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
  - Meconium EtG - 2-24hrs after birth (3/4a)
- **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 Analysis Software
  - Measuring Palpebral Fissure Length
  - Measuring upper Lip Circularity

Statistical Analysis:

- **ANOVA**: 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 = 0.033/0.055; small effect ηp² = 0.038/0.030)

(2) Lip Circularity smaller for: EtG112+ (p = 0.026; small effect ηp² = 0.040)

Lip Circularity correlated with:

Fluid Reasoning & Working Memory

(3a) EtG10+ (p = 0.031/0.084; large/medium effect rI = 0.340/0.298)

(3b) EtG112+ (p = 0.298/0.144; medium/large effect rI = -0.528/0.391)

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:

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Study results were published in: