

Associations of *In Utero* Per- and Poly-fluoroalkyl Substances (PFAS) Exposure with BMI and Overweight or Obesity at Age 2-18 Years in the Prospective Boston Birth Cohort

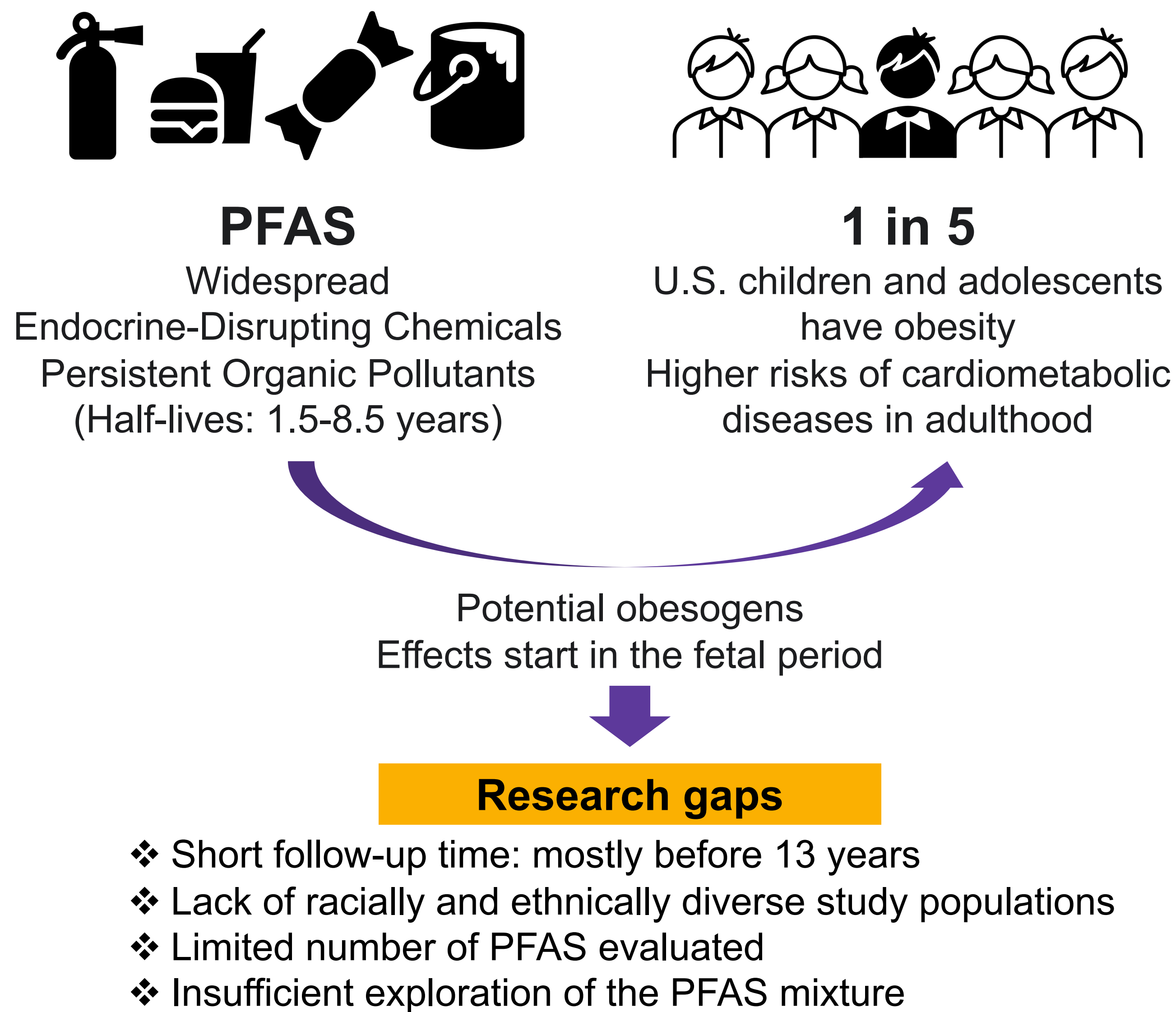


JOHNS HOPKINS
BLOOMBERG SCHOOL
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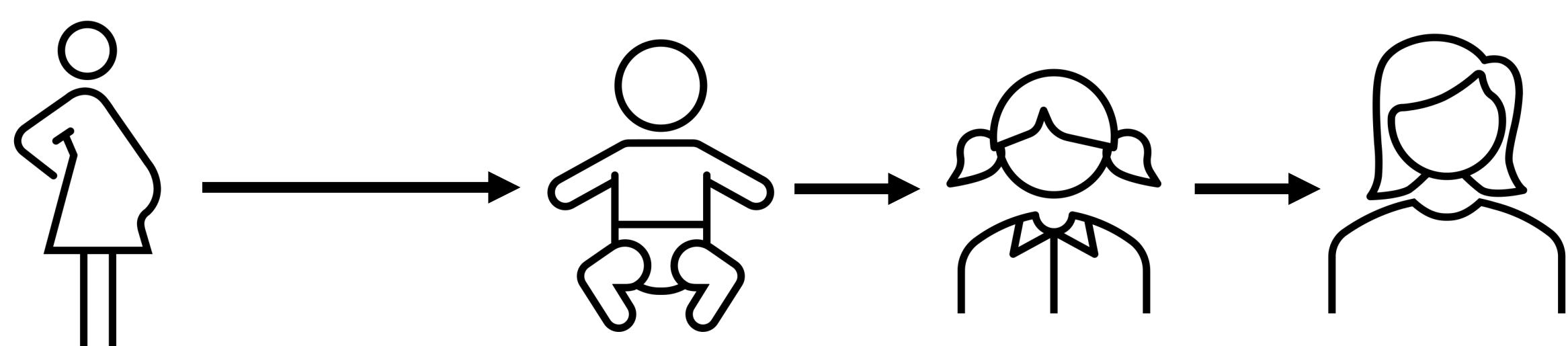
Background



Methods

Boston Birth Cohort (n = 1,189)

U.S. urban, predominantly Black and Hispanic, low-income prospective birth cohort



Exposure

Maternal plasma PFAS
24-72h after delivery
HPLC-MS/MS

Outcome

Offspring BMI Z-Score and
overweight/obesity (OWO) at 2-18 years
Repeated measures & Last measure

Statistical analysis

Individual PFAS association

- ❖ Linear regression between individual PFAS and child BMI Z-Score
- ❖ Log-binomial regression between individual PFAS and child OWO
- ❖ Linear mixed-effects model between PFAS and repeated outcomes

PFAS mixture analysis

- ❖ Quantile g-computation
- ❖ Bayesian kernel machine regression (BKMR)

Stratified analysis

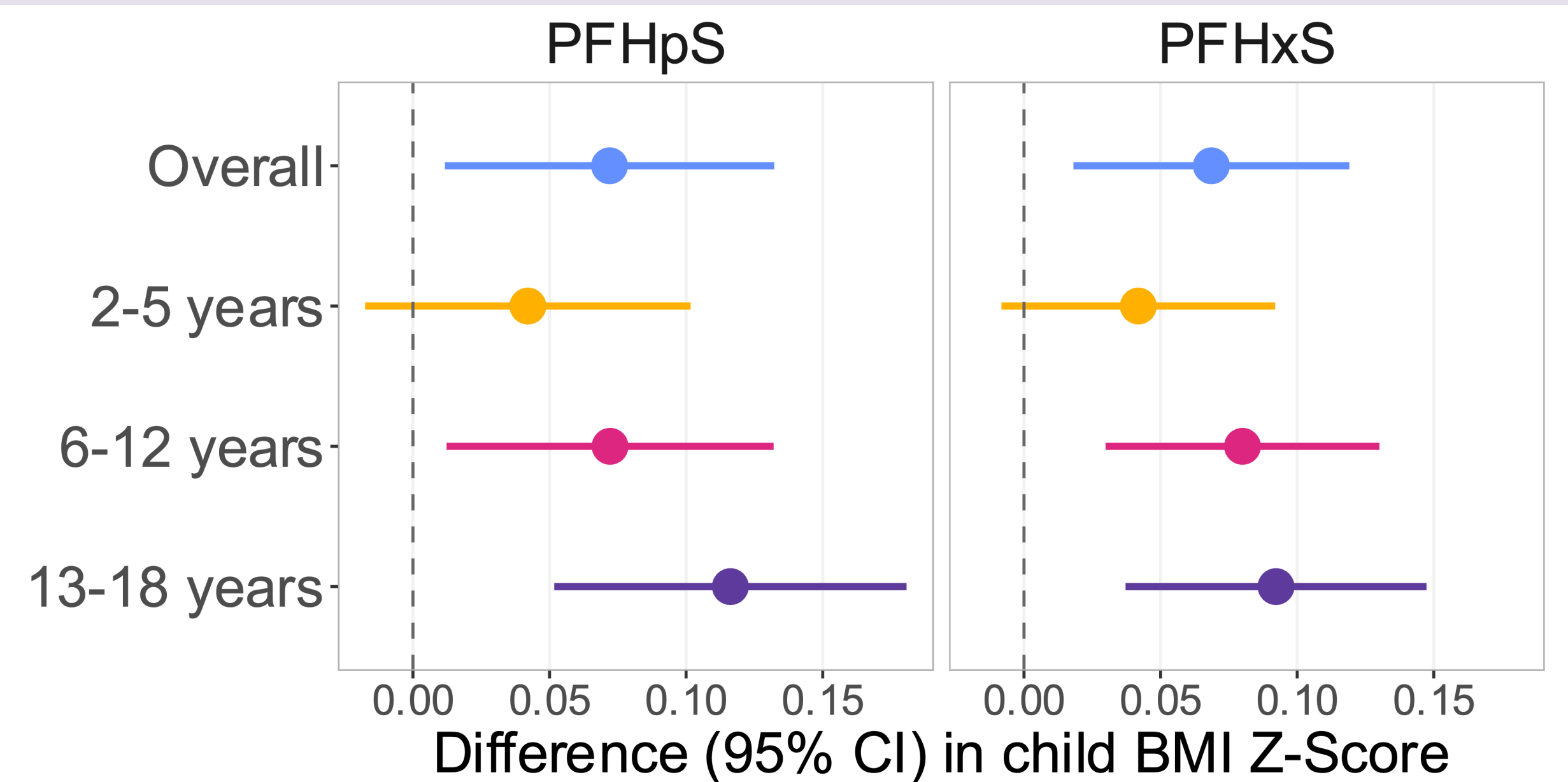
- ❖ By child life stage (2-5 years; 6-12 years; 13-18 years)
- ❖ By maternal pre-pregnancy OWO
- ❖ By child life stage and maternal pre-pregnancy OWO

Covariates

Maternal age at delivery, education, race, pre-pregnancy BMI (if not stratified by maternal OWO), diabetes; and child's sex, fetal growth (i.e., AGA, SGA, LGA), year of birth, delivery mode, and parity

Results

Individual PFAS association (repeated measures)



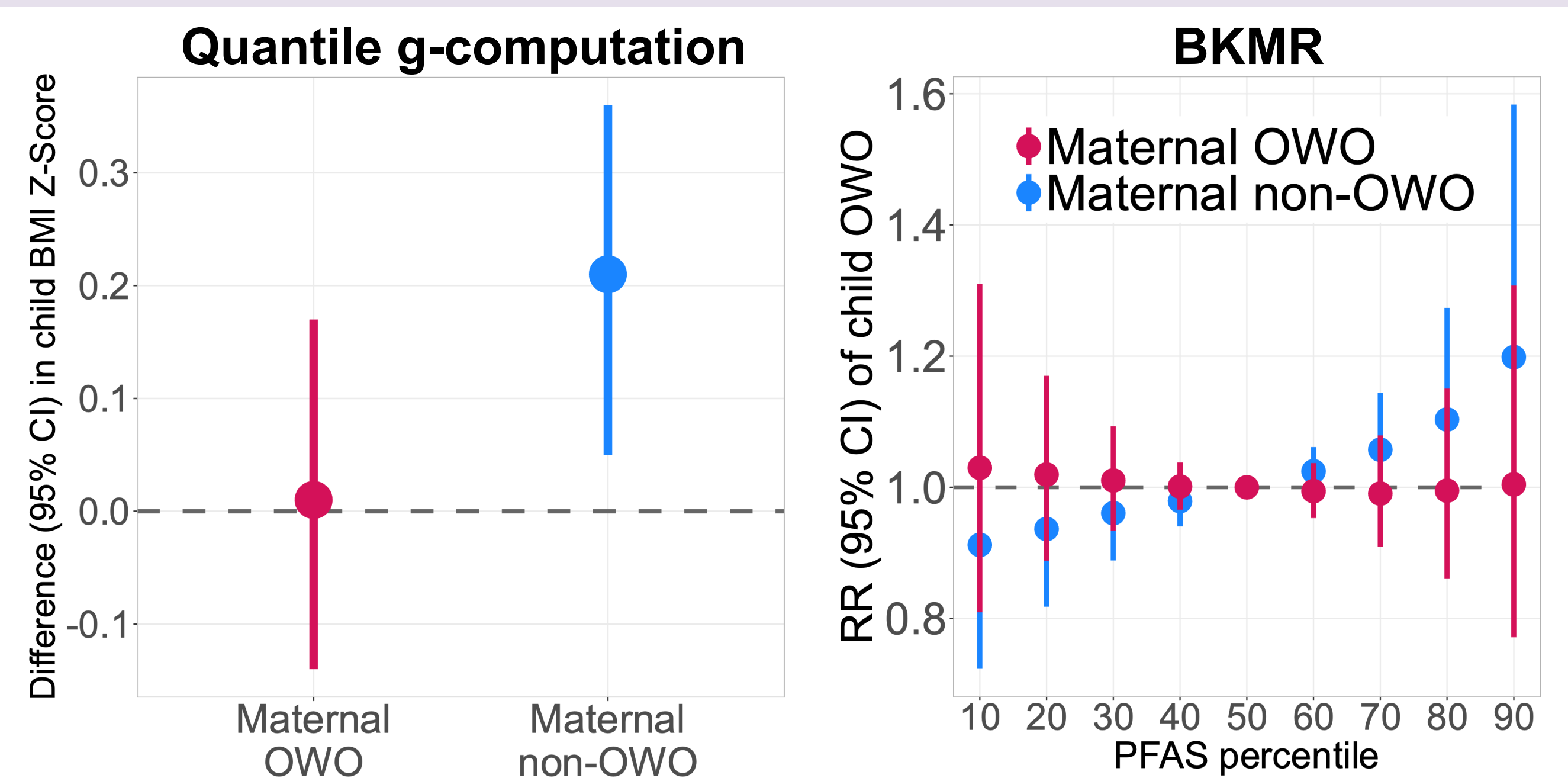
Obesogenic?

PFAS were associated with
higher child BMI Z-score

Age-dependent?

Associations become stronger
in **older** child life stages

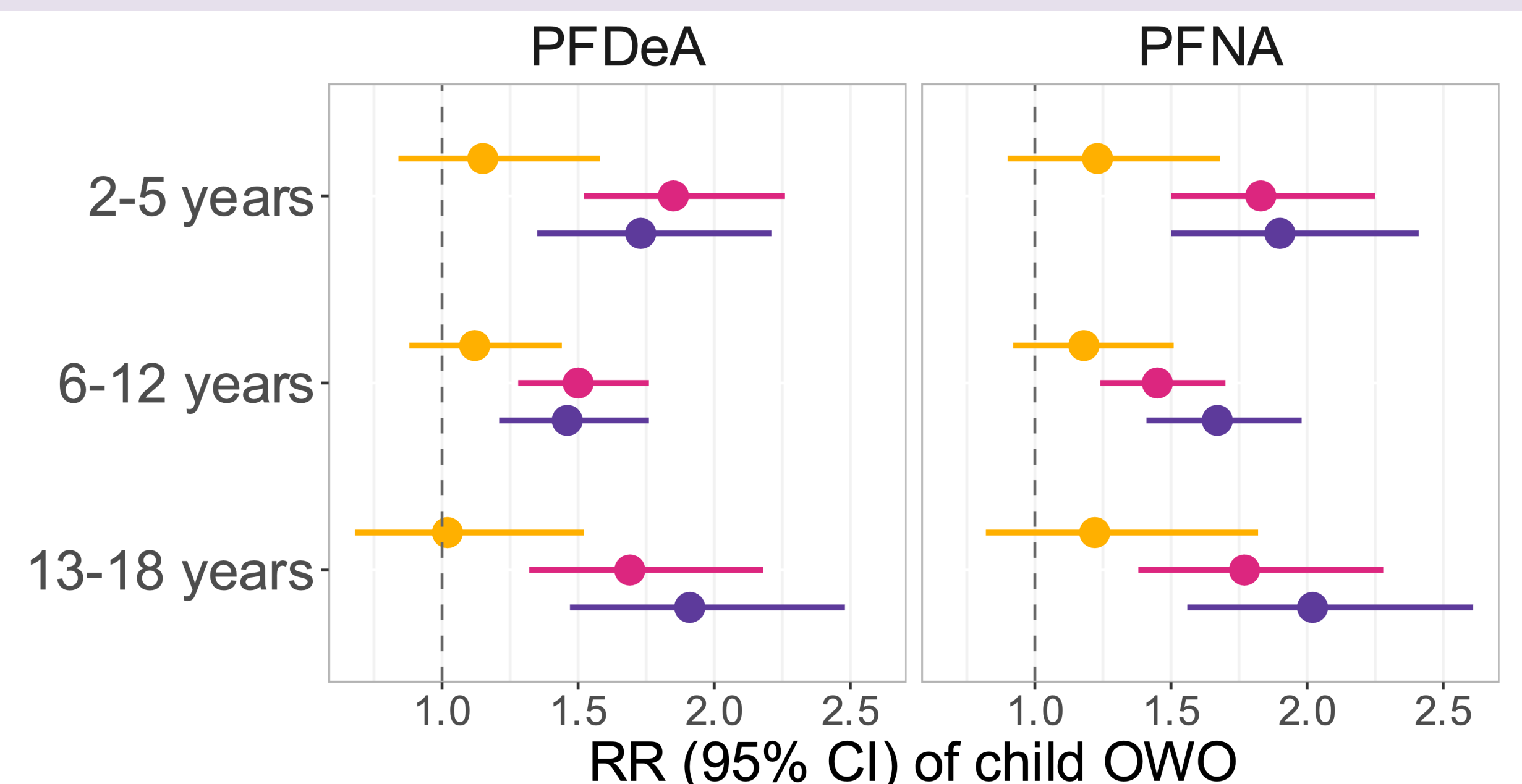
PFAS mixture analysis & stratified analysis (last measure)



Vary by maternal OWO?

Associations were stronger in children of **non-OWO** mothers

Combined association of PFAS and maternal OWO (last measure)



Footnote: The reference group is maternal non-OWO and low PFAS.

- Maternal non-OWO and high PFAS
- Maternal OWO and low PFAS
- Maternal OWO and high PFAS

Synergy of PFAS and maternal OWO?

Synergistic effects of PFAS and maternal OWO emerged in **adolescence**

Conclusion

- ❖ Moderate but detectable positive associations of prenatal exposure to individual PFAS and their mixture with child BMI Z-Score and OWO.
- ❖ The exposure-effect associations were more pronounced in adolescents and offspring of non-OWO mothers.
- ❖ Synergistic effects of prenatal PFAS exposures and maternal OWO on child OWO became evident in adolescence.