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# Do I know you? Influence of adolescent social interactions on brain responses to familiar and AI-generated faces

## Background

Adolescence is a critical period for social development, where strong social connections support emotional well-being, while isolation increases mental health risks (Jose et al., 2012; Lamblin et al., 2017). During this time, socializing—both in-person and online—becomes increasingly important, with social media often enhancing existing relationships and fostering feelings of closeness (Al-Jbouri et al., 2024). While social media can strengthen connections, it also increases exposure to AI-generated faces, which are becoming harder to distinguish from real faces (Sanders et al., 2019). Facial recognition is key to social interaction, with familiar faces evoking stronger neural responses, particularly in ERP components like the N170 and N250 (Caharel et al., 2002; Abreu et al., 2023). Understanding how adolescents process AI-generated faces may offer insight into their social and cognitive development.

## Objectives

This study aimed to investigate how adolescents process faces of varying familiarity and realism using EEG/ERP. Specifically, we examined:

1. **Familiarity in Facial Processing:** We predicted that the N170 and P300 components would show larger amplitudes for more familiar faces (e.g., friends) compared to less familiar faces (e.g., strangers).
2. **Real vs. AI-Generated Faces:** We expected no N170 differences between real and artificial faces but anticipated P300 differences reflecting further cognitive processing.
3. **Social Experience and Face Processing:** We explored how time spent socializing in-person versus online relates to ERP responses, hypothesizing that more in-person social time may enhance familiar face processing.

## Methods

**Participants:** 27 adolescents (ages 12-17 years) from South Carolina and surrounding areas participated; all had normal or corrected-to-normal vision.

**Facial Stimuli Creation:** Participants submitted a friend's photo, which was used to create an AI-generated face, matched with a celebrity lookalike, and paired with a real stranger's face for familiarity comparisons.

**FaceFamAI Task:** Participants passively viewed faces and were asked to respond to a distractor image (dog) to confirm and maintain attention.

**Social Connection Measures:** Participants reported their time spent socializing in-person and online with close friends using adapted Canadian Social Connection Survey items.

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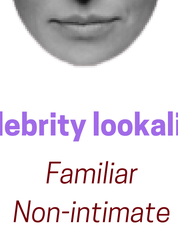
Sources



**Participant friend**

*Familiar*
*Intimate*

**AI-generated stranger**

*Unfamiliar*
*Non-intimate*

**Celebrity lookalike**

*Familiar*
*Non-intimate*

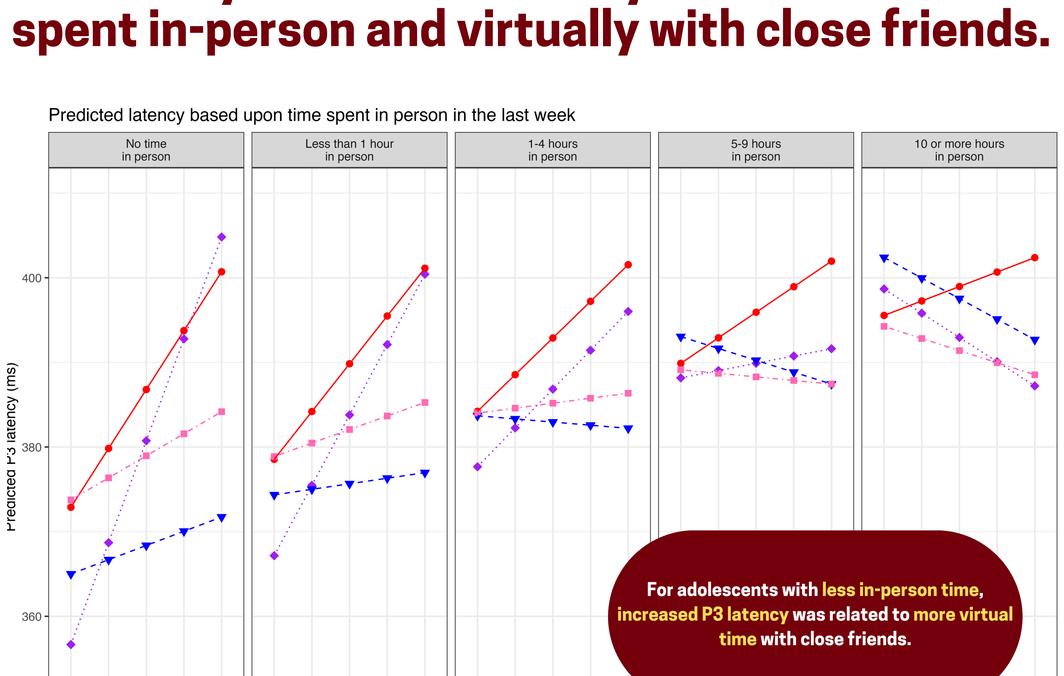
**Real stranger**

*Unfamiliar*
*Non-intimate*

**Distractor**

*Maintain participant attention*

**Reduced N170 amplitude** was predicted for adolescents with **more virtual time spent with friends**, F(1, 22) = 1.42, p = .002.




**Increased P1 latency** (i.e., "slower" latency) to friend (slope = 2.17), celebrity (slope = 2.41), and real stranger (slope = 1.80) faces **was related to increased virtual time spent with close friends**, F(3, 11516)= 3.27, p =.02.




## P3 latency was modulated by amount of time spent in-person and virtually with close friends.




**Increased P3 latency** (i.e., "slower" latency) to friend (slope = 3.82), **was related to increased virtual time spent with close friends**, F(3, 11516)= 4.36, p =.005.