**Associations of Air Pollutants with Total Brain Tissue Volume Trajectories and Autism Spectrum Disorder in Infants**

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**Background**

Previous work has identified differing trajectories in average brain volume growth rates during infancy between those with and without ASD. While mechanisms for this are unknown, one potential risk factor is air pollution exposure, which has been found to be associated with both brain volume and ASD.

**Objectives**

We evaluated potential latent class trajectories of total brain tissue volume in participants from the Infant Brain Imaging Study (IBIS) cohort. We then examined associations of residential exposure to three air pollutants (PM2.5, NO2, O3) with these trajectories along with their differences in membership by ASD diagnosis, and whether this relationship was modified by familial risk of ASD.

**Methods**

Using MPLUS, we utilized latent class growth analysis to discern latent class trajectories in total brain tissue volume (N = 389; evaluated by MRI at 6, 12, and 24 months). Upon discovery of significant latent classes, we built this into a structural equation model with latent class trajectories (i.e., a growth mixture model), clustered on region of residence. We adjusted for *a priori* confounders, sex, race / ethnicity, and income, and evaluated maternal age, maternal education, gestational age, birth season, and enrollment site for additional potential confounding. We then discerned differences in the prevalence of ASD diagnosis by class. Finally, we examined effect modification of our associations by familial risk of ASD.

**Results**

We discovered three latent class trajectories of total brain tissue volume: low (16% of participants), medium (54%), and high (30%) linear non-overlapping growth trajectories, which differed each by ~10% in volume. In our fully adjusted structural equation model, we found that

Higher residential PM2.5 is associated with a lower brain volume trajectory from 6 to 12 to 24 months of age; NO2 & O3 are not associated. Participants with ASD were most likely to be in the lowest volume trajectory class.

**Conclusions**

Exposure to fine particulate matter may contribute to a lower brain volume trajectory in infancy, which may contribute to increased risk of ASD. This contrasts with previous observations of brain enlargement in children with ASD. Next steps will entail evaluating the association between air pollution and 6 to 24 month change in brain volume, examining potential sensitive windows of exposure during pregnancy.