**Associations between Air Pollutants, Brain Growth in Infancy, and Autism Spectrum Disorder**

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**Background**

Previous work has identified differing brain growth rates between infants who develop autism spectrum disorder (ASD) and those who do not. One risk factor known to contribute to both brain volume differences and ASD is air pollution exposure.

**Objectives**

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

**Methods**

We conducted a latent class growth analysis to discern latent trajectories in TBV from 6-24 months of age (N=369). We built 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 identified three latent class trajectories of TBV: low (16% of participants), medium (54%), and high (30%) linear non-overlapping growth trajectories, each differing by ~10% in volume. Higher residential PM2.5 was associated with lower TBV trajectory, while higher residential NO2 was associated with higher trajectory, and O3 was not associated (Figure 1). ASD participants were most likely to be in the lowest TBV trajectory class, with no difference by familial risk.

**Conclusions**

Exposure to fine particulate matter may contribute to lower brain volumes in infancy and increased risk of ASD, while NO2  may contribute to higher brain volumes. 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

