Discrepancies in Anxiety-Reports Autism: Correlating Self-Reports with RMSSD

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Background

- Anxiety is one of the most common co-occurring conditions in autistic youth and can manifest differently in autistic compared to non-autistic populations, making it difficult to identify anxiety in autistic youth.
- The Screen for Child Anxiety-Related Emotional Disorders (SCARED; Birhmaher et al., 1997) is considered to be a gold-standard measurement tool of anxiety symptoms that aims to provide a dual-informed perspective (Behrens et al., 2020).
- However, discrepancies between parent and child reports have been observed, suggesting a need for an objective indicator of anxiety, such as low levels of heart rate variability (HRV) (Shaffer & Ginsberg, 2017).
- This research aimed to **investigate the discrepancies between parent- and child-reported anxiety symptoms within an autistic and non-autistic sample** (Aim 1) and to **examine whether parent and/or child reports are more closely aligned with biological indicators of anxiety** (i.e., low HRV) (Aim 2).
- We hypothesized a) **that there would be statistically significant discrepancies between parent and child-reported anxiety symptoms**, and b) **that child-reported anxiety would more closely align with HRV values** (a negative correlation).

Methodology

Participants:

- 47 (25 autistic, 22 non-autistic) parent-child dyads within a larger study assessing anxiety in autistic and non-autistic youth

Participant Demographics

Variable	Autistic (n = 25)	Non-autistic (n = 22)
Age at Visit (*Mean*, *SD*)	12.97, 1.10	12.79, 1.20
IQ (*Mean*, *SD*)	106.08, 13.80	110, 12.11
Gender (%(n))		
Male	64.0 (16)	22.7 (5)
Female	36.0 (9)	77.3 (17)
Race (%(n))		
Black/African American	28.0 (7)	22.7 (5)
Asian	4.0 (1)	22.7 (5)
White	60.0 (15)	18.2 (4)
More than one race	8.0 (2)	36.4 (8)
Ethnicity (%(n))		
Hispanic or Latino	8.0 (2)	18.2 (4)
Not Hispanic or Latino	92.0 (23)	81.8 (18)

Table 1. Participant Demographics

Measures:

- *Root Mean Square of Successive Differences (RMSSD) Value*
  - A reflection of the variance in heartbeats that serves as a quantification of heart rate variability
  - Calculated via Kubios HRV Scientific
  - 1000Hz ECG data was collected via Zephyr Biomodule and Bioharness during a 5-minute baseline in the lab setting
- *The Screen for Child Anxiety-Related Emotional Disorders (SCARED)*
  - A 41-item questionnaire was given on a Likert scale with separate versions for the parent and for the child.
  - The severity of symptoms was rated on a 0-2 point rating scale, with 0 meaning not true or hardly ever true and 2 meaning true or often true
  - The sum of the 41 items was used as well as a discrepancy score (difference between parent and child report sum)

Data Analysis in *R*:

- Paired Samples *t*-Test (Aim 1)
- Pearson's *r* Correlation Test (Aim 2)
- Independent Samples *t*-Test (Post-hoc exploratory analyses)

Results

Aim 1: To investigate discrepancies between parent- and child-reported anxiety within an autistic and non-autistic sample.

- Results of a paired sample *t*-test indicated that there was a significant difference between parent- and child-reported anxiety symptoms (t = 3.22, p = .002), such that parents reported an average of 7.84 points fewer anxiety symptoms than their child.
- Specifically, parents reported an average of 17.68 (*SD* = 11.79) and children reported an average of 25.52 (*SD* = 14.4).

Aim 2: To examine whether parent and/or child reports are more closely aligned with biological indicators of anxiety.

- Child-reported anxiety symptoms and HRV were not statistically significantly correlated ($r(47)$ = -.23, p = .14).
- Parent-reported anxiety symptoms and HRV trended towards a statistically significant correlation ($r(47)$ = -.29, p = .06).

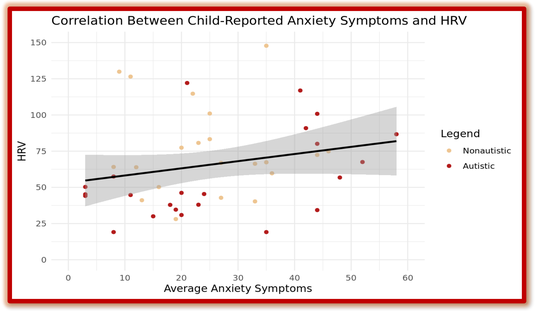

Figure 1. Scatterplot depicting the relationship between child-reported anxiety symptoms and HRV (heart-rate variability)

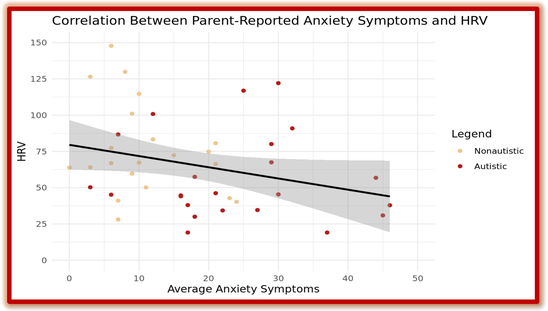

Figure 2. Scatterplots depicting the relationship between child- and parent-reported anxiety symptoms and HRV (heart-rate variability)

Variables	1	2	3	4	5
1. SCARED-P (ASD)	1				
2. SCARED-C (ASD)	.16	1			
3. SCARED-P (non-ASD)	--	--	1		
4. SCARED-C (non-ASD)	--	--	.57**	1	
5. RMSSD	–.07	-.47*	–.29	-.07	1

Note. RMSSD = Root Mean Square of Successive Differences; SCARED = Screen for Child Anxiety Related Emotional Disorders; C = Child report; P = Parent report; ASD = Autism spectrum disorder.
* p < .05. ** p < .01.

Table 2. Correlation matrix depicting a post-hoc analysis investigating correlations between child- and parent-reported anxiety symptoms within diagnostic groups

Post-hoc Exploratory Analyses: We examined whether diagnostic group was associated with discrepancies in parent vs. child-reported anxiety symptoms.

- There was a significant mean difference between the discrepancies for the autistic and non-autistic groups (t = 2.43, p = .02), with a higher rate of discrepancy in the non-autistic group (M = 13.71, 95% CI [1.91, 20.56]).

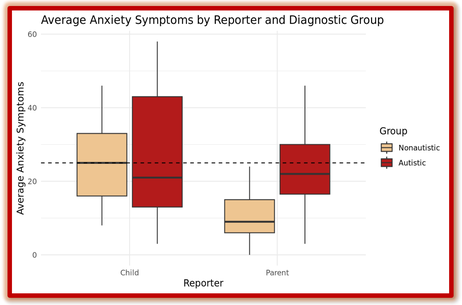

Figure 3. Boxplots comparing mean child- and parent-reported anxiety scores. The dashed line represents the score indicating the clinical presence of anxiety (25).

Discussion

Takeaway:

- A significant mean difference in parent- and child-reported anxiety symptoms was observed between the autistic and non-autistic groups
  - Children were rating higher levels of anxiety
  - Non-autistic children had a significantly larger discrepancy than autistic children
- The parent and child report forms were only significantly correlated in the nonautistic group
- The parent report form for both the autistic and nonautistic groups was not significantly correlated with HRV; the child report form was only significantly correlated with HRV in the autistic group

Limitations:

- The sample size for this study was small (N = 47)
- There was a difference in settings for completing the questionnaires across participants, with some completing them in the laboratory and others completing them at home

Future Directions:

- Perform an ANOVA analyzing HRV as a predictor of anxiety symptoms
- Utilize a larger sample (N > 50)
- Utilize other measurements of HRV, such as Respiratory Sinus Arrhythmia

References

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