Corpus Callosum

shape, cognition and ageing

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BACKGROUND

The corpus callosum is the main bundle of fibres between the left and right cerebral hemispheres.

Its midsaggital shape reflects the number, density, myelination, thickness, and topological distribution of inter-hemispheric connectivity (1-4).

The corpus callosum is connected to cortical regions that are particularly vulnerable to age-associated demyelination and atrophy (3, 5-10).

Because this does not occur uniformly (7, 11, 12), the global shape of the corpus callosum can provide useful information about the health, functioning and cognitive outcomes relating to many regions of the brain in ageing (11, 13).

There are major between-person differences in corpus callosum shape. As people age, there is a decrease in total corpus callosum area(6). Local analysis indicates significant decrease in areas such as the genu (11). However, it is unclear how global shape may change with ageing, particularly when focussing specifically on within-subjects change (6, 14).

METHODS

Participants were sampled from the Personality and Total Health (PATH) Through Life Study (15), a longitudinal study of ageing that includes repeated MRI scans at four year intervals. There were 417 adults aged 45-65 at baseline. Fifty two percent were male.

MRI were acquired and processed as in Shaw (16), and subsequent tracing, elliptical fourier and principal components analysis was used to extract global shape components. These were then analysed in hierarchical mixed models, with time in study as a predictor of change in loading, nested by participant.

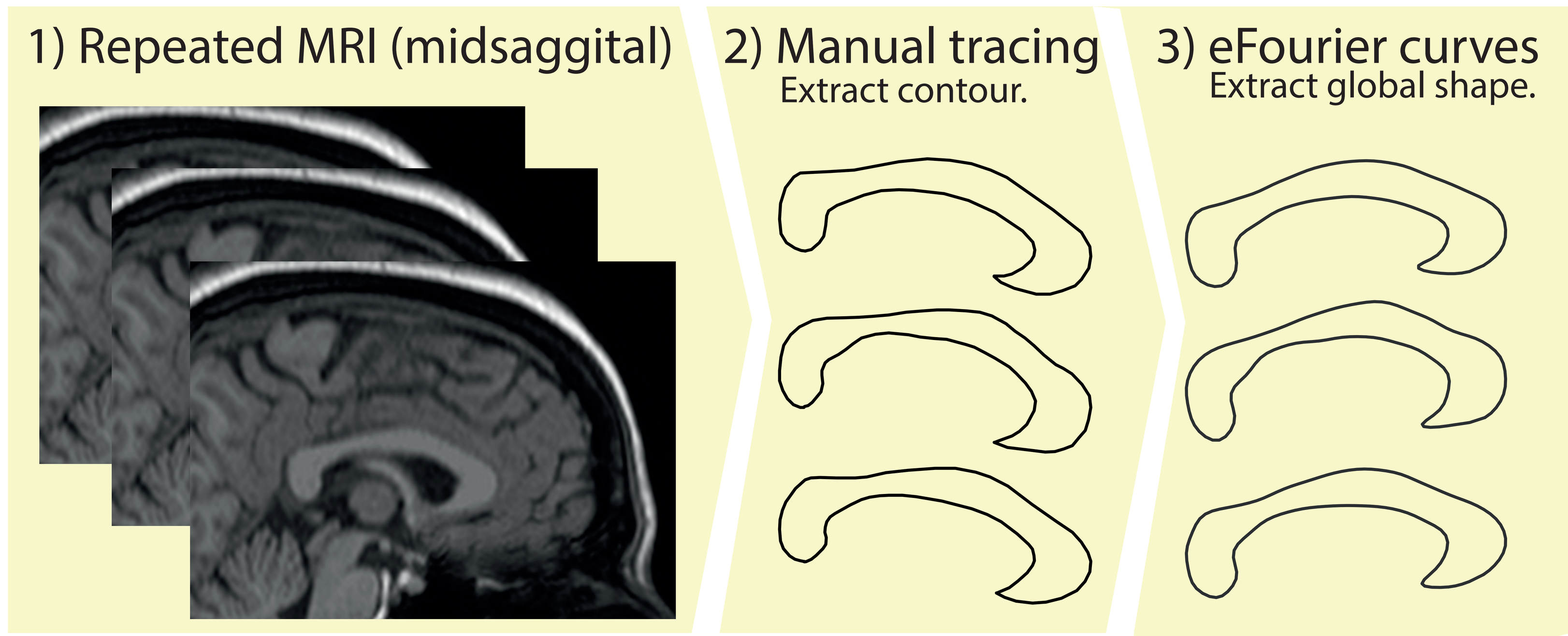
RESULTS AND DISCUSSION

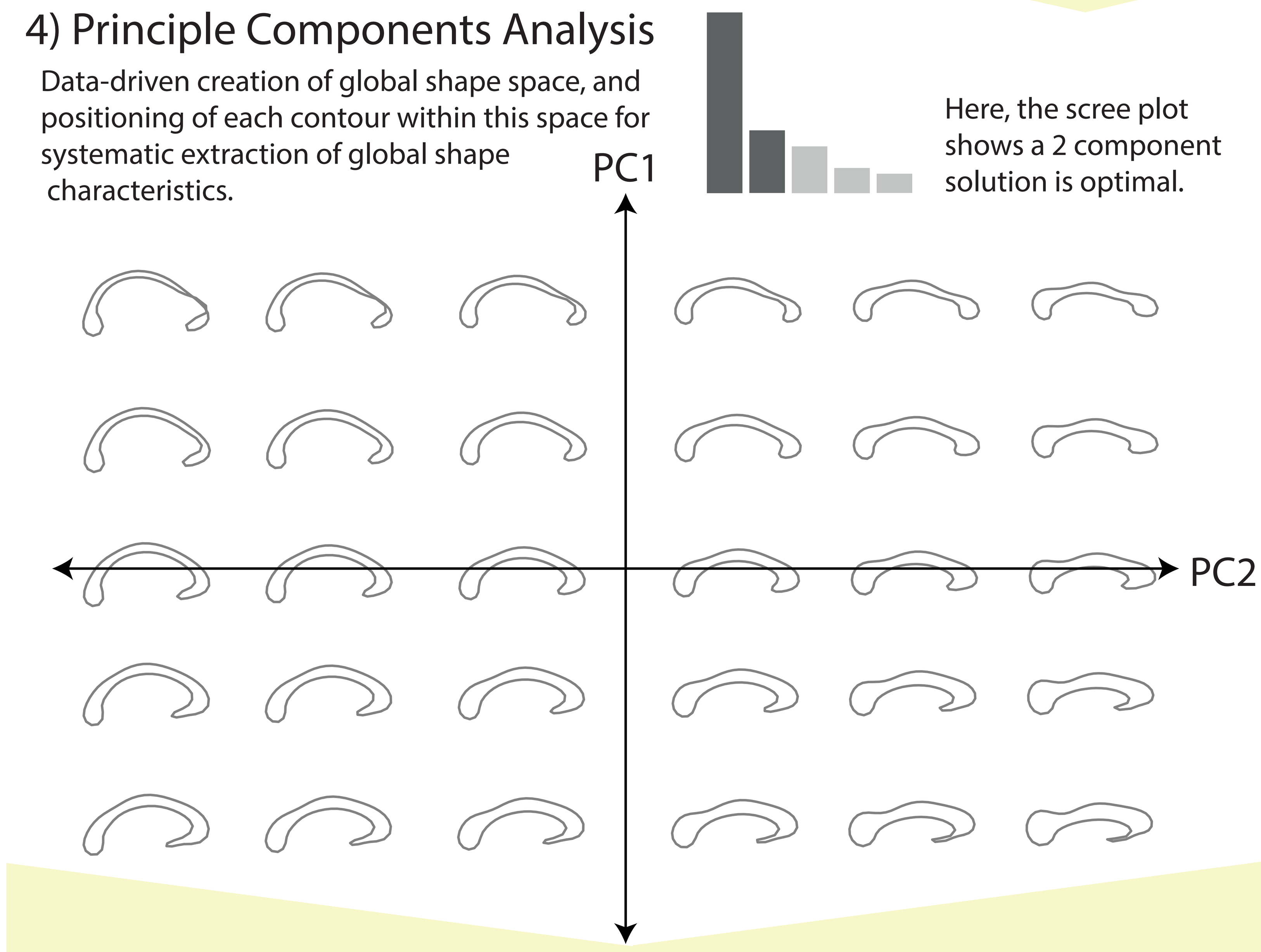
There were two components: midbody curve to right or centre (curve; to), and tall to flat (flatness; to).

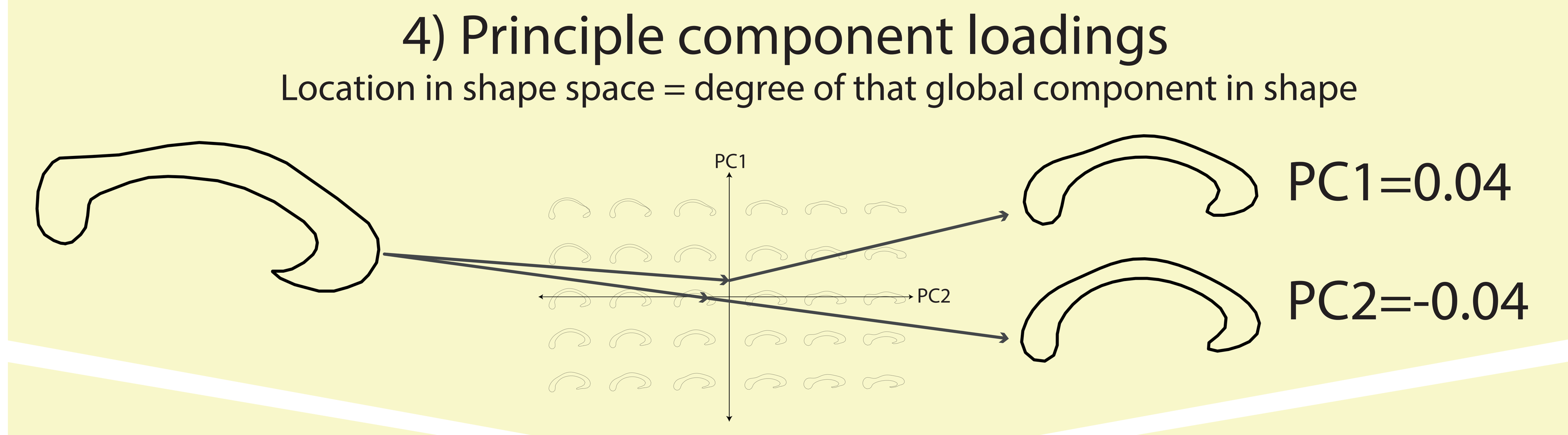
In the 40s, global corpus callosum shape became significantly more curved to the centre over time (PC1 b=-0.001, 95%CI[-0.002,-0.001]). In the 60s, corpus callosum shape became significantly less curved to the centre (PC1 b=0.003, 95%CI[0.003,0.004]) and significantly flatter over time (PC2 b=-0.001, 95%CI[-0.001,-0.001]).

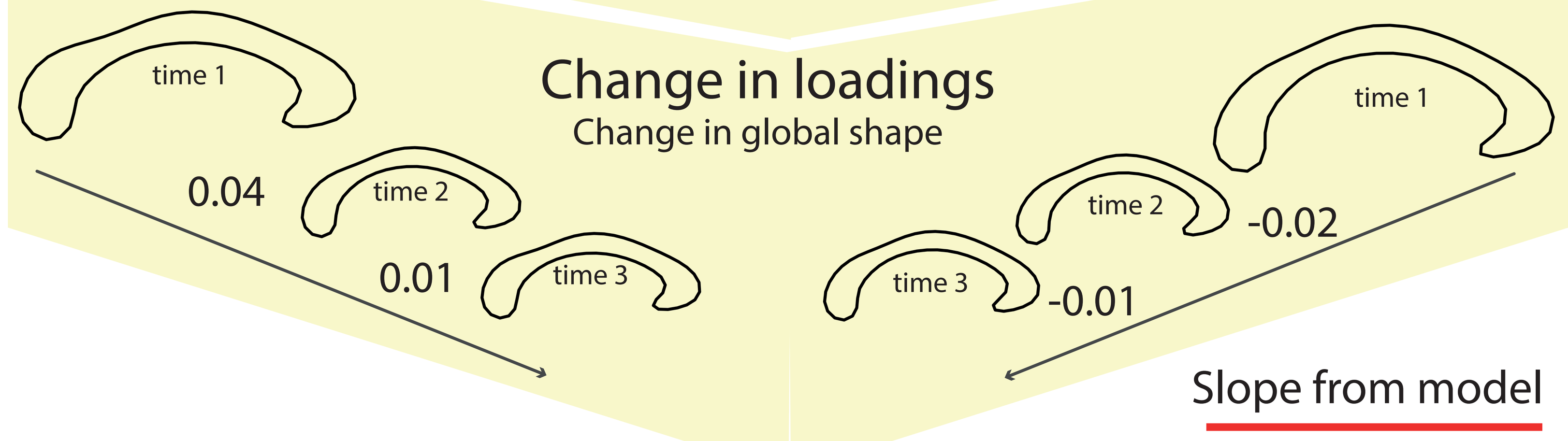
CONCLUSION

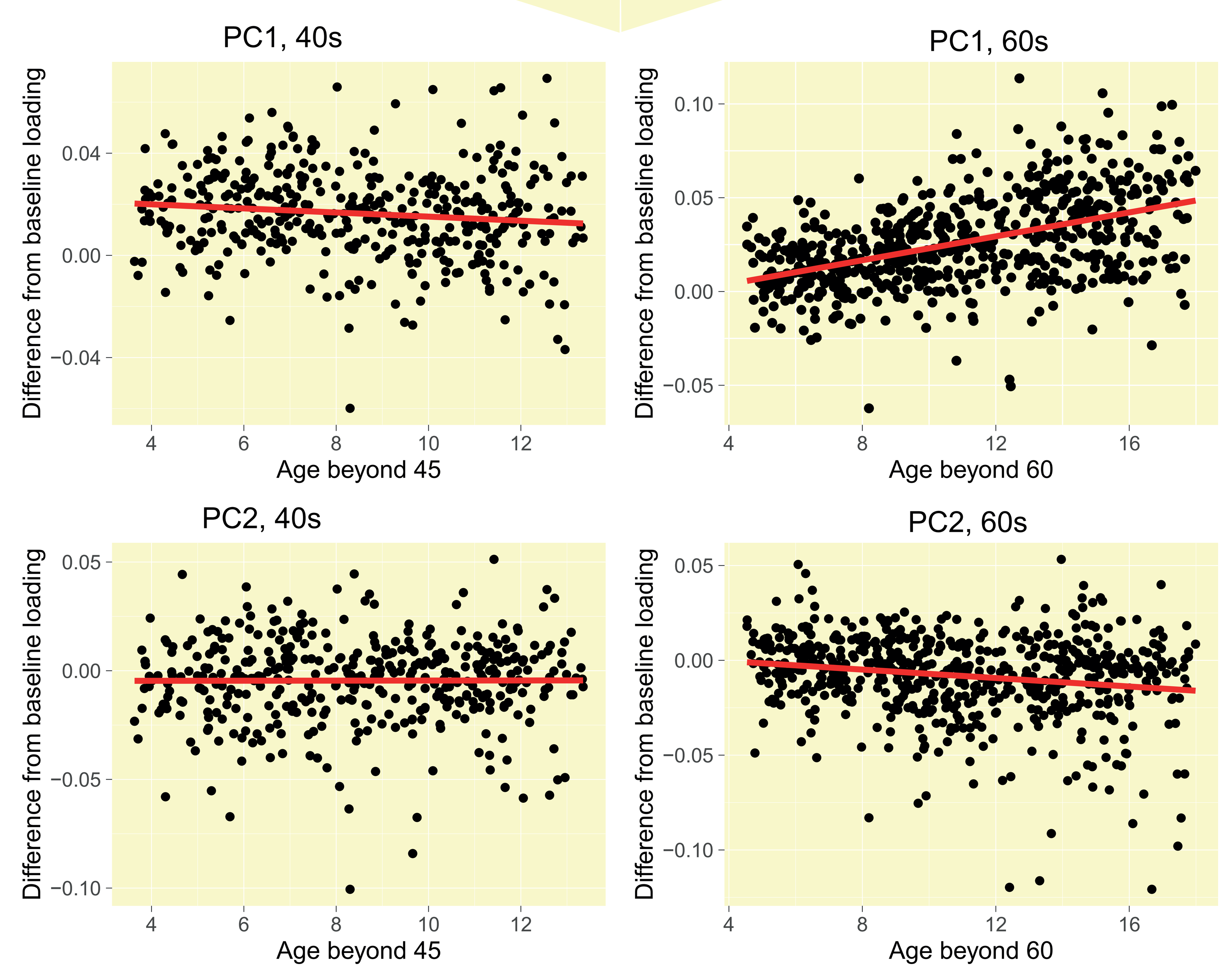
Global corpus callosum shape does change shape in ageing, even when analyses focus purely on within-subjects effects.











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