Background:
- Individuals with ASD have difficulties with social signals, including face-directed gaze and production of canonical facial expressions [1].
- Autistic individuals have perceptual difficulties with cross-modal integration [3] and reduced synchrony of speech and gestures [2].
- However, there are no studies on cross-modal integration of facial and vocal expressions in production.

Objectives:
- Determine if ASD and NT adolescents show different patterns of coordination in speech and face expression production.
- Analyze how face-directed gaze modulates face-voice coordination.

Hypotheses:
- Adolescents with ASD will display weaker cross-modal coordination than NT adolescents, particularly for emotional sentences.
- Increased face-directed gaze will be associated with stronger face-voice coordination.

Task: Dynamic mimicry task using video stimuli of neutral and emotional sentences
Data: audio, motion capture, eye-tracking
Analysis: Granger causality analysis of cross-modal coordination between speech production and facial movement.

Effect of diagnosis on cross-modal dependence
- Emotional sentences have stronger cross-modal coordination than neutral sentences ($t(2.98 \times 10^3) = 172.4, p < 0.05$)
- Difference between emotional and neutral sentences is greater for NT adolescents than for adolescents with ASD ($t(2.98 \times 10^3) = -48.8, p < 0.05$)

Effect of diagnosis on face-directed gaze
- NT adolescents have longer gaze to the upper face than adolescents with ASD during both the neutral ($t(2.98 \times 10^3) = 336, p = 7.3 \times 10^{-15}$) and emotional sentences ($t(2.98 \times 10^3) = 43276.5, p = 2.5 \times 10^{-13}$)
- NT adolescents have slightly longer gaze to the lower face than adolescents with ASD during the neutral sentence ($t(2.98 \times 10^3) = 58481, p = 1.16 \times 10^{-4}$) but not during the emotional sentence.

Conclusions
- NT participants differ from ASD participants in terms of the effect for upper face gaze time ($t(2.98 \times 10^3) = 17.4, p < 2 \times 10^{-15}$) and lower face gaze time ($t(2.98 \times 10^3) = 39.0, p < 2 \times 10^{-15}$).
- For adolescents with ASD, face-directed gaze weakens cross-modal coordination.
- For NT adolescents, face-directed gaze strengthens cross-modal coordination.
- NT adolescents produce emotional sentences with strong cross-modal coordination and produce neutral sentences with weak cross-modal coordination. ASD adolescents do not show this difference across neutral and emotional sentences.
- NT adolescents gaze longer at the upper face than adolescents with ASD during both the neutral and emotional sentences. NT adolescents have slightly longer lower face gaze times than adolescents with ASD during the neutral sentence, but not during the emotional sentence.
- Face-directed gaze is associated with strong cross-modal coordination in NT adolescents and weak cross-modal coordination in ASD adolescents.
- Greater visual attention to faces reinforces face-voice coordination patterns inherent in each diagnostic group.

References