontaneous child ER strategies during the Waiting Task
 - Greater vagal flexibility will be associated with greater parent-reported emotion regulation abilities and well-being.

Behavior	Description
Self-Comforting	Seeking comfort or comforting self without changing situation
Prohibited Object Engagement	Looking at or touching prohibited object; breaking task rules
Social Engagement	Talking about or asking questions pertaining to the prohibited object or asking about task rules in attempt to change situation
Attentional Avoidance	Passively focusing attention elsewhere to avoid the task
Alternative Activity Engagement	Actively shifting the focus of attention by engaging in an alternate activity
(Boring) Object Engagement	Shifting the focus of attention towards the undesired, boring object (plastic blue whale)

Waiting Task ER Strategies



Self-Comforting – Child is seeking comfort from mother



Prohibited Object Engagement – Child is holding and staring at gift



Social Engagement – Child is talking about gift and task



Attentional Avoidance – Child is looking away and not engaging

METHOD

Participants

- 31 children (12 female) aged 5 to 8 years ($M_{age} = 7.15, SD = 1.15$) and their parents.

Materials and Procedure

- Baseline Task:** Children completed a five-minute computerized baseline task while ECG was recorded [8,9,10].
- Waiting Task (WT):** Children were asked to wait to open an attractive gift while their parents filled out questionnaires in the same room (10 minutes).
 - Videos were coded by 4 reliable coders ($M = .75, SD = .09$)
 - Distributions were positively skewed so SQRT transformations were used in analyses
- Child Behavior Questionnaire** [CBQ; 11]
- Emotion Regulation Checklist** [ERCL; 12]
- Electrocardiogram (ECG) data:** Obtained using a Biopac MP150 wireless system and recorded with Acqknowledge v4.4. MindWare HRV 3.1.4 was used to inspect analyze the ECG signal [13].
- RSA Suppression:** Calculated by computing the difference between baseline and WT RSA.

RESULTS

Table 1.

Descriptive statistics for RSA during the Baseline Task and Waiting Task [M(SD)]

	Baseline	Waiting Task	Difference Score (Baseline minus Waiting Task)
RSA	29.84(12.84)	21.64(10.67)	27.86(11.15)

Greater RSA suppression was associated with positive ER strategies during the WT

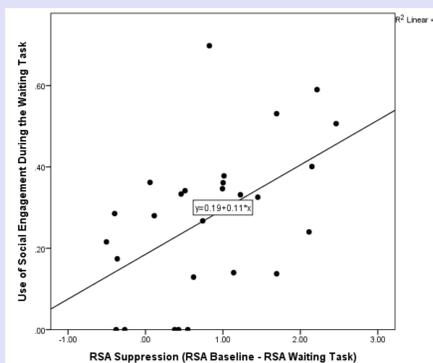


Figure 1. $r = .51, p < .001$

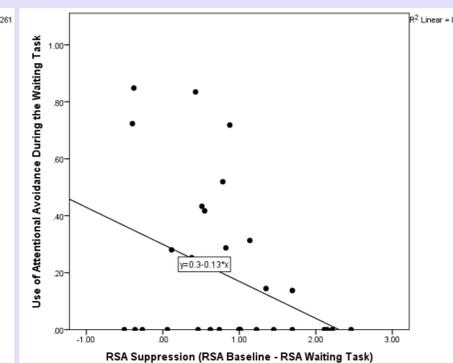


Figure 2. $r = -.38, p = .04$

- Lower RSA during WT predicted greater use of social engagement during the WT ($\beta = -.38, t(28) = -2.53, p = .02$)

RESULTS CON'T

Greater RSA during baseline, lower RSA during WT, and greater RSA suppression were associated with better parent-reported emotion regulation abilities and well-being.

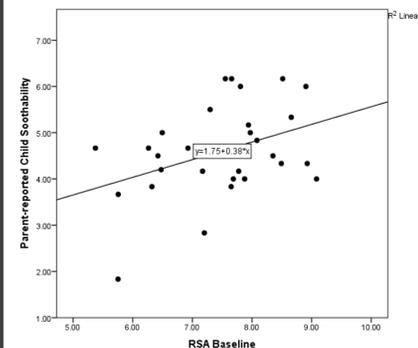


Figure 3. Greater RSA during Baseline was associated with greater parent-reported soothability ($r = .39, p = .03$).

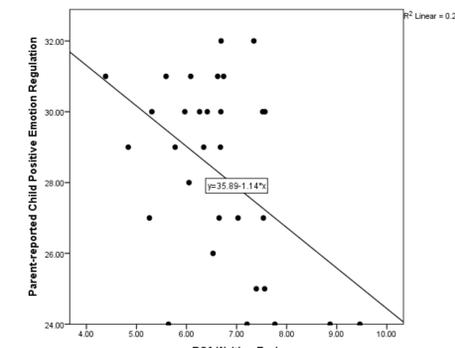


Figure 4. Lower RSA during the Waiting Task was associated greater parent-reported positive emotion regulation ($r = -.47, p = .01$).

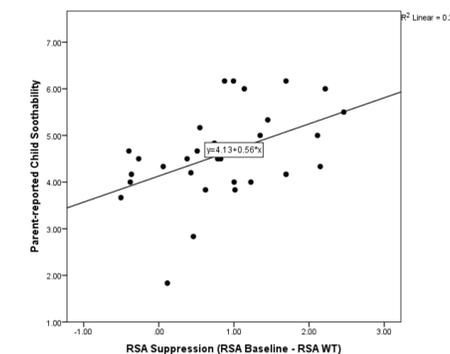


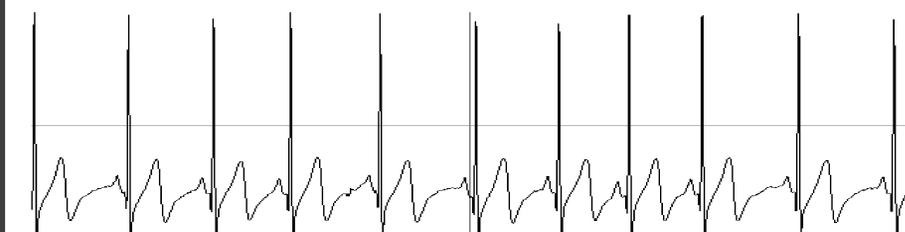
Figure 5. Greater RSA Suppression was associated with greater parent-reported child soothability ($r = .47, p = .01$).

DISCUSSION

- Vagal flexibility (as illustrated by greater RSA suppression) can be used to predict ER strategies during the WT**
 - Lower RSA during WT predicted more use of social engagement during WT
 - Greater RSA suppression predicted more use of social engagement during WT
- Vagal flexibility will be associated with greater parent-reported emotion regulation abilities and well-being**
 - Greater RSA at baseline is related greater parent-reported child soothability
 - Lower RSA during Waiting Task is related to greater parent-reported child emotion regulation capabilities
 - Greater RSA suppression is related to greater parent-reported child soothability
- Findings support previous research by demonstrating links between RSA and child temperament and uniquely, child's use of adaptive ER strategies during an emotional challenge**

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Sample Baseline ECG. RSA was calculated using MindWare software. Greater resting-state RSA, lower RSA during emotional challenge, and greater RSA suppression indicate positive well-being and emotion regulation.