The Role of Emotion Intensity in Facial Emotion Recognition Deficits and Eye Gaze in Children with Callous-Unemotional Traits

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INTRODUCTION

- Callous-Unemotional (CU) traits are emotional deficits characterized as a lack of guilt or remorse, low empathy, and shallow emotions.
- Children with CU traits may have cognitive deficits in facial emotion recognition (FER), especially recognizing others' distress expressions, such as fear, which may increase their risk for aggression.
- Intensity if facial emotion expression may impact FER. Children with CU traits may struggle in particular with recognizing lower-intensity emotional expressions.
- The eye and mouth region of faces are important in conveying emotions. Direction of visual attention to these specific areas of interest (AOIs) on the face can reveal important socio-emotional cues about the emotions people are expressing. The eye region is particularly important in signaling fear, characterized by a wide-eyed expression.
- Children with CU traits have been observed to show deficits in eye gaze, focusing attention on others' eye AOI, which might contribute to their FER deficits, particularly for fear expressions.

HYPOTHESES

- Children with CU traits will experience poorer facial emotion recognition in 50% intensity facial expression for both happy and fearful emotions than the 100% intensity for these emotional expressions.
- For children with CU traits, FER for fear expressions will be poorer than recognition for happy expressions.
- Higher levels of eye gaze will be associated with better recognition of fear expressions.

METHODS

Participants
- 28 children aged from 6-11 with elevated CU traits (M = 8.5 years, SD = 1.77)
- Male: 60.7% Female: 39.3%
- 60.7% African American, 35.7% Non-Hispanic White, 3.5 % Other

FER Measure
-Modified version of Tottenham et al.'s (2009) NimStim set of faces
- Children observed emotionally expressive faces at two different intensities (50% and 100%), displayed one face at a time for 2000 msec on a computer monitor following a 500-msec central fixation cross, and were prompted to indicate by mouse click what emotion they saw.
- During this measure, an eye tracker monitored the number of times the eyes fixate on each AOI (eye, mouth, face, background) and for how long each fixation occurs.

50% Intensity   100% Intensity

Example of a NimStim facial stimuli at 50% and 100% intensities.

The response flower given to participants after they have seen the stimuli
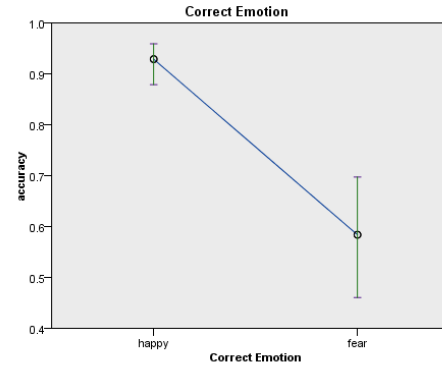
Estimated means of FER accuracy (0 = incorrect, 1 = correct) for happy and fear expressions. Overall, children showed higher FER accuracy for happy than fear expressions.
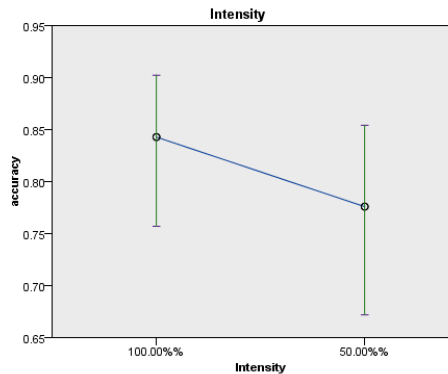
The estimated means of accuracy (0 = inaccurate, 1 = accurate) at 50% and 100% emotion intensity across fear and happy expressions. Overall, children showed higher FER accuracy for facial emotions at 100% vs. 50% intensity.

METHODS CON'T

Analysis
- Binomial logistic regression using a generalized linear mixed model was used to test hypotheses regarding FER for happy vs. fear expressions and FER for 50% vs. 100% intensities.
- Pearson correlations were used to test eye gaze hypotheses.

RESULTS

- Age was positively associated with FER for 100% intensity fear expressions ($r = .519$, $p = .01$) but no other variables.

- As hypothesized, children with CU traits were better at recognizing 100% intensity than 50% intensity expressions ($b = 2.236$, $p < .001$), and at recognizing happy than fearful expressions ($b = .437$, $p = .036$).

- There was a marginal association between eye gaze duration and FER for fear at 50% intensity ($r = .373$, $p = .095$) and for eye gaze fixation and FER for fear at 100% intensity ($r = .399$, $p = .073$).

- While not hypothesized, eye gaze frequency was also positively associated with FER accuracy for happy expressions at 50% intensity and ($r = .551$, $p = .002$), as was eye gaze duration ($r = .631$, $p = .002$).

CONCLUSIONS/SIGNIFICANCE

- As seen in the prior research, children with CU traits have a harder time recognizing fear than happy emotions, regardless of the intensity.
- Emotions with high intensities are easier for children with CU traits to recognize.
- Several eye-tracking indices suggest that increased eye gaze may improve FER in these children for both fear and happy expressions.
- Overall, this study expanded the limited literature on how emotional expression and intensity affects FER in children with CU traits.

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