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Larger N170 after Sad Faces in Individuals with Elevated Depressive Symptoms in a Facial Oddball Task

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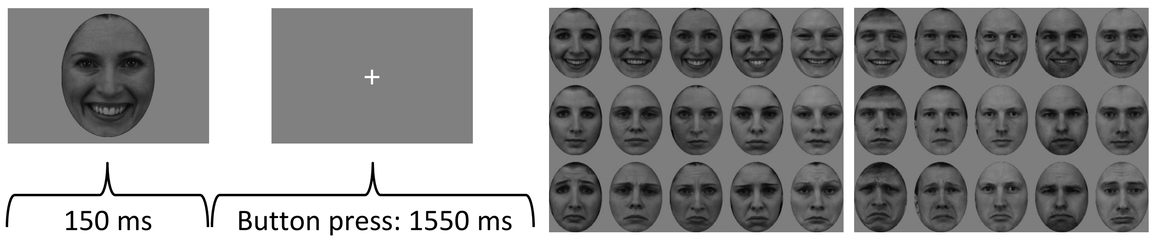
Introduction

- Depression is frequent and burdensome (e.g., [1])
- According to Aaron Beck's Cognitive Model, **depression often incorporates a negative attentional bias**, while healthy people often show a positive bias [2]
- **Our goal:** Finding evidence for an **attentional bias in early face processing** (N170):
  - Towards happy faces in participants with low depressive symptoms
  - Towards sad faces in participants with high depressive symptoms
- Effect should be visible:
  - In comparison of emotional to neutral faces
  - And when comparing frequent to rare faces

Methods

- Facial oddball task: 375 trials (75 trials x 5 blocks)
- Indication of the valence of the face via a button press



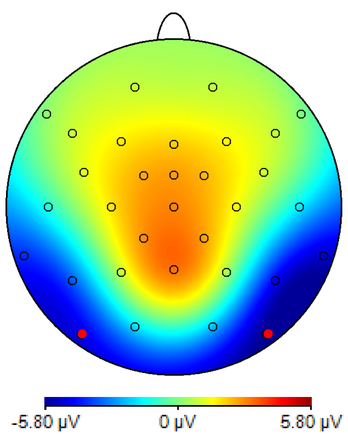
- Oddball: 80% of faces were in one gender (e.g., female), 20% were in the other gender (e.g., male)
- Measurement of depressive symptoms via the *Allgemeine Depressionsskala* (ADS; [3]), the German version of the *Center for Epidemiological Studies Depression Scale* (CES-D; [4])

Results

- Outlier analysis: one participant excluded
- Remaining: 103 participants

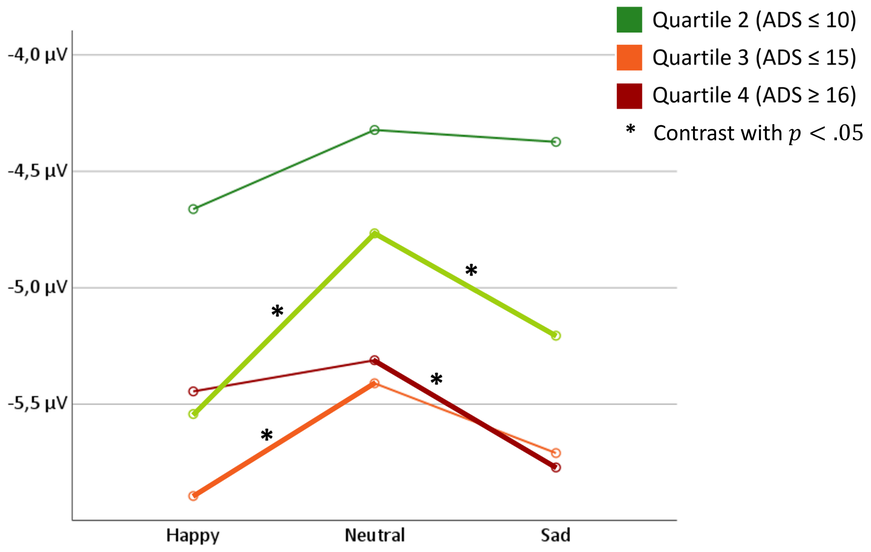
N (female/male)	103 (60/43)
Age mean (SD) in years	25.90 (8.11)
Age range	18 - 65
ADS mean (SD)	11.99 (7.06)
ADS range	1 - 36
ADS ≥ 23 (clinical cutoff)	8

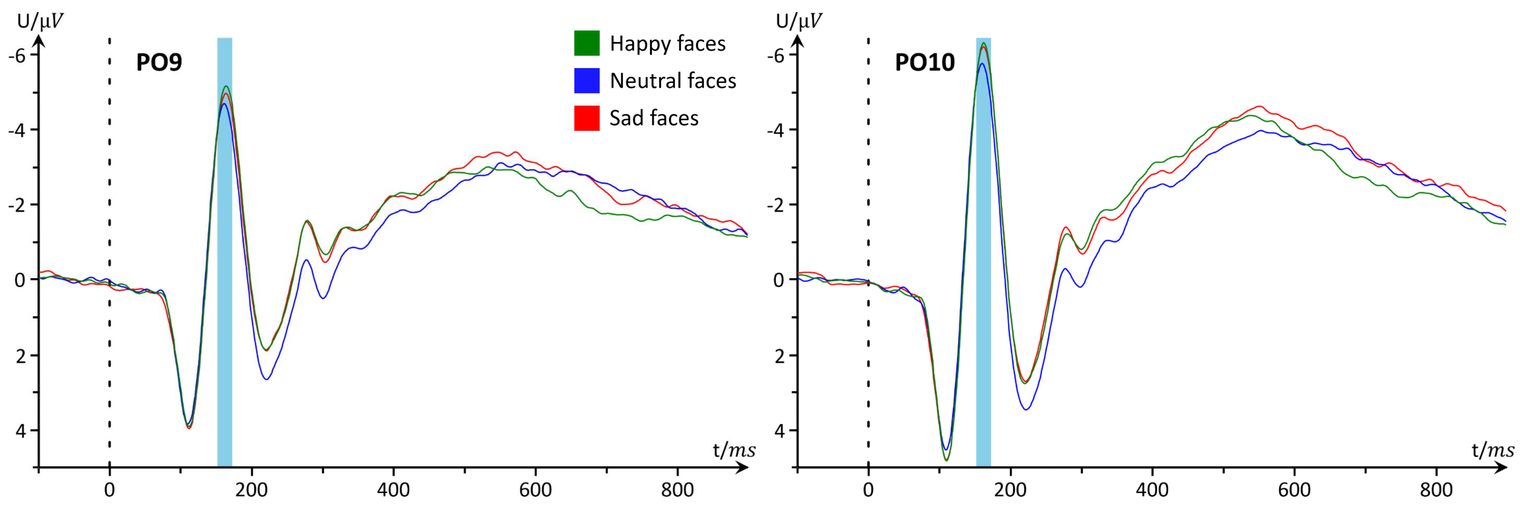
- Dependent variable: **N170** (indicating face recognition [5]; 152-172 ms poststimulus on electrodes PO9 and PO10)



- **ME Valence** ($F_{2;202} = 10.933; p < .001; \eta_p^2 = .098$): More negative amplitudes for happy ($-5.419\ \mu V$) and sad faces ($-5.298\ \mu V$), compared to neutral faces ($-4.971\ \mu V$; ps are $< .001$ and $.001$, respectively; happy vs. sad faces: $p = .249$)
- **ME Hemisphere** ($F_{1;101} = 25.276; p < .001; \eta_p^2 = .200$): Amplitudes in right hemisphere ($-5.802\ \mu V$) more negative than in left hemisphere ($-4.657\ \mu V$)
- No ME Oddball ($F_{1;101} = 0.026; p = .873$)
- No ME DepressiveSymptoms ($F_{1;101} = 0.009; p = .924$)

- **INT Valence*DepressiveSymptoms** ($F_{2;202} = 4.004; p = .020; \eta_p^2 = .038$): Descriptively, most negative N170 amplitudes for happy faces in quartiles 1, 2, and 3 of depressive symptoms, and for sad faces in quartile 4.





- **INT Oddball*DepressiveSymptoms** ($F_{1;101} = 6.055; p = .016; \eta_p^2 = .057$): Significant oddball effect in first quartile of depressive symptoms (rare faces $-5.339\ \mu V$ vs. frequent faces $-5.004\ \mu V$; $p = .017$), but not in the other quartiles ($ps > .061$)
- No INT Oddball*Valence*DepressiveSymptoms ($F_{2;202} = 0.388; p = .679$)

Discussion

- Attentional bias towards **happy faces** in individuals with **low depressive symptoms** and towards **sad faces** in individuals with **high depressive symptoms** in N170 amplitudes
- Visible around 162 ms after stimulus presentation, i.e., in a very **early and therefore automatic process**
- Suggests that mood effects regarding depressive symptoms are associated with **variations in lower-level perceptual processing**
- Study should be repeated with a more clinical sample

Literature

[1] American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders (DSM-5)*. American Psychiatric Association.

[2] Beck, A. T., & Bredemeier, K. (2016). A unified model of depression: Integrating clinical, cognitive, biological, and evolutionary perspectives. *Clinical Psychological Science*, *4*(4), 596-619. doi:10.1177/2167702616628523

[3] Hautzinger, M., & Bailer, M. (1993). *Allgemeine Depressionsskala [General Depression Scale]*. Beltz Test GmbH.

[4] Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*(3), 385-401. doi:10.1177/014662167700100306

[5] Rossion, B., & Jacques, C. (2012). The N170: Understanding the time course of face perception in the human brain. In S. J. Luck & E. S. Kappenman (Eds.), *Oxford handbook of event-related potential components* (pp. 115-141). Oxford University Press.