



# Gray Matter Volume Correlates of the Spatial Distribution of Visual Attention in High Trait Anxiety

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## Introduction

Flexible allocation of attentional resources to different spatial loci is crucial to meet the demands of a dynamic environment that we navigate daily. The inability to adaptively redistribute spatial attention may lead to constricted or tunnel vision, which may compromise sampling the span of the visual field towards optimizing visually guided behaviour. This is of interest in anxious individuals, who are known to have biases in visual processing. We used a modified affect-primed, visual-spatial behavioural attention task with structural magnetic resonance imaging (sMRI) in a sample of healthy young adults with varying degrees of trait(dispositional) anxiety (n = 60 with 23 females; age [mean ± s.d.] = 22.8 ± 3.8; trait anxiety [mean ± s.d.] = 46.52 ± 11.04). Using objective measures from the behavioural task and sMRI, we explored if a) fear and neutral affect from image primes differed relative to no affect (scrambled image prime) in modulating the distribution of visual spatial attention; b) an association existed between the gray matter volume (GMV) of any particular region(s) of the whole brain and a measure of the spatial distribution of attention by individual valences of affect and overall.

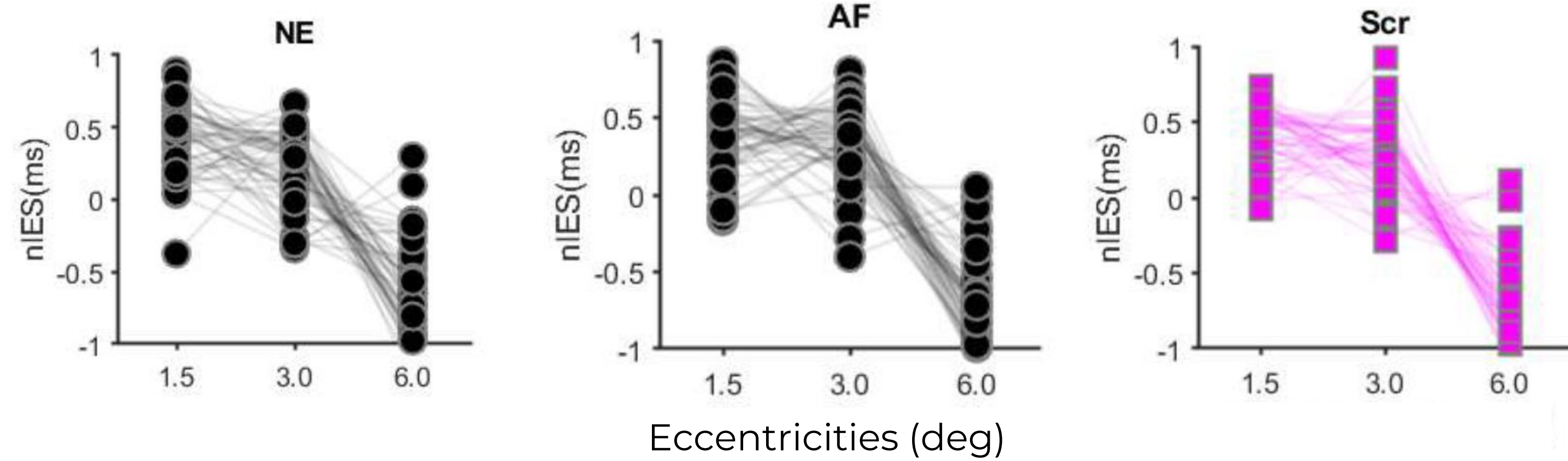
## Methodology

- ❖ Spatial gradient of visual attention calculated as a metric for tunnel vision using measures of attentional efficiency at spatial loci near the central fixation (1.5 degrees; close to the presentation of the image prime) minus far from it (6 degrees) in an affective priming based behavioural study design with partial emotion information.
- ❖ Greater positive gradient values reflected better attentional efficiency at the near relative to farther spatial loci or higher degrees of tunnel vision.
- ❖ Voxel-based Morphometry: Average gradient (across emotional valences), submitted to a multiple regression analysis with total intracranial volume and age as nuisance covariates.

## Results

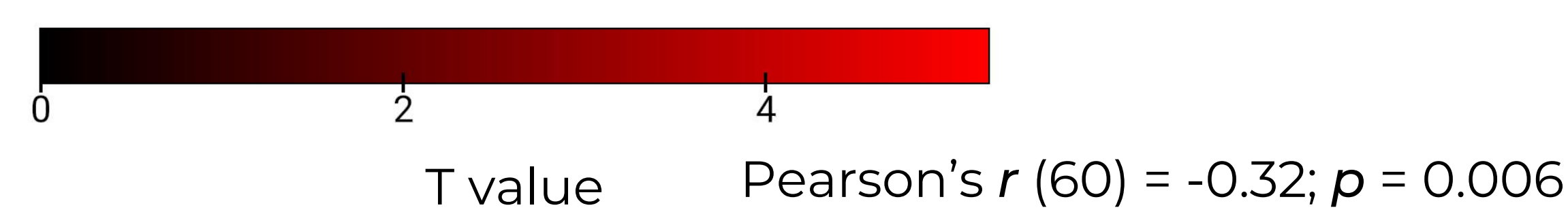
### Visual attention drops with increasing spatial eccentricities from centre but emotional cues with partial information do not influence the distribution

NE = Neutral emotion, AF = Afraid emotion, Scr = Scrambled / no emotion

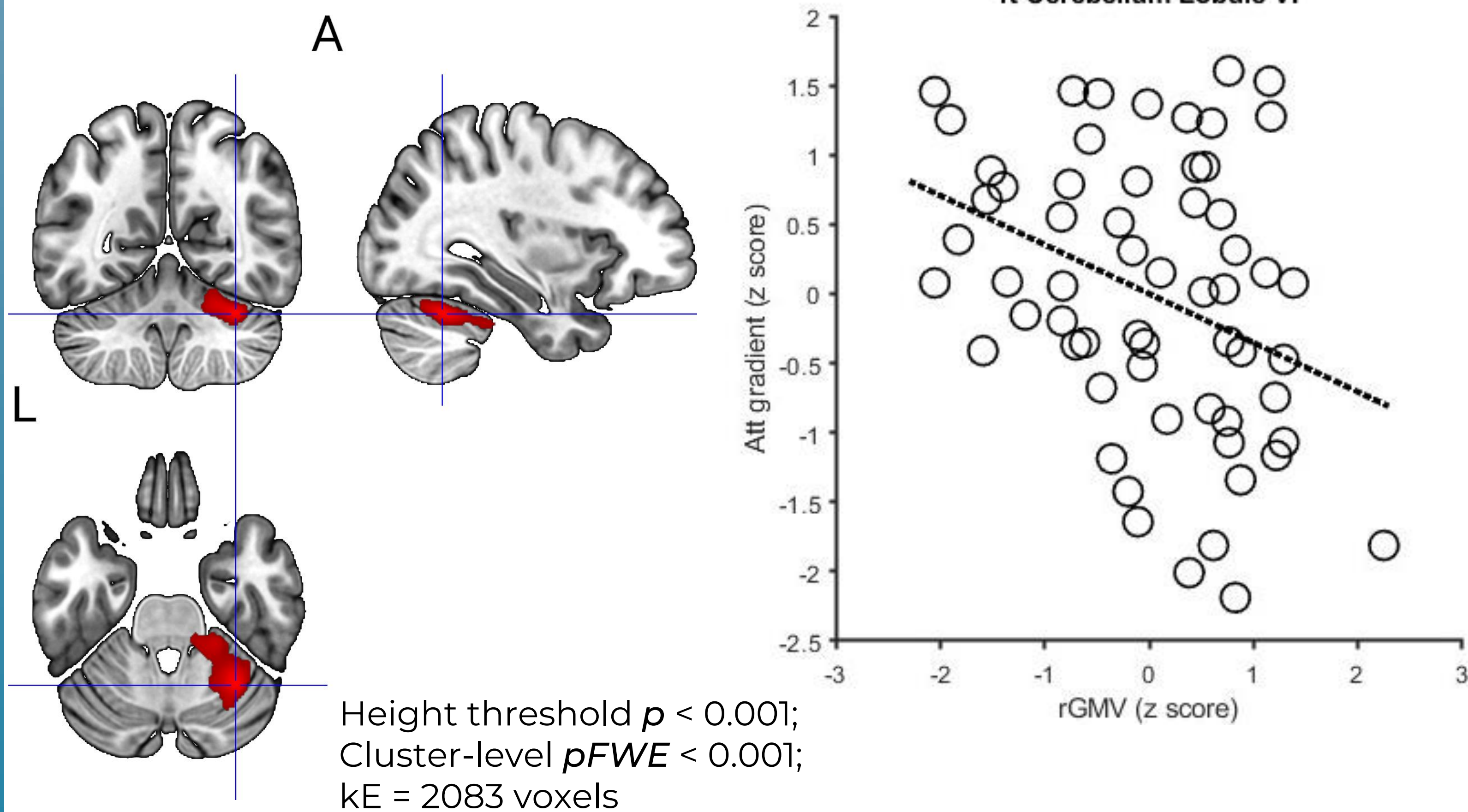


nIES = negative inverse efficiency (measure of attentional efficiency)

### Visual attention gradient scales negatively with right Cerebellar lobule VI volume

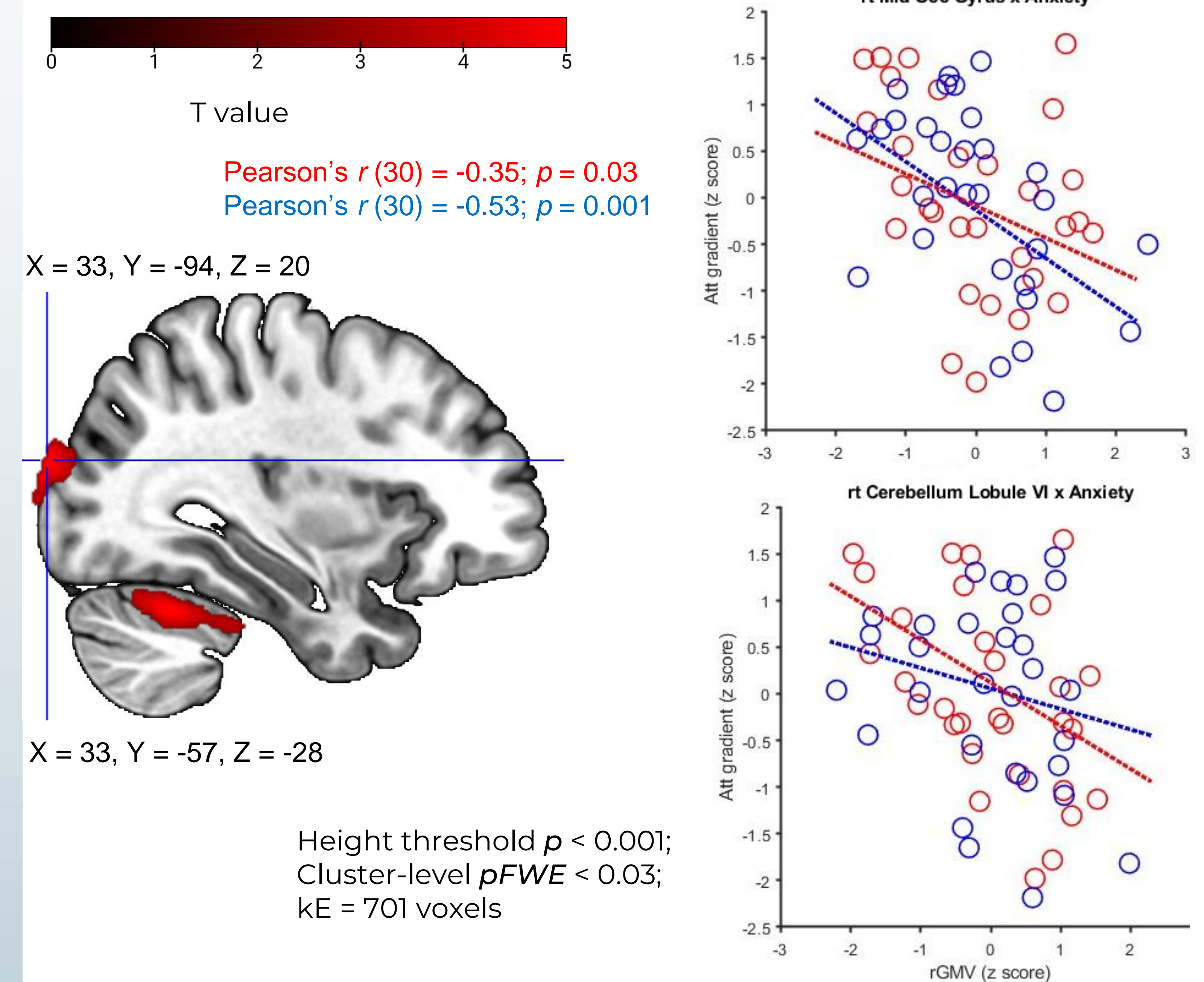


X = 33, Y = -56, Z = -28

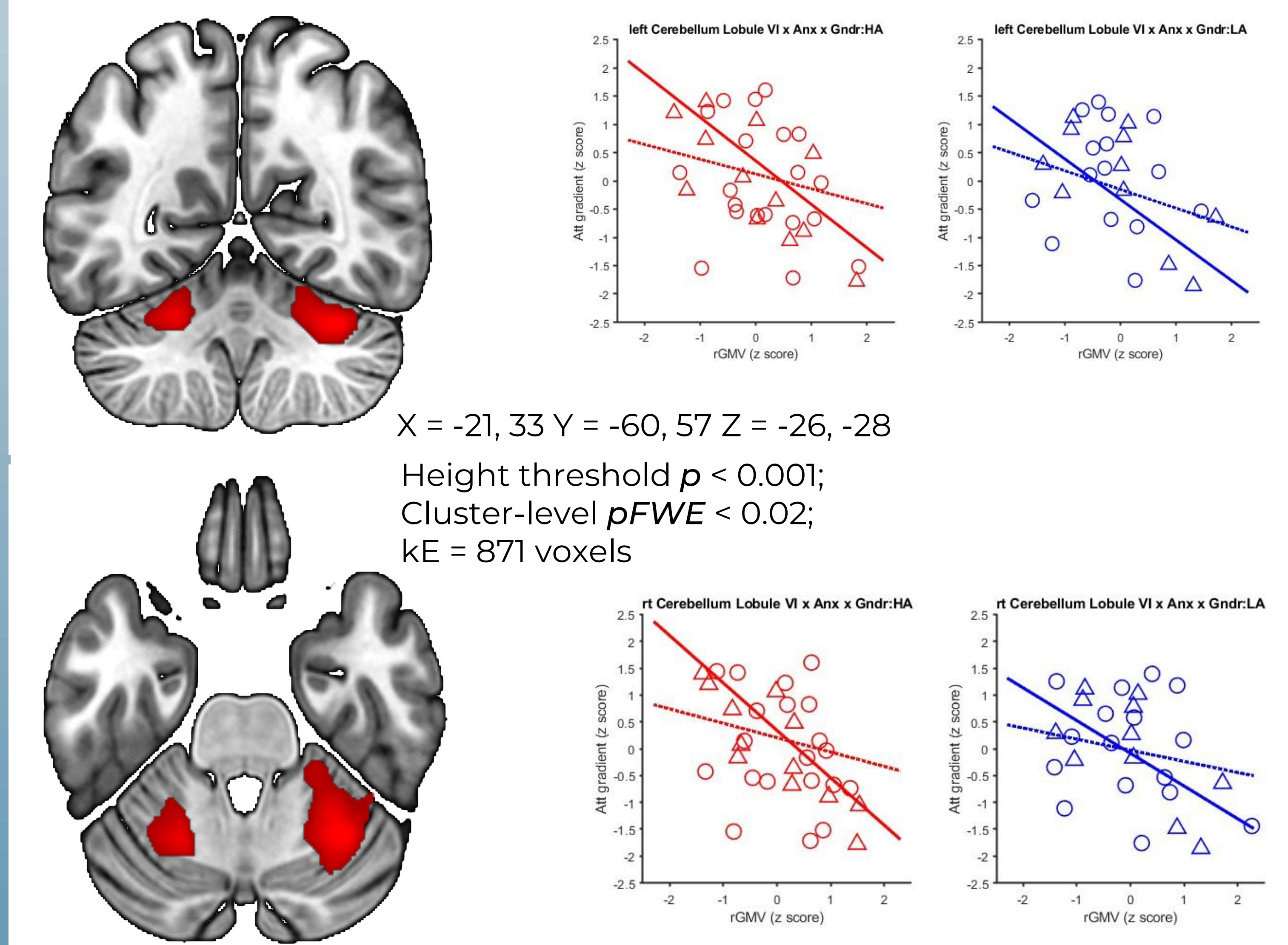


## Results

### Trait anxiety moderates the relationship between visual attention gradient with gray matter volume of right Mid Occipital Gyrus and Cerebellar lobule VI



### Trait anxiety and Gender moderate the relationship between visual attention gradient and gray matter volume of Cerebellum lobule VI



## Conclusion

- ❖ Young adults with lesser GMV of cerebellar lobule VI may manifest greater individual severity of tunnel vision.
- ❖ The above effect is further shaped by inter-individual differences of trait anxiety and gender
- ❖ Results support non-classical role of cerebellum in visual-spatial attention & tunnel vision.

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