Race and Socioeconomic Status On Hair Biomarker Levels and Early Childhood Development

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Introduction

- **Adverse Childhood Experiences** (ACEs) increase stress → Cortisol levels disrupt Hypothalamic-Pituitary-Adrenal Axis
- ACEs increase risk of **childhood development** challenges by 29-44%
- **Hair Cortisol Concentration** (HCC) and **Hair Oxytocin Concentration** (HOC) measure cortisol and oxytocin release from the past 3-6 months
- Few studies have explored the relationship between HCC and HOC and early childhood development
- **Research Question:** What is the association between HCC, HOC, and childhood development? Does race and socioeconomic status modify this association?

Methods

Dataset

Race: Non-Hispanic White, Asian, Mixed

Socioeconomic Status (SES): Socioeconomic Adversity Index

- 55 familial, social, and economic variables

Hair Pigment: Dark, Medium, Light

Sex: Male, Female

Age (years): 0-5

1,389 Children in Northern CA

Exposures

Hair Cortisol Concentration (ng/mg)

Hair Oxytocin Concentration (pg/mg)

Analysis

ANOVA, Chi-Square, Linear Regression, Ordinal Logistic Regression

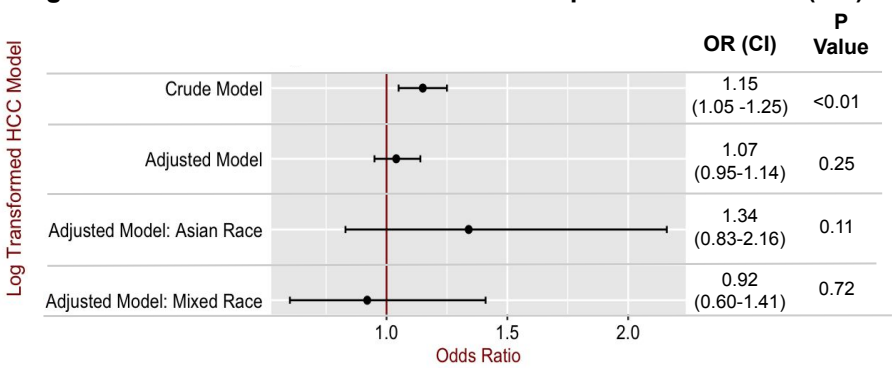
Outcomes

Early Childhood Development: Ages and Stages Questionnaire (ASQ-3)

5 Categories: Communication, Gross Motor Skills, Fine Motor Skills, Problem Solving, Personal-Social Development

Results

Figure 1. Hair Biomarkers and Child Development Odds Ratio (OR)



*Adjusted Model Covariates: Race, SES, log transformed HOC (lnHOC), age, sex, and hair color

Figure 2. Race and Mean of lnHCC

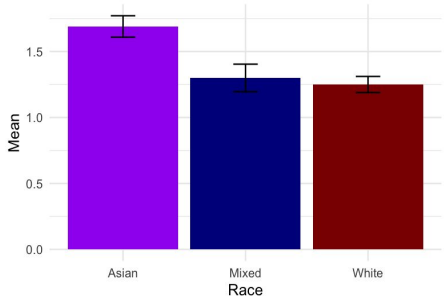


Figure 1. **Race** and **socioeconomic status** were not effect modifiers on the relationship between log-transformed HCC and child development, but Asian children higher childhood development rates.

Figure 2. **Asian** children have higher lnHCC than White children (difference = 0.44, $p < 0.01$) as well as Mixed children (difference = 0.39, $p < 0.01$). There were no significant differences in lnHOC between racial groups.

Discussion

- Asian children had higher lnHCC levels than other racial groups in Northern California
- Log-transformed HCC was associated with delays in childhood development
- Socioeconomic status and race did not affect the relationship between hair biomarkers and early childhood development
- **Limitations:**
  - Limited sample size
  - Geographic, racial, and socioeconomic diversity of sample
  - Narrow definition of socioeconomic status

Future Directions

- Future studies with larger sample sizes should explore how different social drivers of health modify the relationship between HCC and childhood development
- Examine the impact of race/ ethnicity on early childhood stress

References