Age-related change in stimulus-elicited amygdala-prefrontal circuitry: a longitudinal multiverse approach

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Questions? Ask me!

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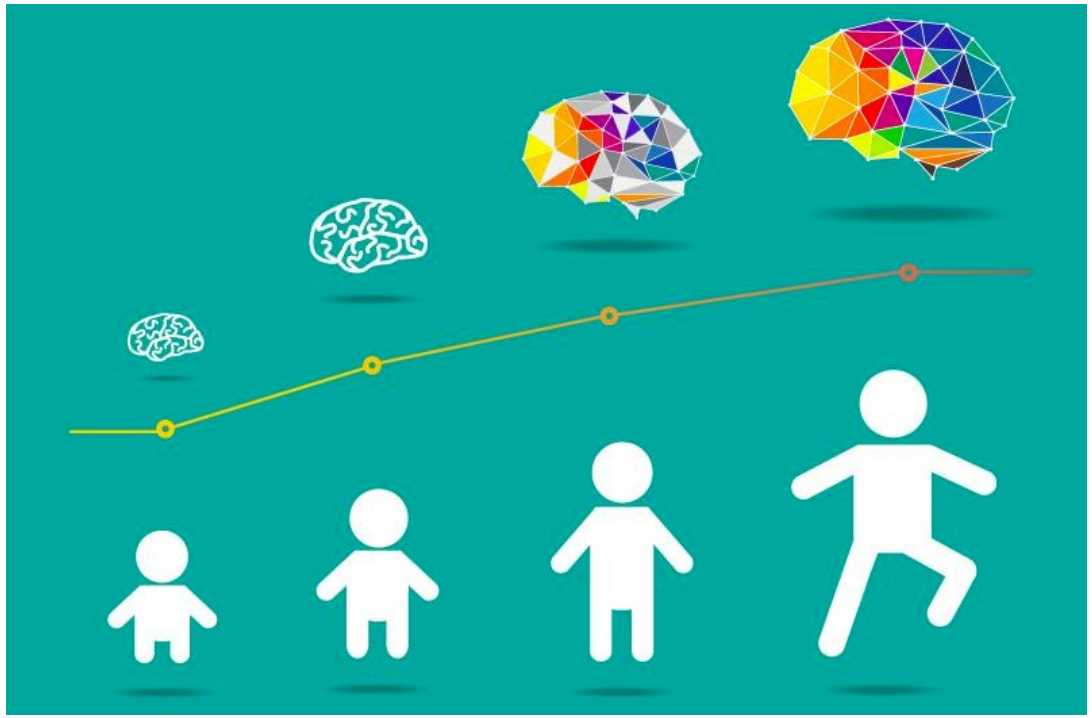
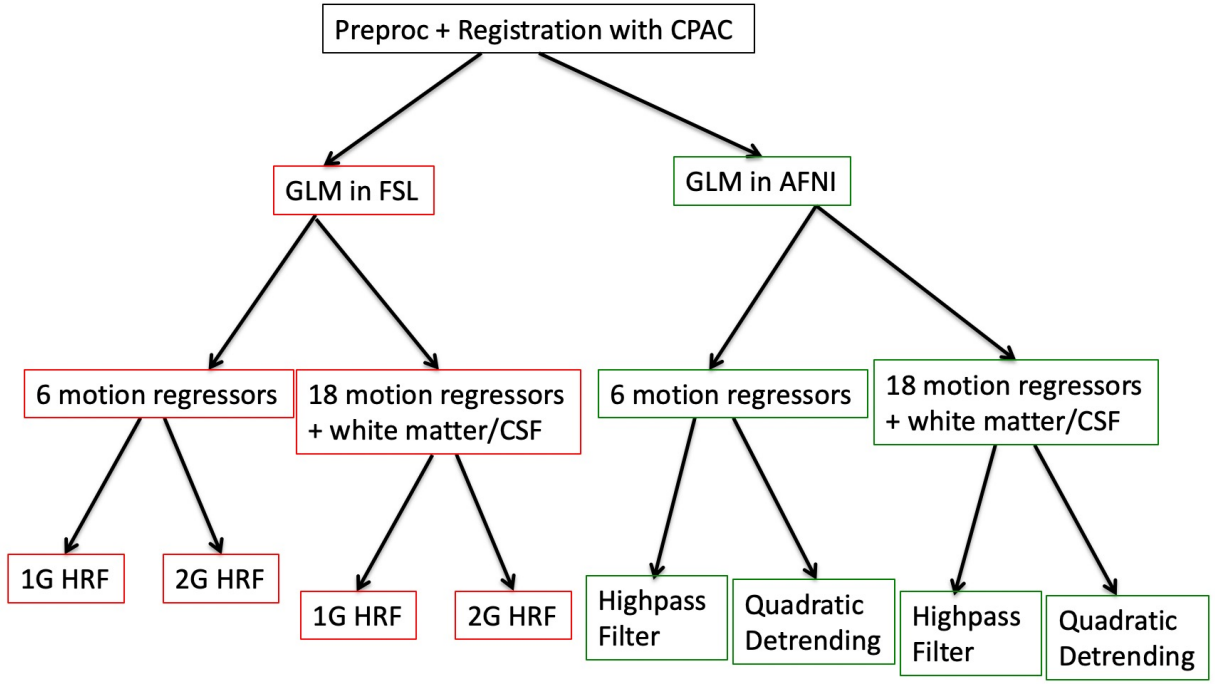
Study Objectives

- Understand within-person longitudinal changes in task-elicited amygdala-mPFC circuitry between ages 4-22 years



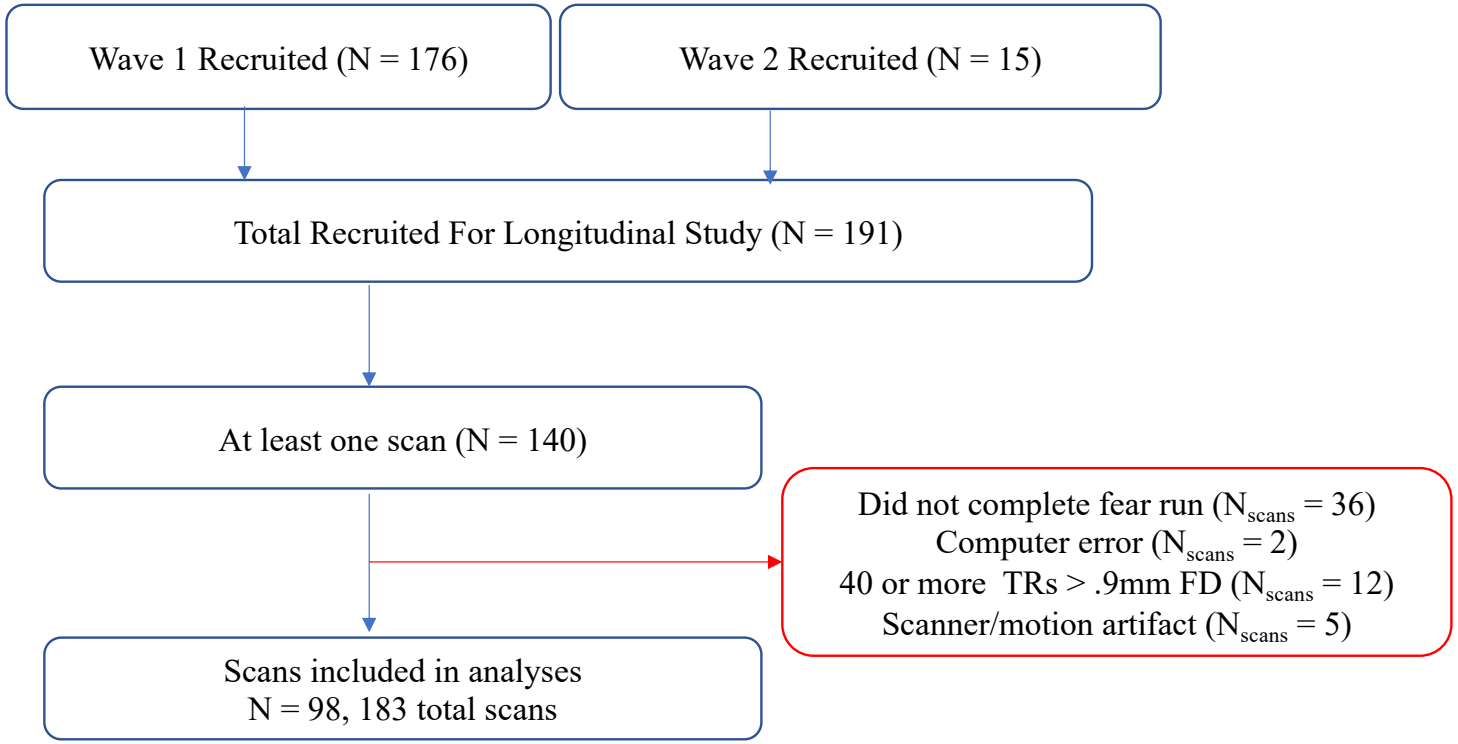
Study Objectives

- Understand within-person longitudinal changes in task-elicited amygdala-mPFC circuitry between ages 4-22 years
- Assess whether any age-related changes are robust to fMRI analysis decisions (Botvinik-Nezer et al., 2020)



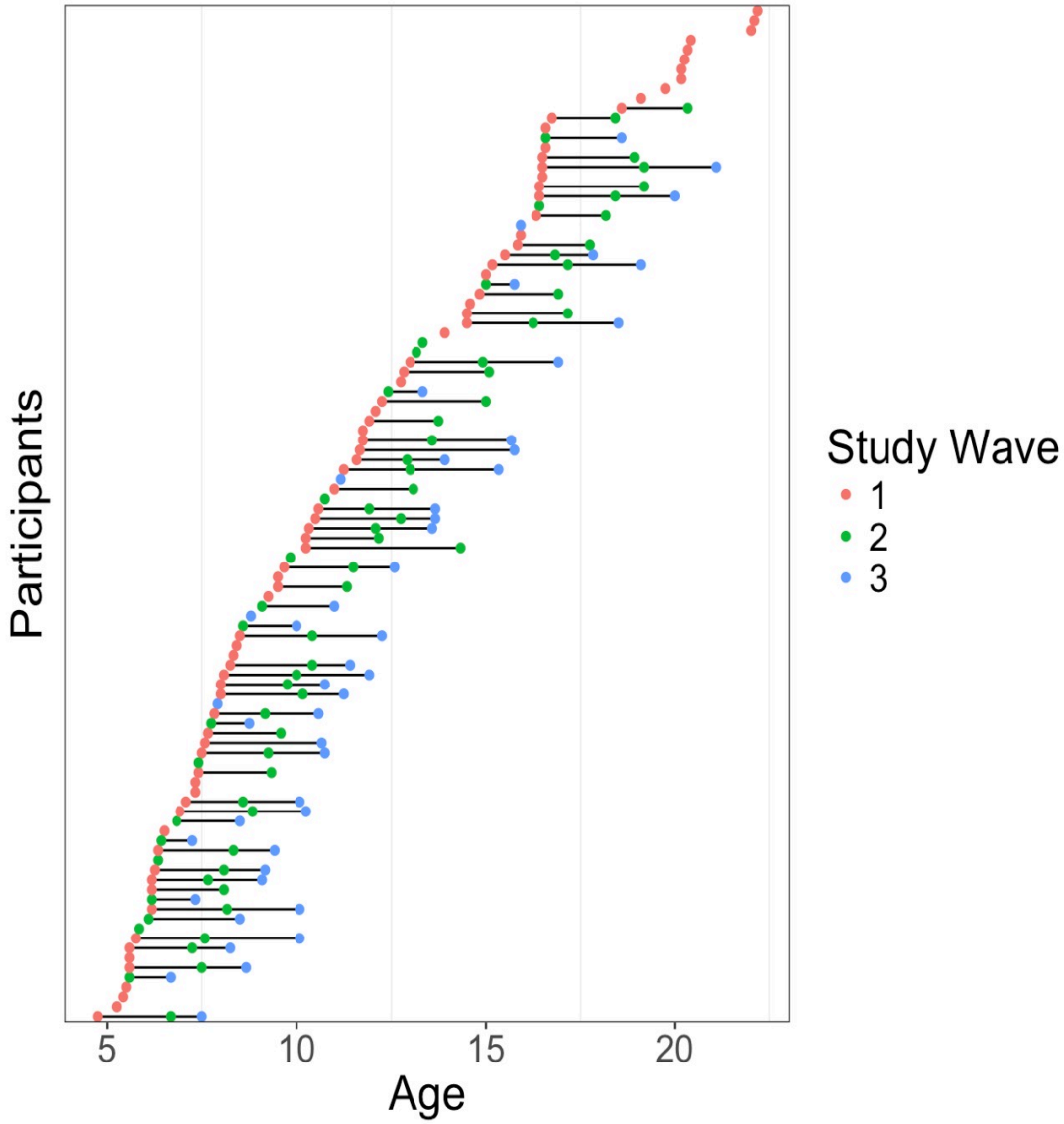
Cohort

- Recruitment in greater LA through flyers, state birth records, community events, online advertising, lab website and newsletters, psychologists' offices, word-of-mouth
- Longitudinal recruitment at 'waves' 1 & 2 out of 3



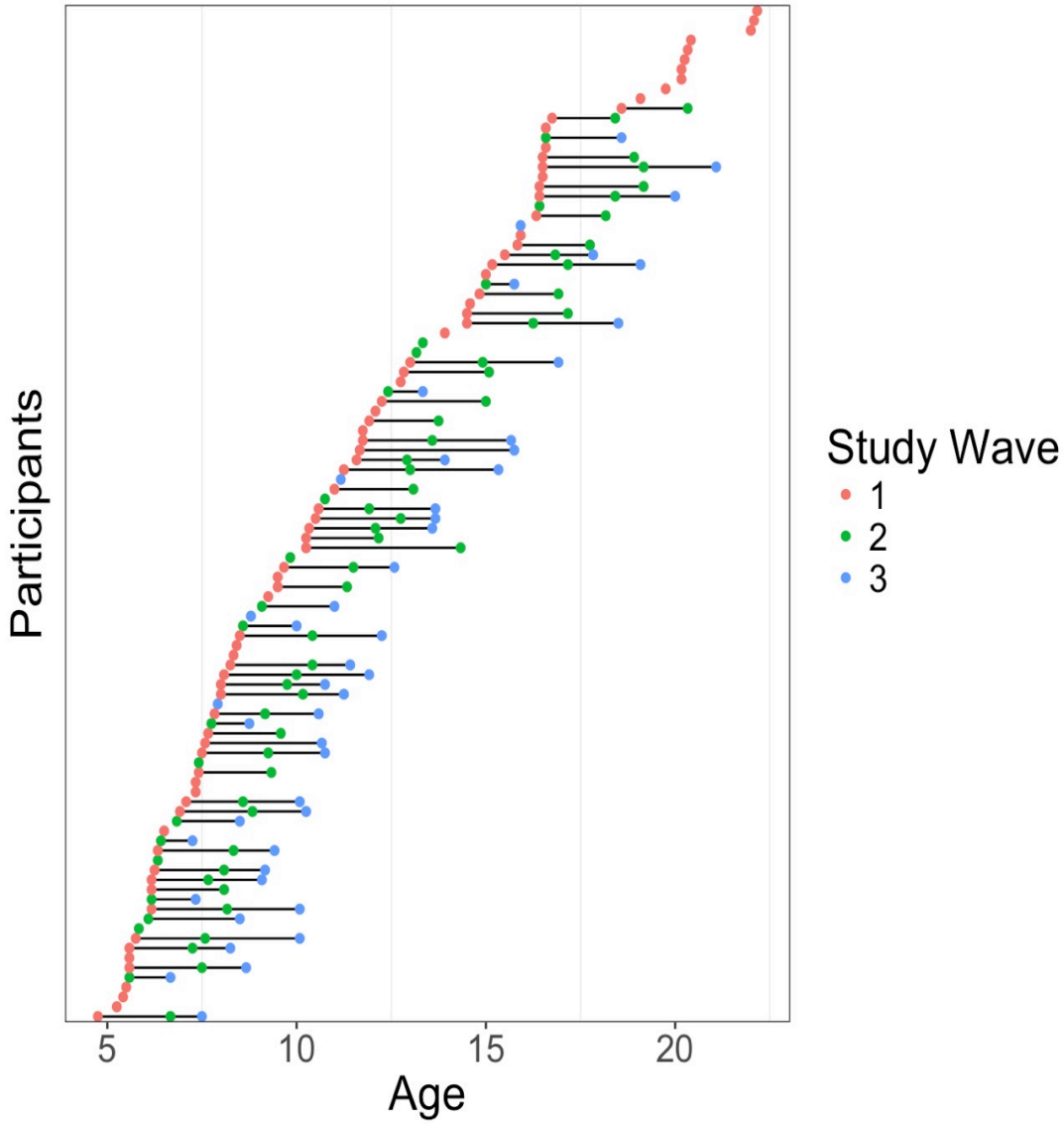
American Indian/Alaskan Native	3
Asian	18
Black	26
Hawaiian/Pacific Islander	2
More than one race	8
White	36

Design



N = 98 (55% F), 183 total scans

Design



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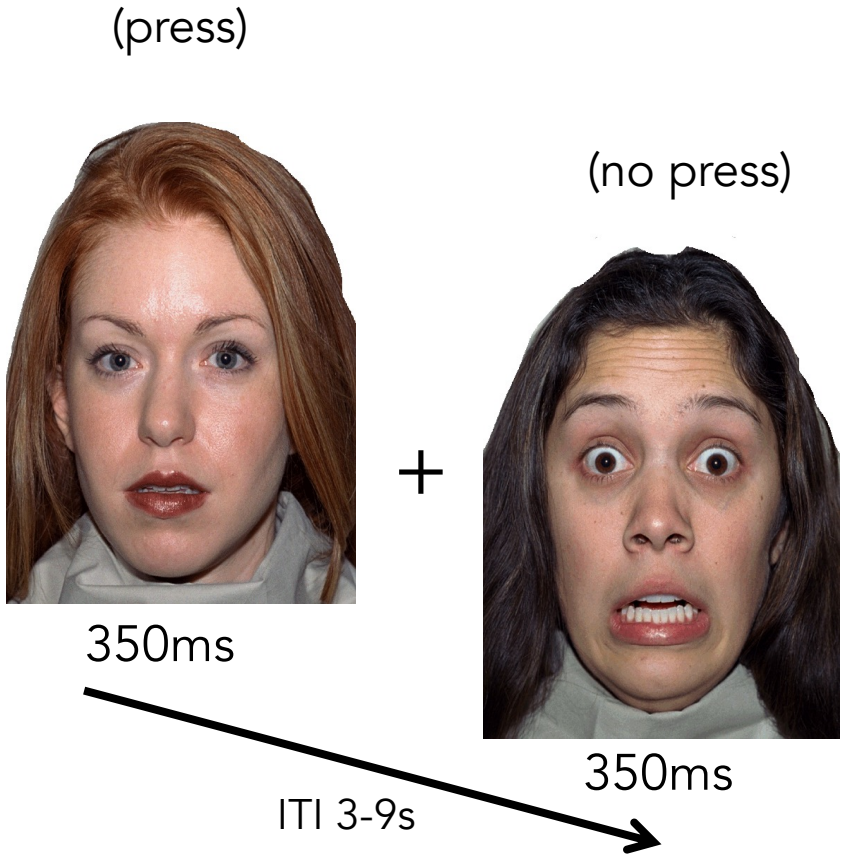
Emotion discrimination task in scanner

Event-related design
TR= 2s



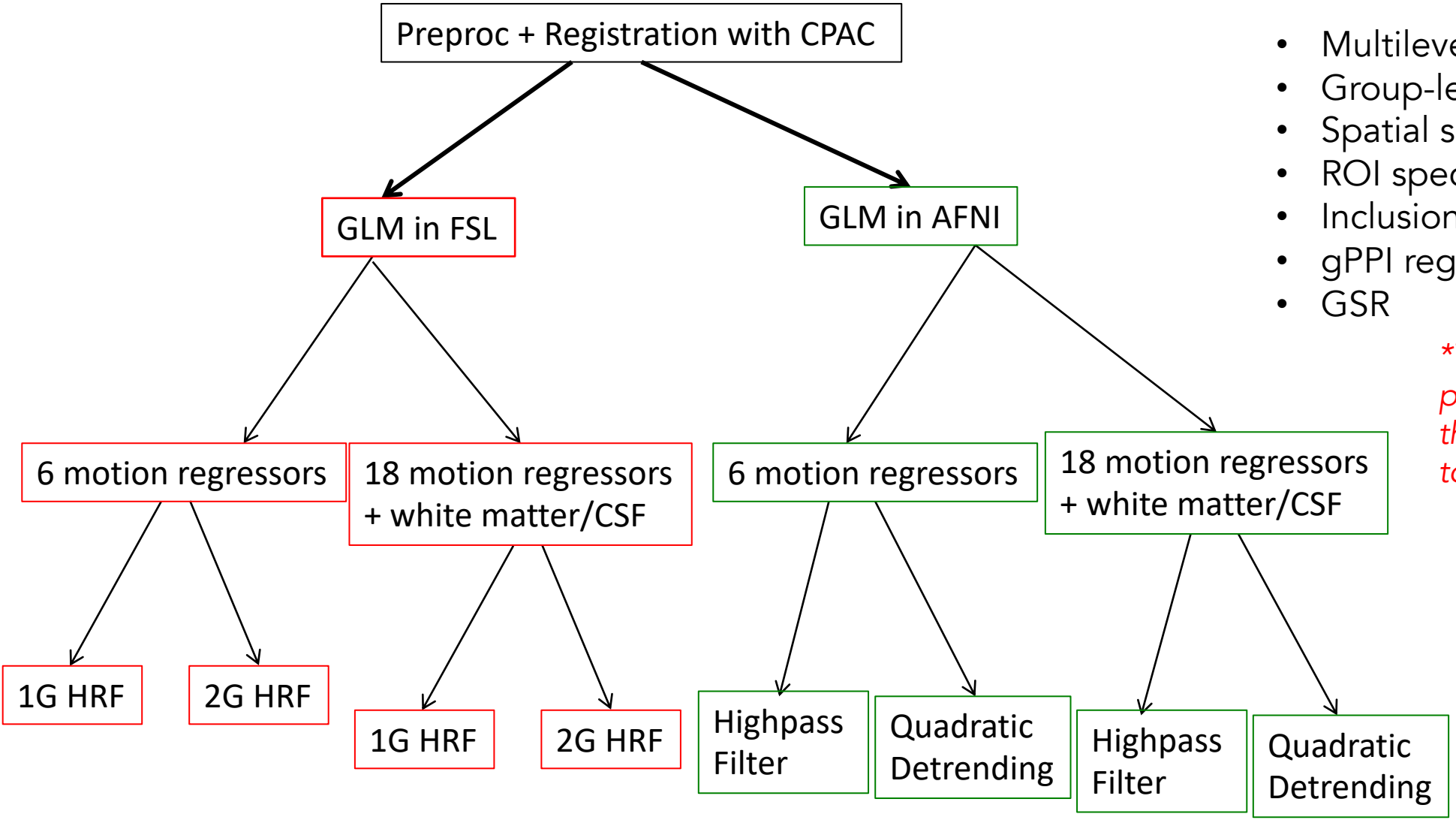
Hypothesis

Decreases in amygdala reactivity to fear faces with age
(Gee et al., 2013)

A shift from positive to negative amygdala-mPFC connectivity with age *(generalized psychophysiological interaction; gPPI)*
(Gee et al., 2013)

OSF

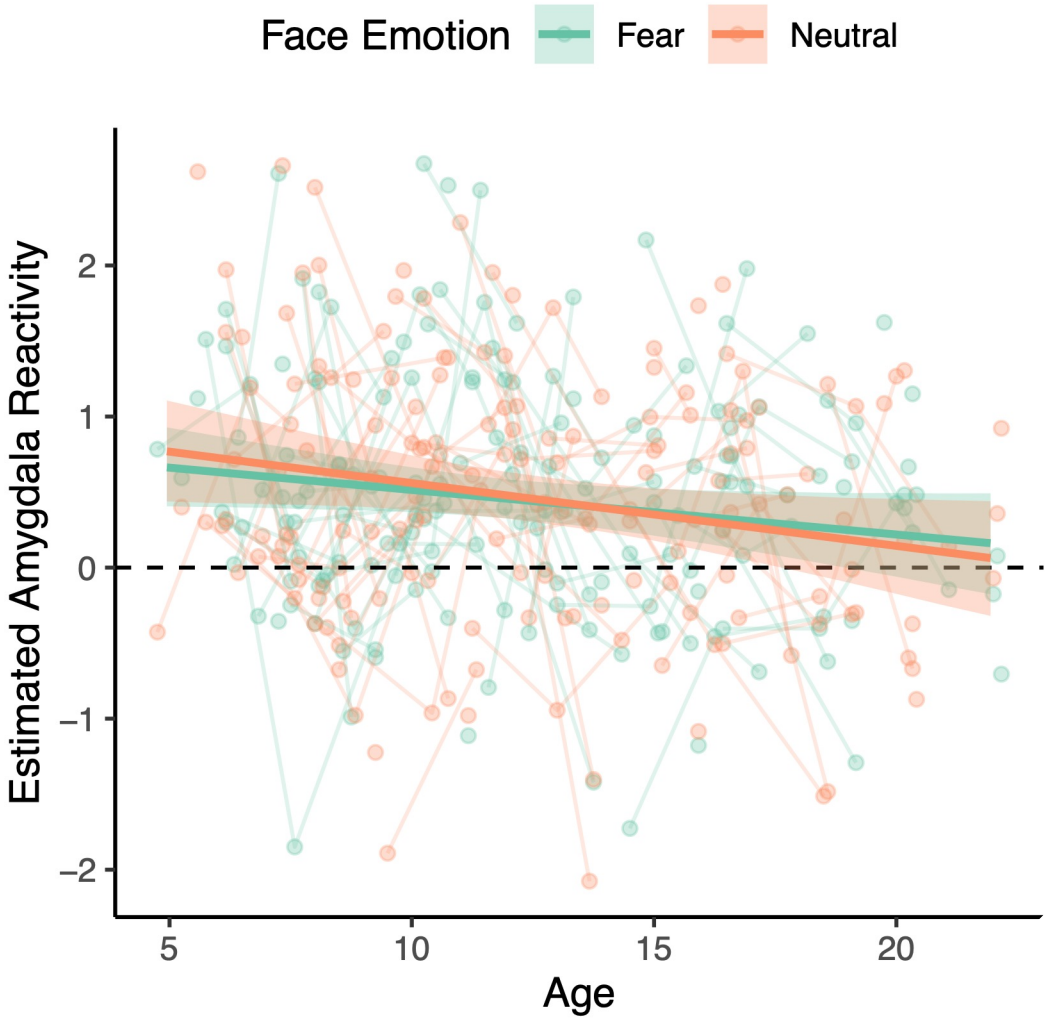
Multiverse analyses: parallel forking paths



- Multilevel model specifications
- Group-level covariates
- Spatial smoothing
- ROI specifications
- Inclusion criteria
- gPPI regressor creation
- GSR

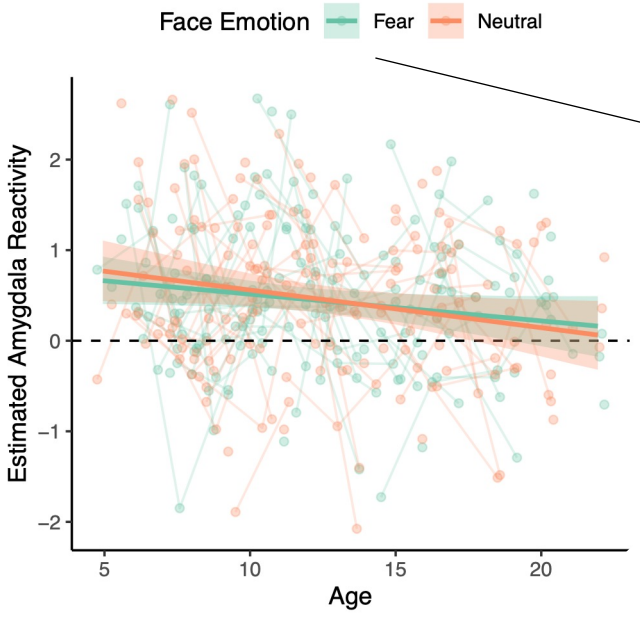
There isn't time to discuss the preproc steps in depth during this presentation, but feel free to ask me!

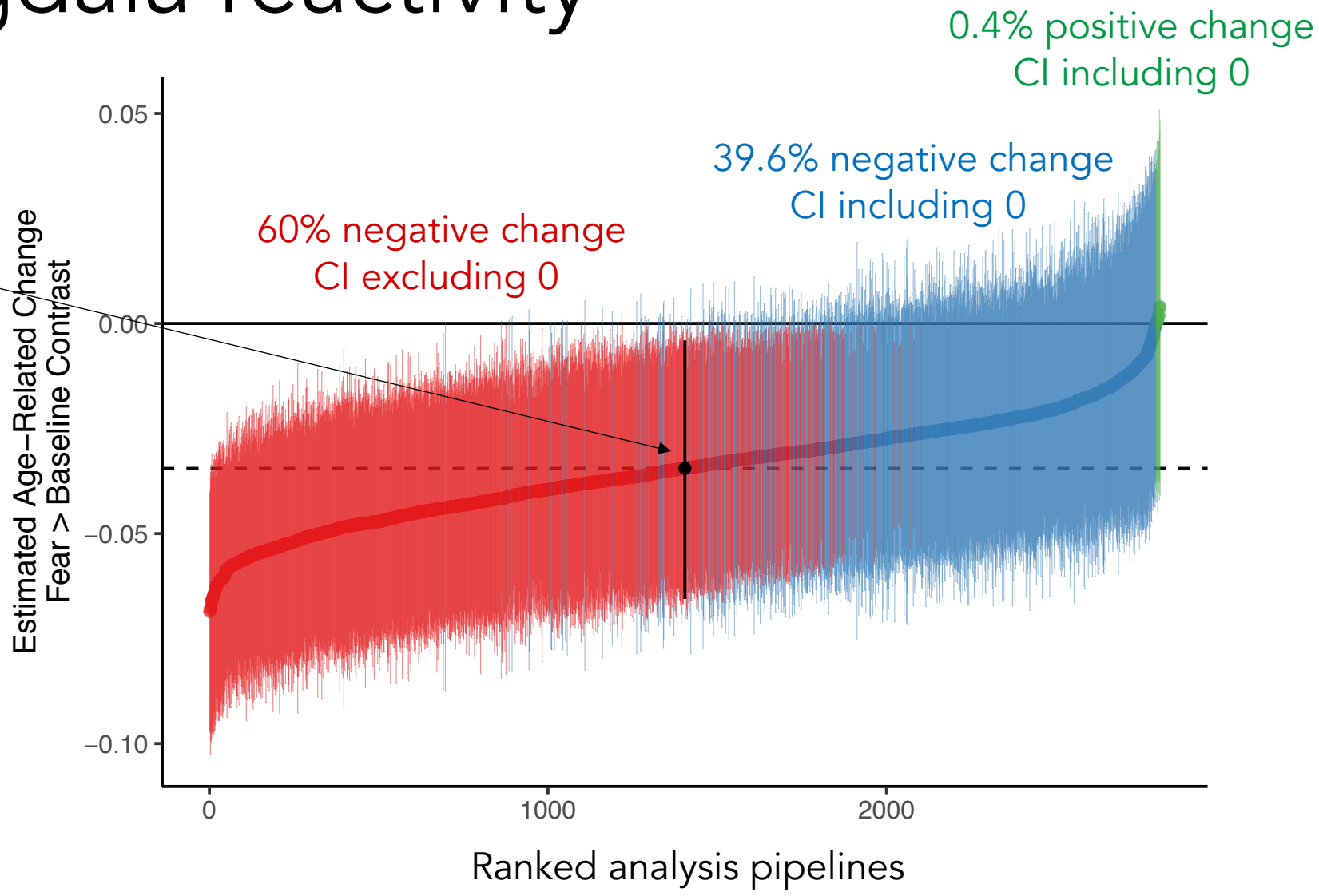
Results: amygdala reactivity



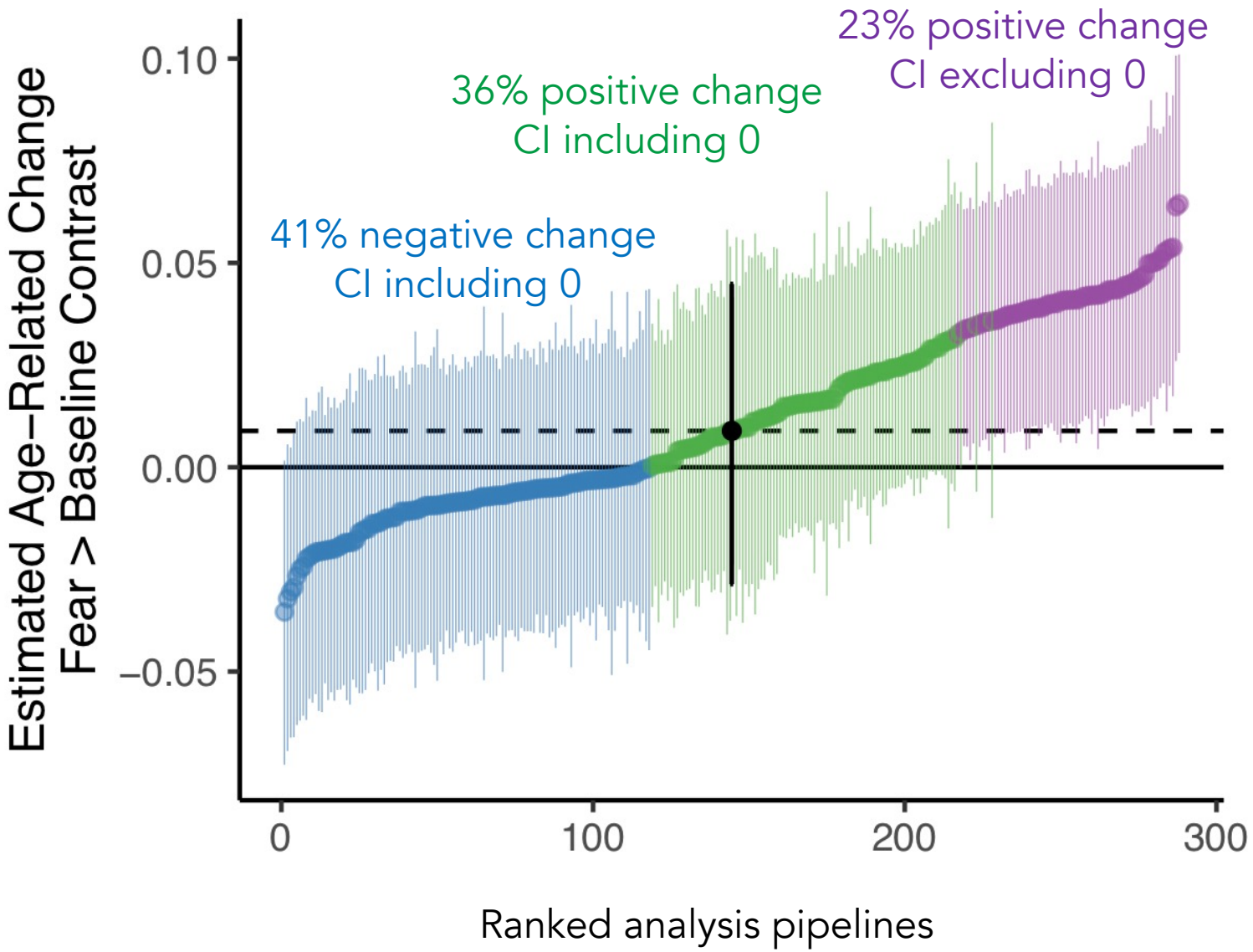
"Median pipeline"

Results: amygdala reactivity



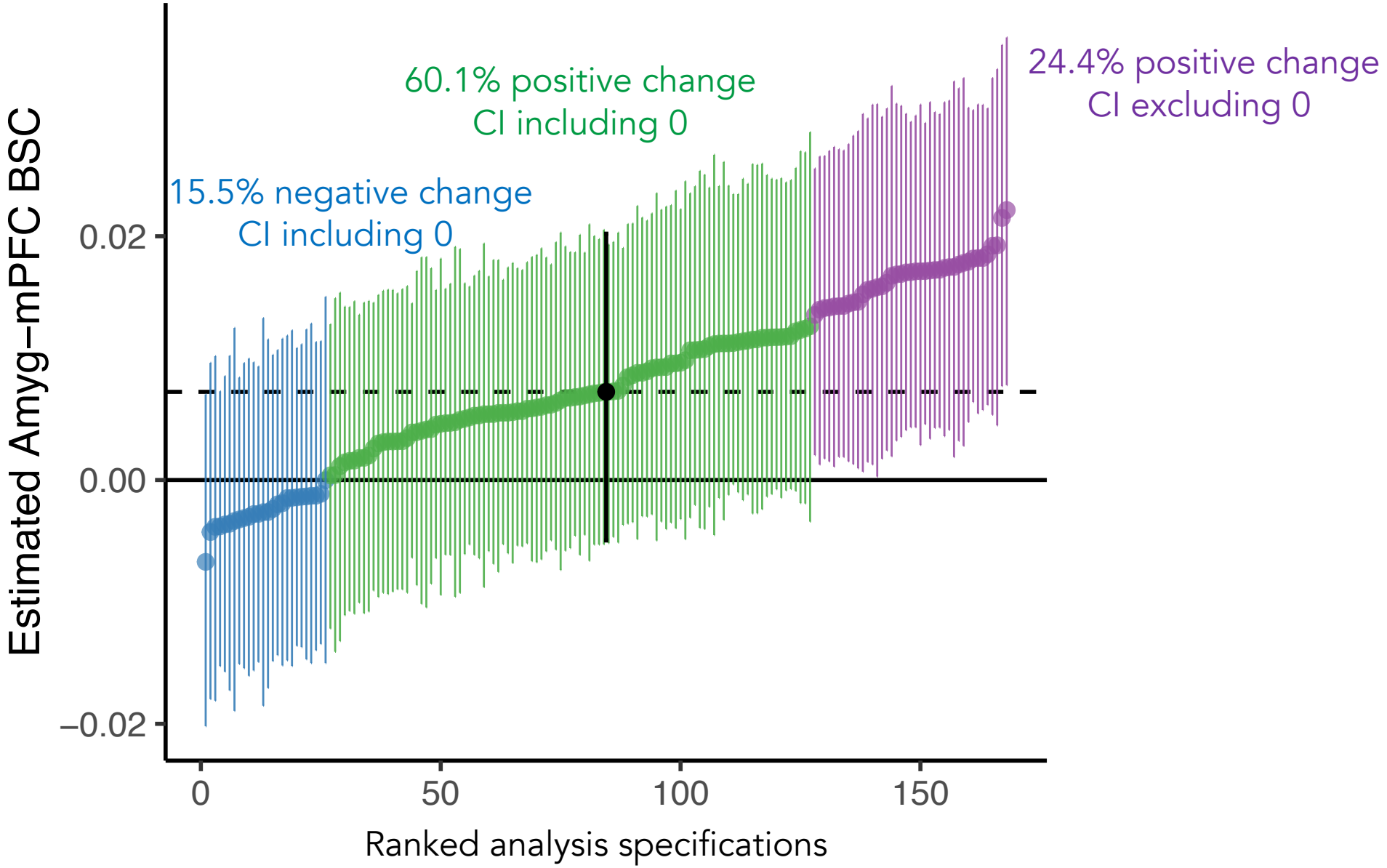


Results: amygdala-mPFC functional connectivity (gPPI)



Ask me about how these results were sensitive to deconvolution decisions in creating the gPPI regressors

Results: amygdala-mPFC beta series functional connectivity



Conclusions

- Many results highly sensitive to analysis decisions (Botvinik-Nezer et al., 2020)
  - Multiverse analyses can help determine robustness

- Some evidence for age-related decreases in amygdala reactivity to both fear & neutral faces
- No evidence for age-related changes in amygdala-mPFC connectivity to faces
  (Zhang et al., 2019)

Limitations

- No evidence for age-related change ≠ evidence for *no* age-related change
- Sample not representative of the US population (LeWinn et al., 2017)
- Limited sample size (Marek & Tervo-Clemmens et al., 2020)
- Short, rapid event-related task design

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Questions? Ask me!

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Thank You!

Nim Tottenham
Mariam Aly
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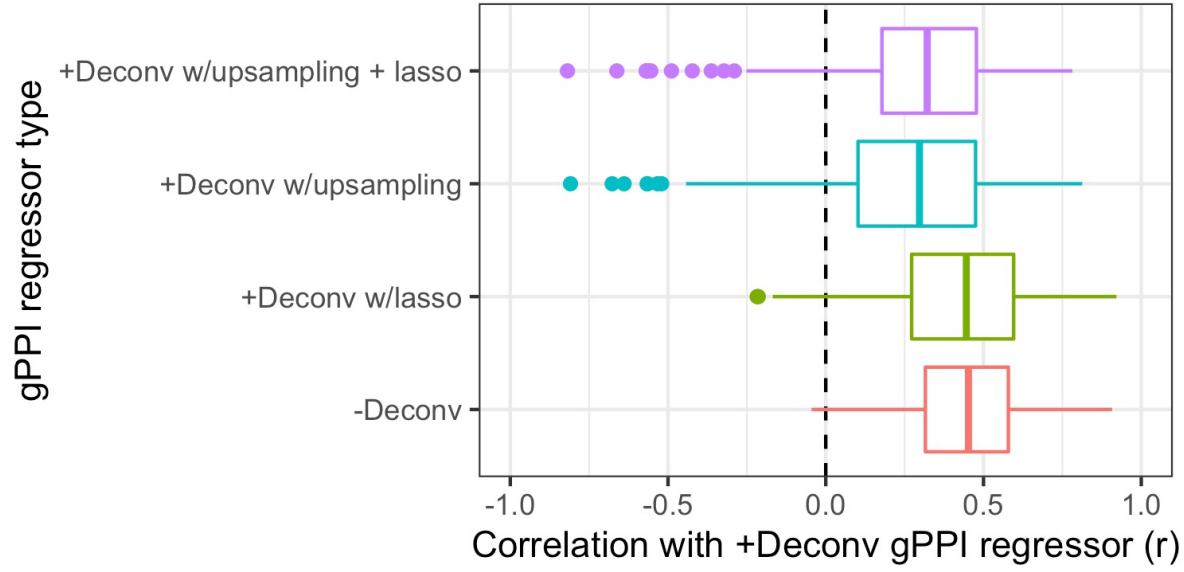
Anna Vannucci
Tricia Choy
Nick Camacho
Syntia Hadis
Lisa Gibson
Charlotte Heleniak
Sameah Algharazi
DANLab RAs
Louis Waweru

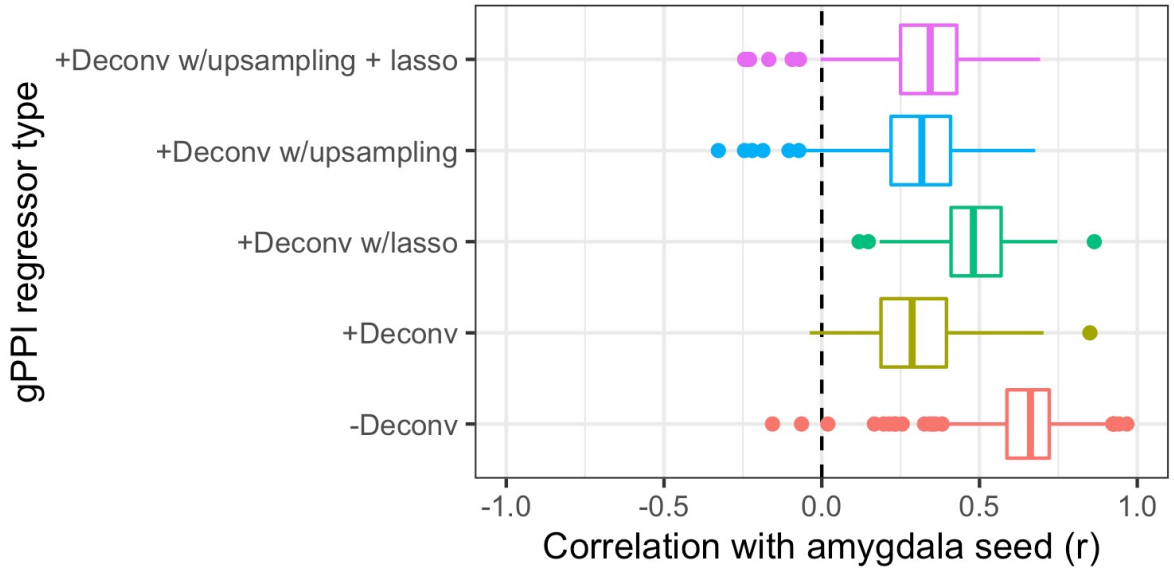
Developmental Affective Neuroscience Laboratory

Society for Research in Child Development

Influence of of deconvolution step on gPPI regressors



- gPPI regressors are not *that* similar for deconvolution vs. none
- Changes within deconvolution algorithm create substantially different gPPI regressors



- gPPI regressors correlated with seed, but most strongly without deconvolution