Department of Pharmacology and Physiology

Use of Facial Analysis Software to Determine Facial Expression Differences in Children with Autism Spectrum Disorder

COLLEGE OF OSTEOPATHIC MEDICINE at the Cherokee Nation

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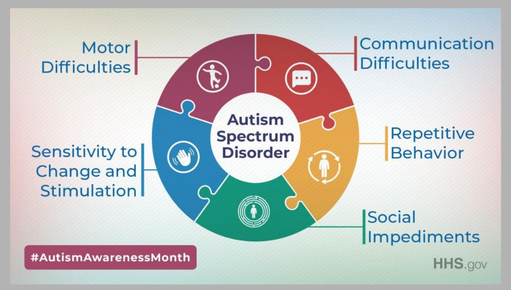
INTRODUCTION

- Autism Spectrum Disorder (ASD) is described as a disorder of variable severity that is characterized by difficulty in social interaction and communication and by restricted or repetitive patterns of thought or behavior
- Delaying diagnosis can result in delays in early help that affected children need
- Current diagnosis is limited to evaluation of a child's behavior and development
- Facial analysis is emerging as a new technology to diagnose ASD in children due to their distinct facial attributes



OBJECTIVES

- The aim of this study was to determine whether facial analysis using Noldus FaceReader technology can be used as a tool to determine facial expression differences in children with ASD versus those without.

METHODS

Data Information

- ✓ Kaggle dataset was utilized (kaggle.com/datasets), which consists of over three thousand images of both autistic and non-autistic children
- ✓ Kaggle is a de-identified public use dataset that can be freely downloaded

Figure 1. Child with ASD (left) and child without ASD (right).

Facial Analysis

- ✓ Facial analysis was conducted using FaceReader 9.0 (Noldus Information Technology)
- ✓ FaceReader is capable of detecting facial expressions, including happy, sad, angry, surprised, scared, disgusted, and neutral
- ✓ The main output of FaceReader is a classification of the facial expressions of each participant

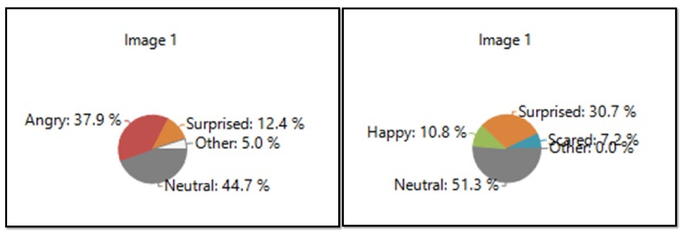


Figure 2. Examples of facial expression output by FaceReader 9.0.

Data Collection

- ✓ Facial photos of diagnosed autistic and non-autistic male and female children were obtained from the Kaggle dataset
- ✓ Facial analysis was conducted on each photograph to determine facial expression and percentage of each expression was recorded
- ✓ Data was divided according to autistic vs. non-autistic, male vs. female (data not shown), and facial expressions were recorded for each group

Figure 3. Facial photo analysis using FaceReader 9.0.

RESULTS

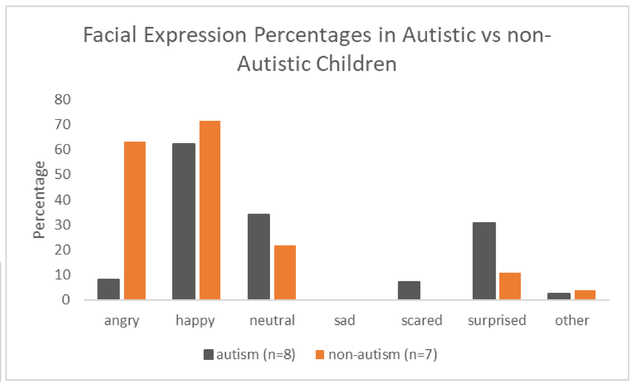


Figure 4. Percentage of each facial expression in children diagnosed with autism vs non-autistic children.

- ✓ Autistic children tended to display more scared, neutral, and surprised facial expressions
- ✓ Non-autistic children displayed more angry and happy facial expressions

CONCLUSION

- This project represents a preliminary study to determine whether facial analysis can be used as a tool to determine facial expression differences in children with ASD versus those without
- Early intervention services can help children with ASD from birth to 3 years learn important skills, such as walking, talking, and interacting with others
- We evaluated images of both male and female children with and without ASD and compared percentages of each facial expression displayed in each image
- While this was a preliminary study and more images need to be evaluated, there were some differences in facial expression between autistic and non-autistic children

FUTURE DIRECTIONS

- Continue to investigate the applicability of facial analysis in diagnosing/categorizing ASD