Characterization of Parental Electrodermal Activity in Response to Child Communication

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Background

Autism Spectrum Disorders: a neurodevelopmental disorder characterized by social communicative deficits and restricted/repetitive behaviors.

Responsiveness, a parent's ability to notice and respond to child communication, is a key component of the success of parent-mediated language interventions for children with autism.[1]

Electrodermal Activity (EDA): a skin conductance measure of psychological arousal, is utilized in the current study as a novel approach of measuring parents' physiological responses during parent-child interactions.

Study Aims

1. Address the feasibility of the use of EDA bracelets during parent-child interactions.
2. Characterize parents' physiological arousal in response to different types of child communication.
3. Address the relationship between parental responsiveness and physiological arousal to child communication.

Methods

Participants

- 12 parents (11 females) and 12 children (4 females; *M*=34.83 months, *SD*=6.13) were recruited from the Chicago area.
- Autism diagnoses were verified based on Autism Diagnostic Observation Schedule scores.
- During an 8 minute naturalistic parent-child interaction, parents wore an Empatica E4 Bracelet to measure their EDA throughout the interactions.[2]

- Interactions were transcribed and coded using Mangold INTERACT software by a research reliable coder.
- Electrodermal data were processed using the Ledalab software package in MATLAB.
  - A continuous decomposition analysis[3] was performed for each parent's data to separate the tonic and phasic components of the EDA signal.
  - Multilevel modeling was used to analyze phasic responses to child communicative acts, with communicative acts nested within parent-child dyads.

Results

Communication Measures	
Directedness	
Directed Communication	Any child utterance paired with eye contact, a gesture or a word/name to direct the parent's attention.
Non-Directed Communication	Any child utterance that was not paired with eye contact, a gesture or a word/name.
Communicative Complexity	
High-level Communication	Any child utterance including a vowel, vowel + consonant or jargon.
Low-level Communication	Any child utterance including a vocal stim, vocal play, laughing or crying.
Parent Responsiveness	Number of communicative turns within 3 seconds of a child's utterance that were topically related to the child's communication.
EDA Measure	
nSCR	Number of skin conductive responses above .01 μS within 3 seconds of a child communicative turn.

Figure 1. Graph of proportion of communicative complexity and directedness across all utterances

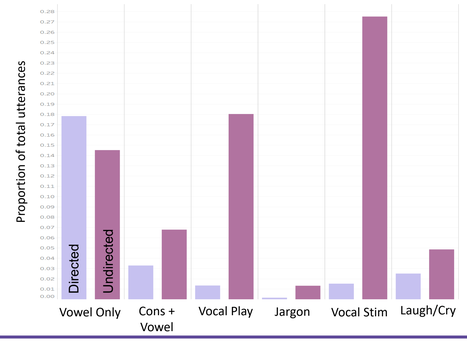

Figure 2. Graph of phasic driver for one parent in response to directed and undirected vocalizations

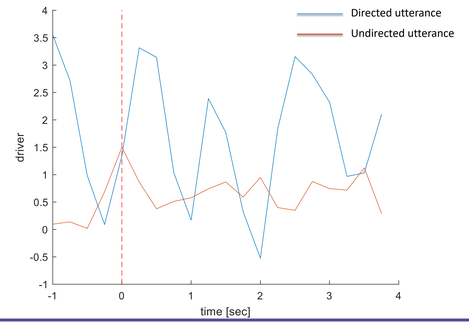

Table 1. Research Questions, Models, and Results

Research Question	Model	Results
Do parents experience a larger physiological response to directed vs. undirected utterances?	$Y_{ij} = \beta_{0j} + \beta_{1j}Directed + R_{ij}$	No significant difference
Do parents experience a larger physiological response to high-level vs. low-level *directed* communication?	$Y_{ij} = \beta_{0j} + \beta_{1j}High\text{-}Level + R_{ij}$	β_1 = -0.521 (.214), p = 0.017
Is parents' rate of responsiveness associated with a larger physiological response to child communication?	$Y_{ij} = \beta_{0j} + R_{ij}$ $\beta_{0j} = \gamma_{00} + \gamma_{01}Responsiveness + U_{0j}$	No significant impact of responsiveness on physiological response

Conclusions

- No significant differences were found in parental EDA responses to children's directed and non-directed communication.
- These results may inform interventions that focus on teaching parents identification of child communicative acts.
- Significantly higher parental EDA responses to children's low-level directed communication were found when compared to high-level directed communication.
- These results may inform interventions that teach parents how to respond to lower-levels of communication.
- No significant relationships were found between parental responsiveness and EDA responses to child communication.
- This study supports the feasibility of the use of EDA bracelets to assess parent's response to children's communication.

Limitations and Future Directions

- Limitations include a small sample size.
- Interpretation of EDA responses is still limited. More research is necessary in order to evaluate the clinical relevance of EDA measures, particularly in parent-child interactions.
- Future research will address whether there is a significant change in parents' physiological responses after parent intervention training.

References

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More Information

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