**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 growth rates in brain volume during infancy between those with and without ASD. One shared risk factor for brain volume differences and ASD is air pollution exposure.

**Objectives**

We evaluated latent class trajectories of total brain tissue volume in participants from the Infant Brain Imaging Study (IBIS). We examined associations of residential exposure to three air pollutants (fine particulate matter [PM2.5], nitrogen dioxide [NO2], and ozone [O3]) with these trajectories along with differences by ASD.

**Methods**

We conducted a latent class growth analysis with MPLUS to discern latent trajectories in total brain tissue volume (N = 369; MRI at 6, 12, and 24 months). We built this into a growth mixture model, clustered on residential region, adjusted for potentialconfounders. We then discerned differences in prevalence of ASD by class and examined effect modification by familial risk.

**Results**

We discovered three latent class trajectories of brain 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 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 while higher residential NO2 is associated with a higher trajectory and O3 is not associated (Figure 1). Participants with ASD were most likely to be in the lowest volume trajectory class, with no difference by familial risk.

**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; however, previous studies have pre-specified and compared across groups by familial risk and diagnosis of ASD rather than identifying latent subgroup trajectories.

**Figure 1.** Total brain tissue volume trajectories and associations with air pollutants

