Supplementary Online Content


eAppendix. MRI data acquisition and measures of areal expansion/compression.
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eFigure. Brain map (voxel-based morphometry) of significant gray matter differences in ASD (N = 178; P = .0041) rendered to the cortical surface.

This supplementary material has been provided by the authors to give readers additional information about their work.
eAppendix

MRI Data Acquisition. Spoiled gradient recalled (SPGR) were acquired at two flip angles ($\alpha$) with the sequence parameters given in Table 1 from which an estimate of $T_1$ was derived at each cerebral voxel. These quantitative $T_1$ maps were then used to create simulated structural $T_1$-weighted inversion recovery (IR) images, with 176 contiguous slices (1 mm x 1 mm x 1 mm resolution), a field-of-view of 25.6 cm, a simulated repetition time/inversion time (TR/TI) of 1800/850 ms, and flip angle of 20°. This combination of parameters gave optimal deep and cortical grey/white matter contrast in the subsequent tissue segmentation without modulation by $B_0$ and $B_1$ field inhomogeneities.$^1$

Measures of Areal Expansion/Compression. The FreeSurfer analysis suite was used to derive a triangular cortical mesh for grey/white matter surfaces in each $T_1$-weighted images. Generally, vertex-based measures of surface area (SA) are computed as the average of the area of the triangles indicant to a vertex (i.e. sharing that vertex). Thus, it becomes possible to refer to area expansion and area compression at a particular vertex since the average of the areas of the triangles incident to that vertex may vary over the cortex. As the average area of the incident triangles at a given vertex diminishes, SA is then said to be (locally) compressed at that point. Similarly, the average area of a vertex may increase in comparison to the average areas of the triangles incident to the neighboring vertices, and this will be referred to as (local) surface expansion. One may therefore ask whether this variability in local SA over the cortex is identical across different patients populations.

In the initial FreeSurfer tessellation, the size of the triangles is constant - but the number of triangles varies according to brain size and would hence influence vertex-based measures of surface area. To make the number of tessellations identical across subjects, the individual subject’s surfaces were deformed using a spherical atlas registration procedure – followed by registration of the individual spheres into the common coordinate system. This resulted in a standard number of tessellations across each individual’s brain surface. As the dimensions of the tessellations around a given vertex were now redistributed due to deformation, a relative contraction/expansion map of cortical surface area can be obtained and compared across subject groups.$^2$
eReferences


eFigure. Brain map (voxel-based morphometry) of significant gray matter differences in ASD (N = 178; P = .0041) rendered to the cortical surface. Relative excesses in gray matter volume in adults with ASD compared with controls are displayed in blue, while deficits are displayed in red.