Respiratory Sinus Arrhythmia is Uncorrelated with Vocalizations Among Infants at High and Low Risk for ASD and ADHD

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INTRODUCTION

- Respiratory sinus arrhythmia (RSA), high frequency heart rate variability linked with regular respiration, is an index of vagal tone and parasympathetic activity.[1]
- RSA is associated with effort allocation and emotion regulation,[1] and is often measured in studies of infants.
- Increased RSA allows for behavioral adaption and cognitive flexibility; reduced RSA is associated with maladaptive response to stress.[3]
- Factors that disrupt regular respiration, such as talking, have been shown to affect RSA and other heartbeat derived measures in adults.[2]
- It is unclear whether vocalizations affect RSA measurement in infants.

OBJECTIVE

We investigated the impact of vocalizations on RSA measurement in infancy by assessing correlations between the two metrics in infants aged 12 and 18 months.

METHODS

Participants

- Total of 44 infants aged 12 (n = 27) and 18 (n = 17) months at familial risk for ASD (n = 17), familial risk for ADHD (n = 13), or low risk for both (n = 14).

Experimental Design

- Infants participated in a 3-minute parent-child play task.
- Actiwave single-channel ECG (CamnTech) collected data during the parent-child play task.
- MindWare® software used to clean heartbeat data and calculate RSA; raw values were analyzed.
- Coders were trained to 70% agreement on vocalization codes to be considered reliable.
- Infant vocalizations during the parent-child play task were coded in BORIS 6.3.9.

Analyses

- Correlations between mean RSA and duration of vocalizations during 3 minutes of video-recorded parent-child play were examined.

Figure 1. Parent-child play task as part of the Early Risk Study.

RESULTS

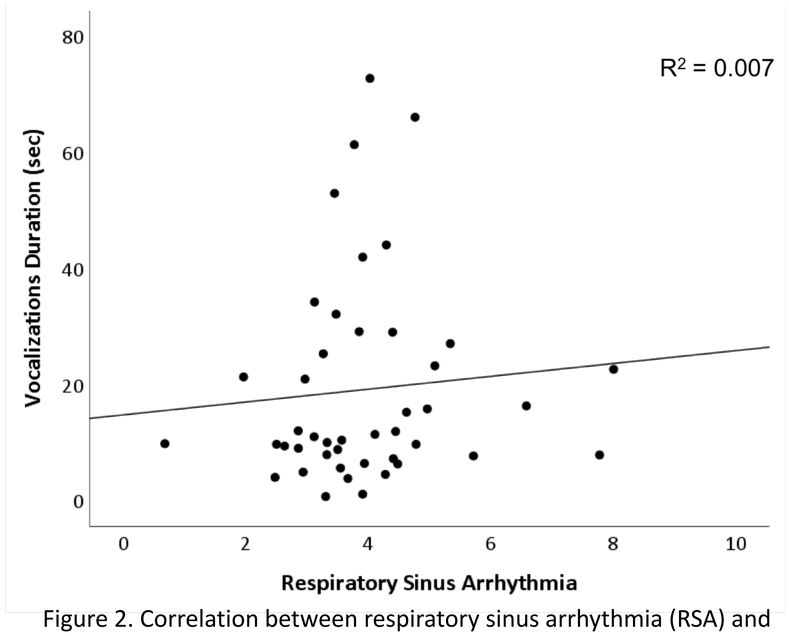

Figure 2. Correlation between respiratory sinus arrhythmia (RSA) and the duration of vocalizations.

SUMMARY

- The correlation between vocalization duration and RSA was not statistically significant (r = 0.08, p = 0.59; **Fig. 2**).
- Exploratory moderation analysis indicated that risk group did not moderate the association between vocalizations and RSA.

CONCLUSIONS

Conclusions

- Vocalizations were not correlated with RSA.
- Although we cannot prevent infants from vocalizing during certain tasks, we conclude that vocalizations do not interfere with the collection of valid RSA measurements in infants/toddlers.

Future Steps

- We can examine whether the association between vocalizations and RSA differs depending on emotional quality of vocalizations.
- We can investigate whether RSA is an early biomarker of later outcomes of ASD or ADHD as children age.

STRENGTHS & LIMITATIONS

Strengths

- No prior studies have examined associations between RSA and vocalizations in this age range.
- We addressed methodological weaknesses in prior literature.

Limitations

- Not all infants tolerated the electrodes.
- Vocalizations were not coded to capture emotional intent and reactivity.

REFERENCES

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