Stereotyped Motor Behaviors and Managing Hyper-arousal: Examining Cardiac Function in Children with Autism Spectrum Disorders

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Discussion
• Results suggest that higher HR and lower RSA are associated with greater likelihood of engaging in stereotyped motor behaviors.
• As children with ASD have been found to have higher HR and lower RSA than children with typical development, these findings support the notion of a functional explanation for stereotyped motor behaviors, which may serve as an attempt to manage physiological hyper-arousal in ASD.
• Further research is needed to clarify whether hyper-arousal is actually reduced during or immediately following stereotyped motor movements.

Background
• Autism spectrum disorders (ASD) are characterized by deficits related to social functioning, communication, and restricted and repetitive behaviors (American Psychiatric Association [APA], 2000).
• Repetitive behaviors include stereotyped motor movements such as hand flapping and spinning.
• Children with ASD have reduced respiratory sinus arrhythmia (RSA) and faster heart rate (HR) compared to children with typical development (Bal et al., 2010; Van Hecke et al., 2009).
• Stereotyped/repetitive motor movements may serve a self-soothing function as an attempt to manage sensory or physiological hyper-arousal and avoid excessive stimulation (Kinsbourne, 1980).

Objective
• Considering the use of stereotyped motor behaviors as a means of managing physiological hyper-arousal, we predicted that higher HR and lower RSA at baseline would be associated with more parent-reported stereotyped motor behaviors in children with ASD.

Participants
• N = 23 (18 boys, 4 girls), 4-7 years old (M = 5.72, SD = 1.17)
• Autistic Disorder (n = 12), Asperger’s (n = 10), PDD-NOS (n = 1)

Methodology
• LifeShirt®: ambulatory physiology monitor used to measure HR and RSA.
• Primary caregiver-reported symptoms: primary caregivers selected symptoms displayed by their child from a list of 55 items targeting the social, communication, and repetitive and stereotyped behavior criteria of ASD (APA, 2000).
• Participants watched a neutral 3-minute video while wearing the LifeShirt® heart monitor, during which baseline HR and RSA data were collected.

Results
• Binary logistic regression models were fitted to predict parent endorsement of stereotyped motor behaviors (hand flapping, spinning) using baseline HR and RSA as predictors.
  - Predicting parent endorsement of hand flapping as a function of HR and RSA:
    • A test of the full model versus a constant-only model suggested that HR and RSA approached statistical significance in distinguishing between children whose parents did and did not endorse that their child engaged in hand flapping, \( \chi^2(2, n = 20) = 5.417, p = .067 \).
    • Nagelkerke’s \( R^2 = .316 \); moderate relationship between prediction and grouping on hand flapping.
    • Overall prediction success rate = 75% (70% no, 80% yes).


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<th>( p )</th>
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• Predicting parent endorsement of spinning as a function of HR and RSA:
  - A test of the full model versus a constant-only model was statistically significant, suggesting that HR and RSA distinguished between children whose parents did and did not endorse that their child engaged in spinning, \( \chi^2(2, n = 20) = 13.689, p = .001 \).
  - Nagelkerke’s \( R^2 = .784 \); moderately strong relationship between prediction and grouping on spinning.
  - Overall prediction success rate = 95% (100% no, 75% yes).

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References