FRIEDRICH-ALEXANDER UNIVERSITÄT ERLANGEN-NÜRNBERG
MEDIZINISCHE FAKULTÄT

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Franconian Cognition and Emotion Studies (FRANCES): Prenatal Alcohol Consumption and Facial Dysmorphia - a Study Based on Meconium Ethyl Glucuronide

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Introduction

- Prenatal alcohol exposure (PAE) known risk factor for child development [1,2,3]
- PAE can damage brain development throughout pregnancy and cause structural abnormalities (i.e., facial malformation) [4]
- Rare evidence which 'invisible' subclinical effect intrauterine alcohol exposure can have on facial characteristics [5]
- PAE was implemented by newborn meconium ethyl glucuronide (EtG) and maternal self-reports (3rd Trimester)
- Craniofacial shape measured via: FAS Facial Photographic Analysis Software [6]

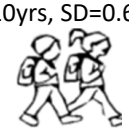
Aim of the study: prediction for facial anomalies and functional relevance of these anomalies

Method

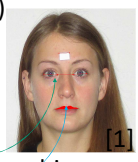
- **T1**: 2005-2007
- ***n* = 1100**
- 3rd Trimester
- Pregnancy alcohol consumption: Interview

Birth
Meconium EtG
2-24hrs after birth (~1g)

- **T2**: 2012-2015
- ***n* = 245**
- Age: 7.6 yrs (6-10yrs, SD=0.6)
- IQ: WISC-V



- **T3**: 2018-2021
- ***n* = 129**; ♂ 66 ♀ 63
- Age: 13.3 yrs (12-14yrs, SD=0.32)
- EtG Cut-Off:
  ≥10 ng/g (*n* = 32)
  ≥112 ng/g (*n* = 20)
- Facial Photographs
- Facial Analysis: FAS Facial Photographic Software
- Measuring Palpebral Fissure Length
- Measuring upper Lip Circularity


[1]

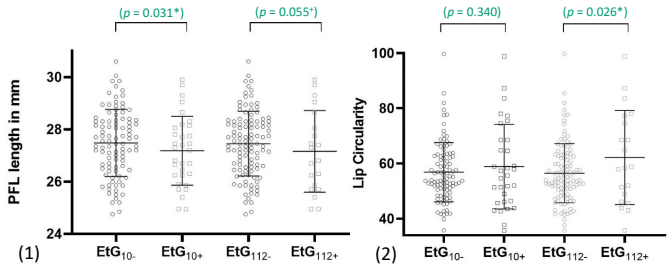
Statistical Analysis:

- **ANCOVA**: one-factorial (EtG positive vs. negative; two cut-offs in separate analyses: 10 ng/g & 112 ng/g), confounder-controlled, outcomes: Palpebral Fissure Length & Lip Circularity in separate analyses; if significant EtG main effect: self-report yes vs. no prediction in a separate analysis
- **Controlled variables**: Child age, birthweight, sex, current weight, height and head circumference
- **Partial correlations** for functional relevance: Fluid Reasoning and Working Memory

Results

(1) Palpebral Fissure Length shorter for: EtG10+ and EtG112+
(p = 0.031/0.055; small effect η_p^2 = 0.038/0.030)

(2) Lip Circularity smaller for: EtG112+ (p = 0.026; small effect η_p^2 = 0.040)

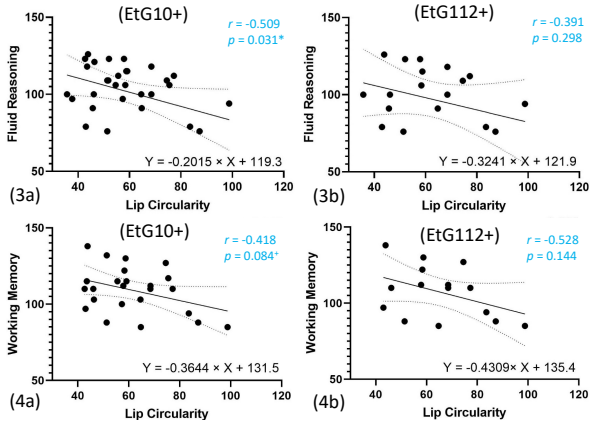


Lip Circularity correlated with:
Fluid Reasoning & Working Memory

↑High Lip Circularity Scores = Small upper lip ↓

(3/4a) EtG10+ (p = 0.031/0.084; large/medium effect |r| = .509/.418)

(3/4b) EtG112+ (p = 0.298/0.144; medium/large effect |r| = .391/.528)



Discussion

- ✓ The present study demonstrates visible effects on the facial phenotype in exposed adolescents
- ✓ Facial malformation was associated with child cognitive performance in the alcohol-exposed group
- ✓ The EtG biomarker was a better predictor than maternal self-reports, maternal self-reports may be biased [7]

Maternal **self-report** yes vs. no: No significant predictions for Palpebral Fissure Length or Lip Circularity

References:
[1] Maschke et al. (2021) *Brain Sciences*
[2] Muggli et al. (2014) *BMC Pregnancy Childbirth*
[3] Muggli et al. (2017) *JAMA Pediatr*
[4] De Gruyter S. (2013) *Teratogenität des Alkohols*
[5] Hoyme et al. (2016) Pediatrics
[6] Astley S. (2015) *J. Popul. Ther. Clin. Pharmacol*
[7] Eichler et al. (2016) *Alcohol*

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Study results were published in:
Maschke, J.; Roetner, J.; Goecke, T.W.; Fasching, P.A.; Beckmann, M.W.; Kratz, O.; Moll, G.H.; Lenz, B.; Kornhuber, J.; Eichler, A.; IMAC-Mind-Consortium. Prenatal Alcohol Exposure and the Facial Phenotype in Adolescents: A Study Based on Meconium Ethyl Glucuronide. *Brain Sci.* **2021**, *11*, 154. https://doi.org/10.3390/brainsci11020154

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