Physiological and Family-Level Predictors of Autistic Children's Sleep Quality

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INTRODUCTION

Background

- Children on the autism spectrum commonly experience numerous sleep problems, such as insomnia and nightmares (Richdale & Schreck, 2009).
- Respiratory Sinus Arrhythmia (RSA) is a measure of parasympathetic nervous system activity that is associated with sleep quality in non-autistic children (El-Sheikh et al., 2013).
- Schiltz and colleagues (2022) found that baseline RSA and RSA reactivity during a challenging task interacted to predict sleep problems.
- Due to the lack of prior research examining potential links between RSA and sleep quality in adolescents with ASD, this study hopes to replicate and extend Schiltz et al.'s (2022) results.

OBJECTIVES

- The current study sought to conceptually replicate Schiltz and colleagues' (2012) findings utilizing different methods and a larger sample.
- In particular, we examined RSA during a family situation that was designed to be mildly stressful for participants.
- Additionally, our participant sample consisted of adolescents who were verbal and had higher intellectual functioning.
- Finally, we extended our analyses to examine whether family functioning predicted children's sleep above and beyond levels of RSA.

METHOD

Participants

- 107 children (10-17 years old; $M = 13.25$ years, $SD = 2.21$ years) and their parents (mothers and fathers) participated in the study.
- Children were able to speak in at least 2-3 word sentences and had an IQ score > 70 ($M = 103.17$, $SD = 18.26$; Range 72-147).
- 79.4% of children were male.
- All children had a community diagnosis of autism that was verified by study personnel.

Procedure

- Children's baseline RSA was recorded during a 3-min quiet baseline and a 3-min nature video baseline. Baseline scores were averaged to create a single baseline (RSA_B).
- Children then watched a video of their parents engaged in a discussion about something they disagreed about in their relationship. RSA was recorded and an RSA reactivity score (RSA_R) was calculated by subtracting RSA_B from the task RSA.
- Parents and children completed surveys during the study visit.

Survey Measures

- The Cleveland Adolescent Sleep Questionnaire was completed by children as a measure of daytime sleepiness. The total score was used.
- Risky Families Questionnaire completed by children.
- Parents separately completed the O'Leary Porter Scale about the level of conflict in their relationship. The average of mother and father report was used.
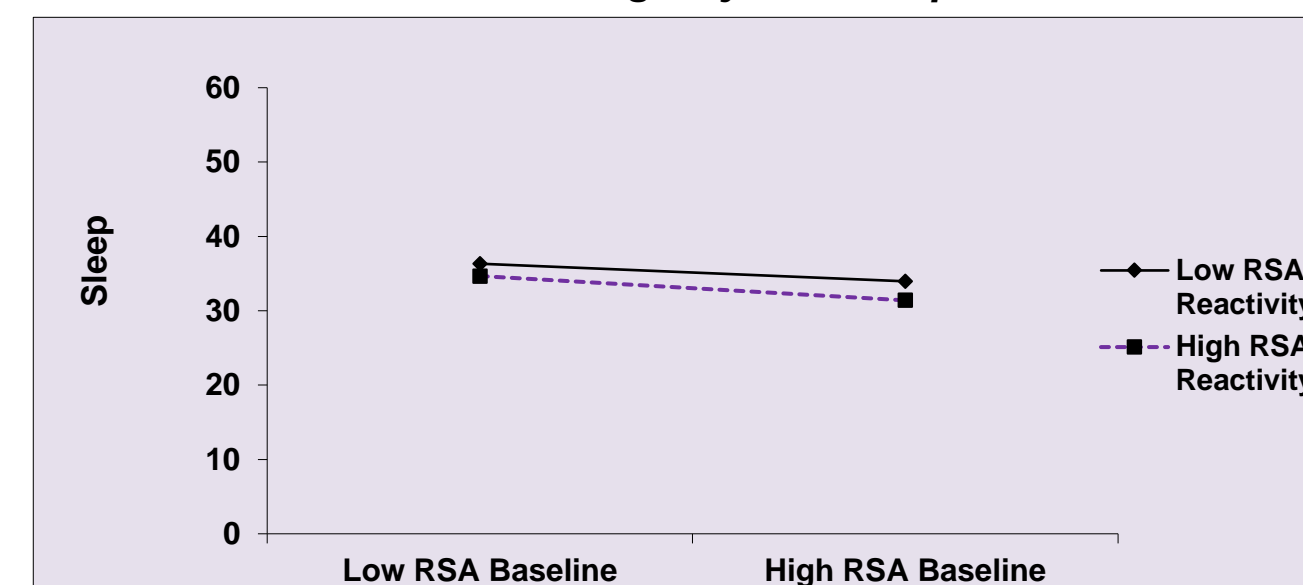
ANALYTIC PLAN

- Analyses were preregistered
- A series of moderated regression analyses were conducted:

$$\text{Sleepiness} = \beta_0 + \beta_1 \text{RSA\_B} + \beta_2 \text{RSA\_R} + \beta_3 \text{RSA\_B} \times \text{RSA\_R} + e$$

- A second model added risky family as a main effect and interaction.
- We then explored whether marital conflict predicted children's sleepiness.

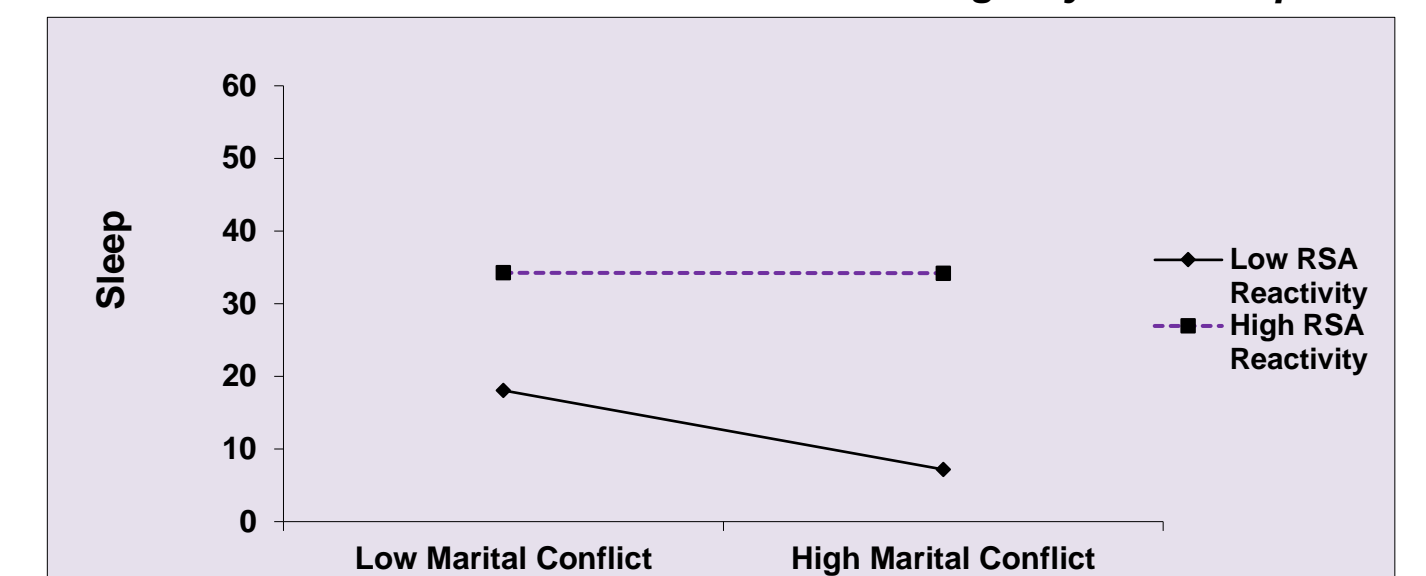## RESULTS

Children's RSA Predicting Daytime Sleepiness

After controlling for child IQ, the main effects and interaction were non-significant ($ps > .05$).


Children's RSA and Marital Conflict Predicting Daytime Sleepiness

The marital conflict * RSA_R interaction was significant ($p < .05$) and was unpacked two ways.

Children's RSA and Family Environment Predicting Daytime Sleepiness

	Coeff (*SE*)	*t*	*p*
Intercept	34.76(1.17)	29.78	<.001
RSA_B	-1.46(1.01)	-1.45	.15
RSA_R	-.85 (1.00)	-.41	.68
Family	**.53(.19)**	**2.77**	**<.05**
RSA_B * RSA_R	-.09(1.76)	-.05	.96
RSA_B * Family	-.14(.13)	-1.08	.28
RSA_C * Family	-.41(.30)	-1.40	.16
RSA_B*RSA_R*Family	-.06(.26)	-.23	.82
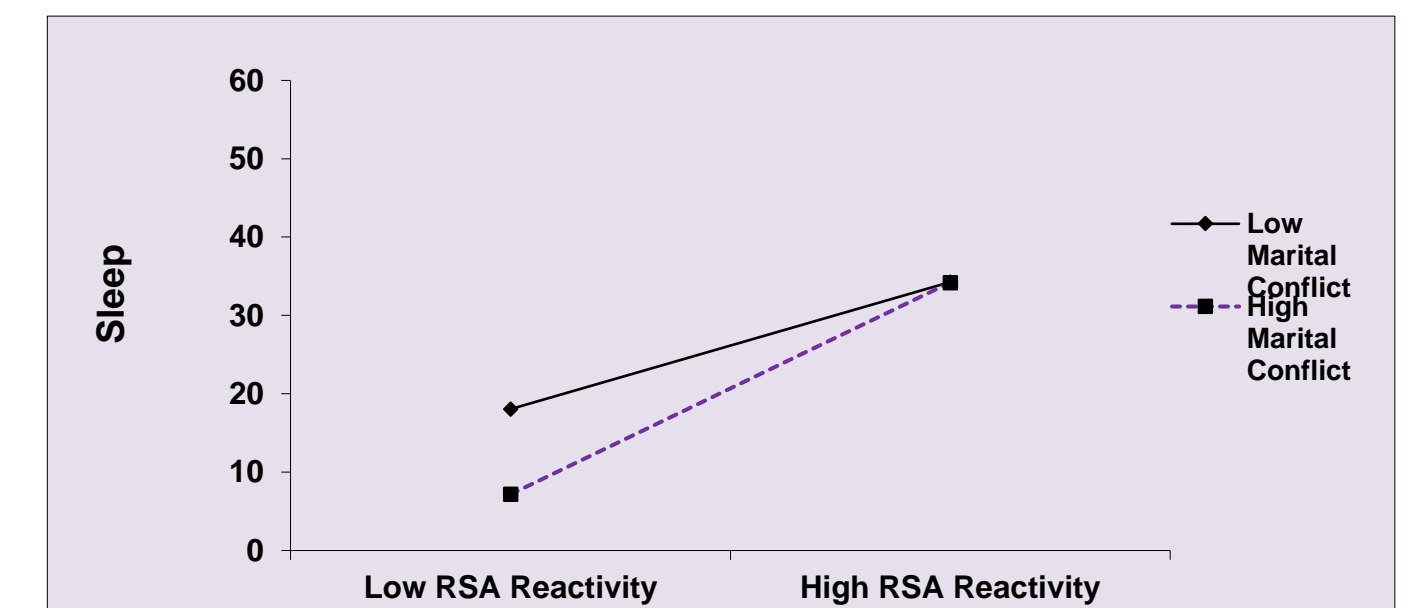
Children who struggled to regulate had greater sleepiness, regardless of marital conflict levels. However, at low levels of conflict, children who regulated better reported worse sleepiness.

DISCUSSION AND LIMITATIONS

- We did not conceptually replicate the findings of Schiltz et al. (2022). Our task was different, and the sample was older and larger. In addition, we also relied on child-report of sleep.
- We found that the family context was a significant predictor of children's sleepiness, above and beyond RSA levels. This is consistent with research in non-autistic children that finds that family context is one of the most significant predictors of children's sleep quality (El-Sheikh & Kelly, 2017).
- Children's RSA_R, an indicator of regulatory skills, predicted sleep; however, the association depended upon levels of marital conflict. The findings of this model contrasted with research of non-autistic children. Specifically, children who were better at regulating were adversely impacted by low levels of marital conflict, an association that we cannot yet explain.
- The current study had several limitations. First, all of this study's participants on the autism spectrum were verbal, so results cannot necessarily be generalized to children on the autism spectrum who are nonverbal. Additionally, because nearly 80% of the current study's children were male and all autistic participants were adolescents, so results are hard to generalize to girls and children on the autism spectrum.
- Future directions include studying samples of children on the autism spectrum who are nonverbal, recruiting more girls on the autism spectrum, and examining child samples as opposed to only adolescents.