

Decreased Cortical Gyrfication Associated with Trait Anxiety



BACKGROUND

- Dispositional anxiety is a risk factor for anxiety and other psychiatric disorders.¹
- Extant research has demonstrated structural and functional brain abnormalities in anxiety disorders.²
- Recent evidence has demonstrated similar abnormalities in the cortical surface in specific anxiety and related psychiatric disorders; particularly, in the precuneus, a key region involved in the default mode network.^{3,4,5}
- The gyrification of the cortex happens early in neurodevelopment and is a useful measure to understand underlying abnormalities in cortical connectivity during this critical period.⁶
- No study has examined differences in cortical gyrification associated with the broader vulnerability of dispositional anxiety

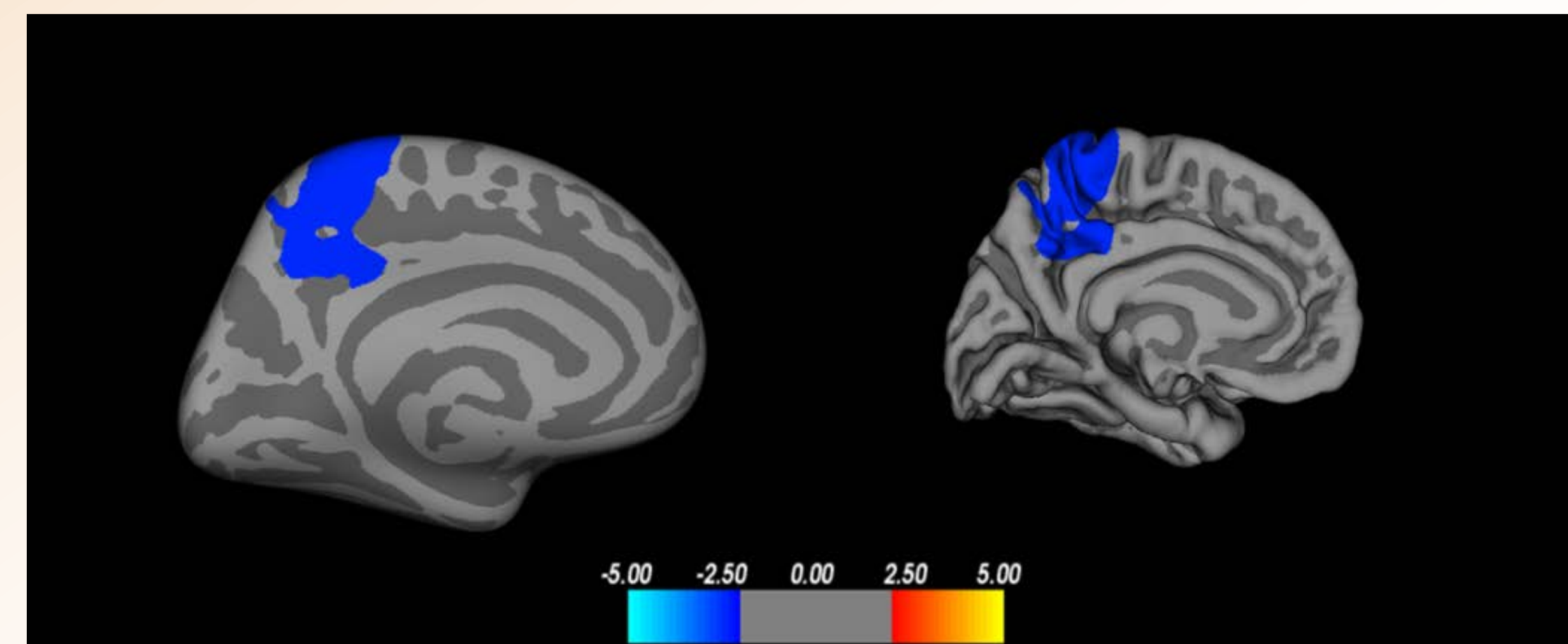
AIMS

- **Primary Aim:** utilize a novel 3D measurement of cortical gyrification (Local Gyrfication Index) to examine differences in the cortical surface associated with trait anxiety.
- **Exploratory Aim:** Further examine relationships between LGI and other structural measures, such as cortical thickness, in anxiety.

METHODOLOGY

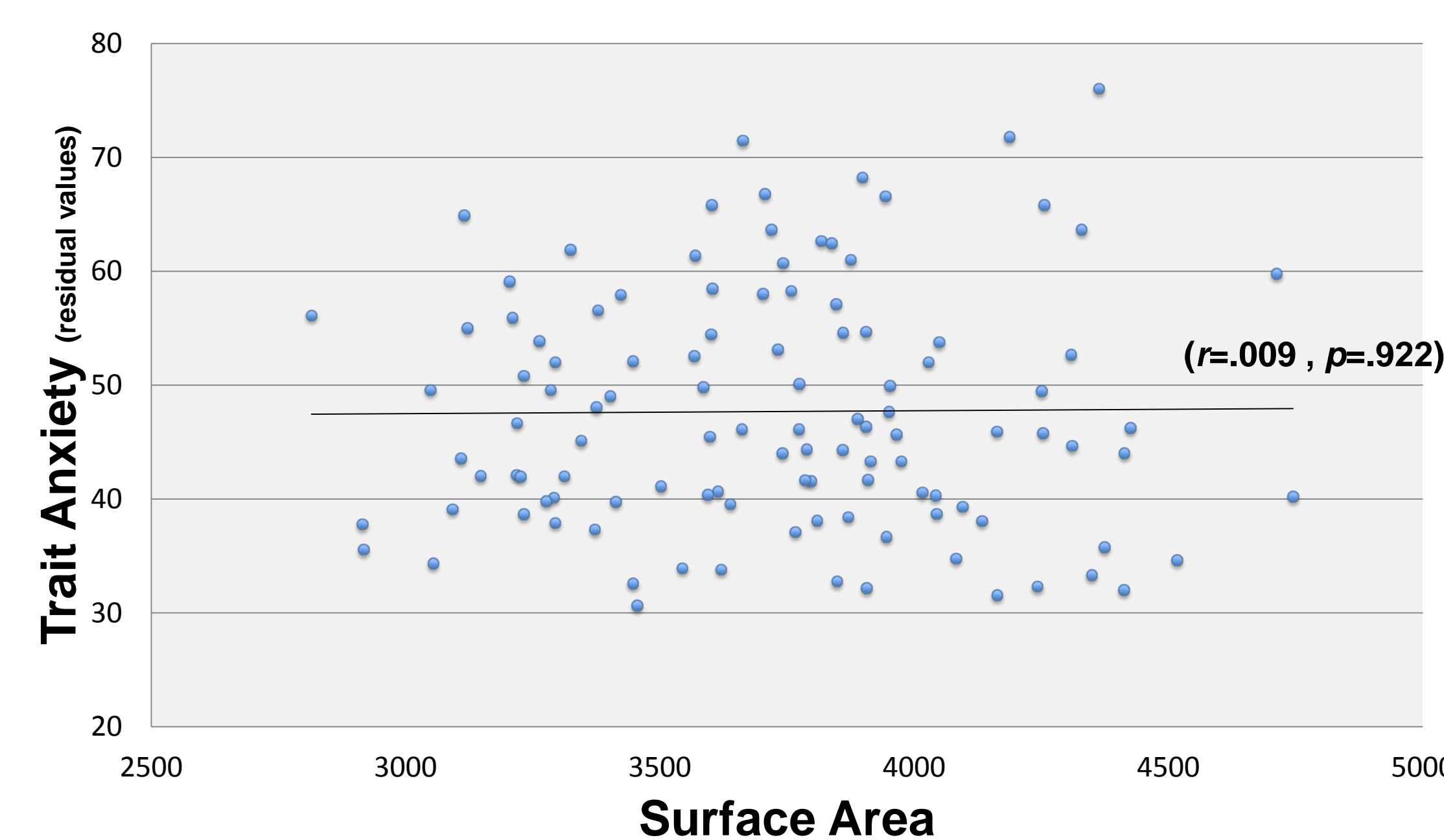
- 120 UWM undergraduate students (73 females)
 - Age range 18-35
 - Participants completed the Trait version of the STAI.⁶
- High resolution SPGR Images (0.9375 x 0.9375 x 1 mm) were acquired using a 3T GE scanner.
- Data Analysis
 - FreeSurfer 5.1 was used to reconstruct the cortical surface and compute the LGI.⁷
 - A smoothing 5mm FWHM was applied.
 - Whole brain analyses were performed using QDEC and age and sex were used as covariates.
 - Cluster correction was done using Monte Carlo simulation with 10,000 iterations (vertex-wise threshold $p=0.05$) in order to correct for multiple comparison.
 - Average values for LGI, surface area and cortical thickness were extracted for Desikan-Killiany Atlas defined ROIs.

RESULTS

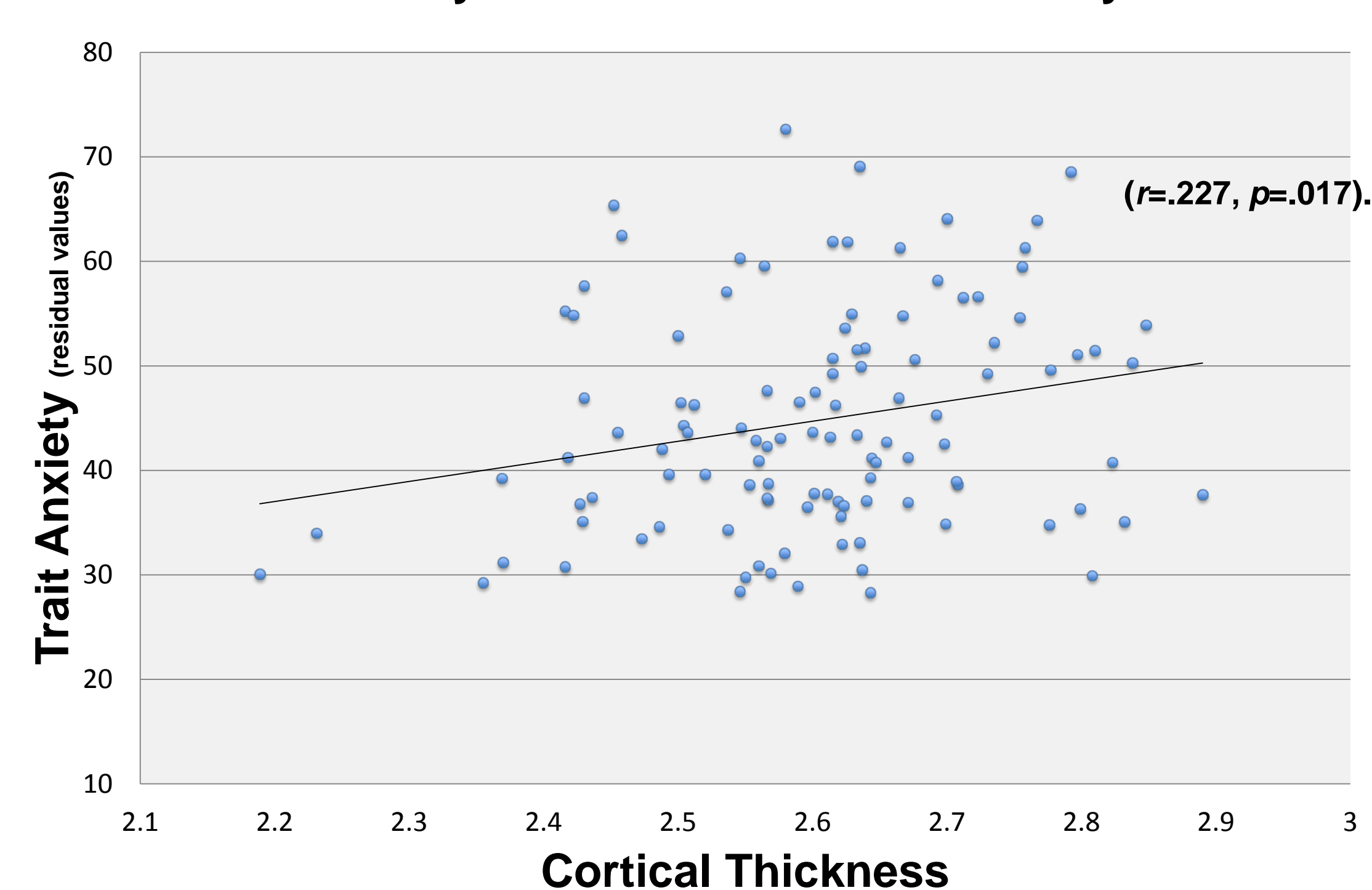


- There was a negative correlation between trait anxiety and LGI in the precuneus (cluster size =2536.6mm², clusterwise $p=0.0032$)

Average Surface Area in LH Precuneus is Not Associated with Trait Anxiety

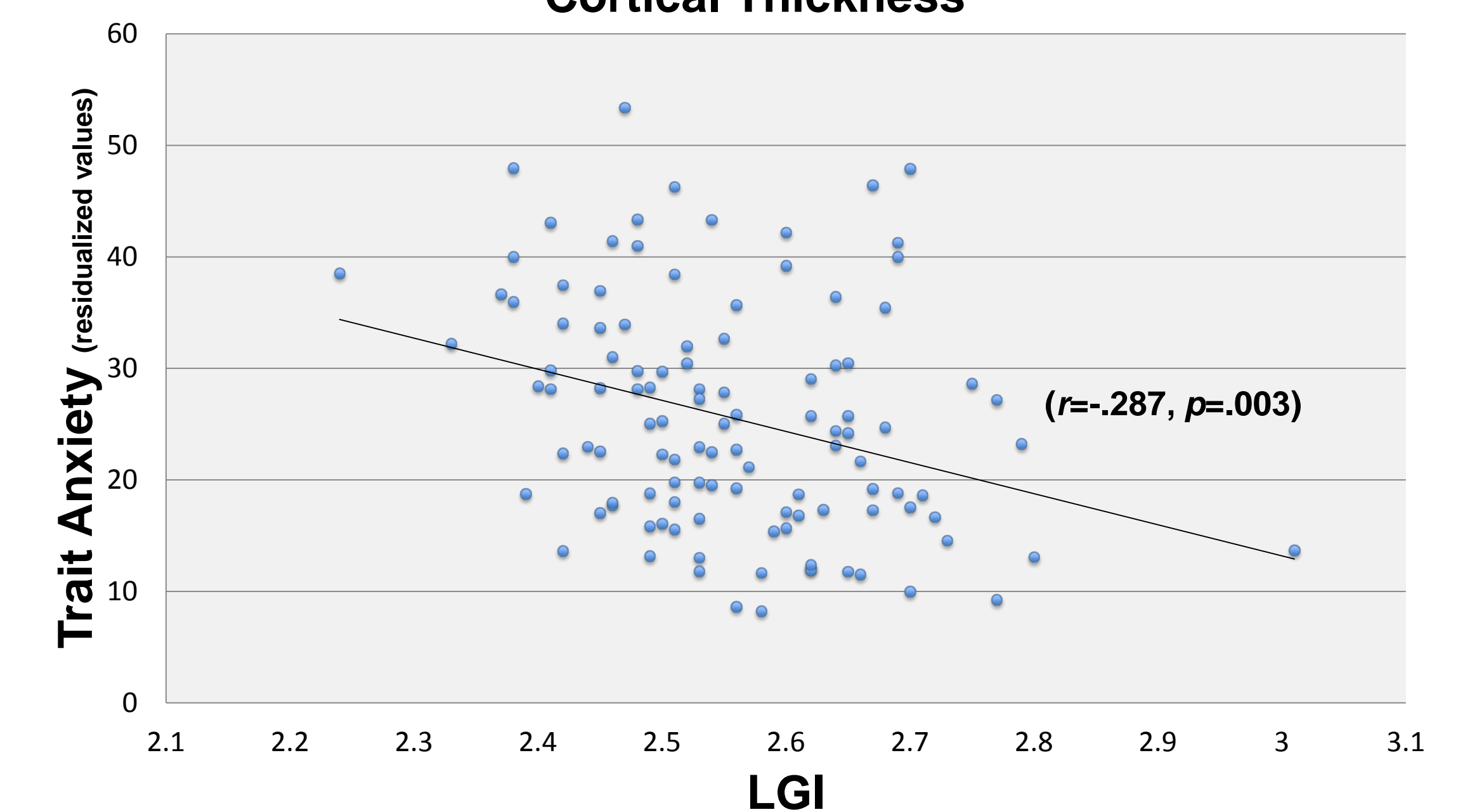


Average Cortical Thickness in LH Precuneus is Positively Associated with Trait Anxiety



RESULTS (cont.)

LGI Decreases as a Function of Trait Anxiety in the Precuneus When Controlling for Variance Due to Cortical Thickness



CONCLUSIONS

- Dispositional anxiety is associated with less cortical complexity in the precuneus even when controlling for the effects of cortical thickness; however there is no associated decrease in surface area.
- This is consistent with prior research that has demonstrated abnormal cortical folding in this area in disorders that individuals with high trait anxiety are vulnerable to (e.g. depression and panic disorder).^{3,4,5}
- In addition, this is consistent with prior research demonstrating functional/structural abnormalities in the precuneus area in anxiety and depression; specifically, in abnormalities associated with the default mode network.^{3,4,5,8}
- The current findings highlight possible early developmental differences in local parietal connectivity that is related to trait anxiety.

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