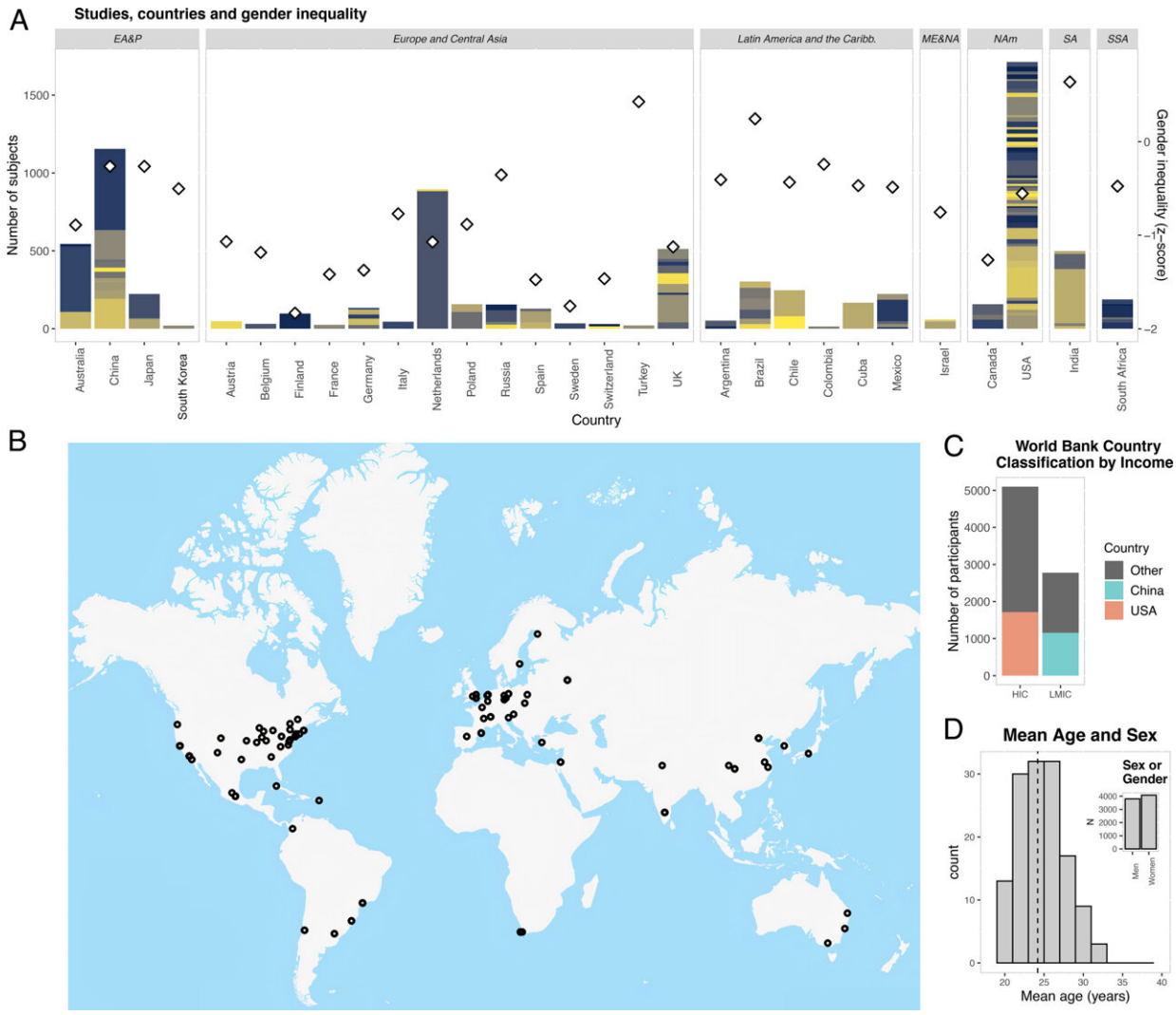
Gender discrimination may be making parts of the female brain thinner

May 9 2023, by Bob Yirka



Demographic characteristics of samples included. (A) Number of participants included in each country (bars), with different colors denoting different studies/samples. The right Y axis and diamonds describe gender inequality Z-

score, where higher values denote higher inequality. (B) Map showing the location of the main institutions that performed the studies included. (C) Number of participants from high-income countries (HIC) and low- and middle-income countries (LMIC), highlighting participants from China and the United States. (D) Histogram with mean age and sex within and across the samples, respectively. EA&P = East Asia and Pacific; ME&NA = Middle East and North Africa; NAm = North America; SA = South Asia; SSA = Sub-Saharan Africa. Credit: *Proceedings of the National Academy of Sciences* (2023). DOI: 10.1073/pnas.2218782120

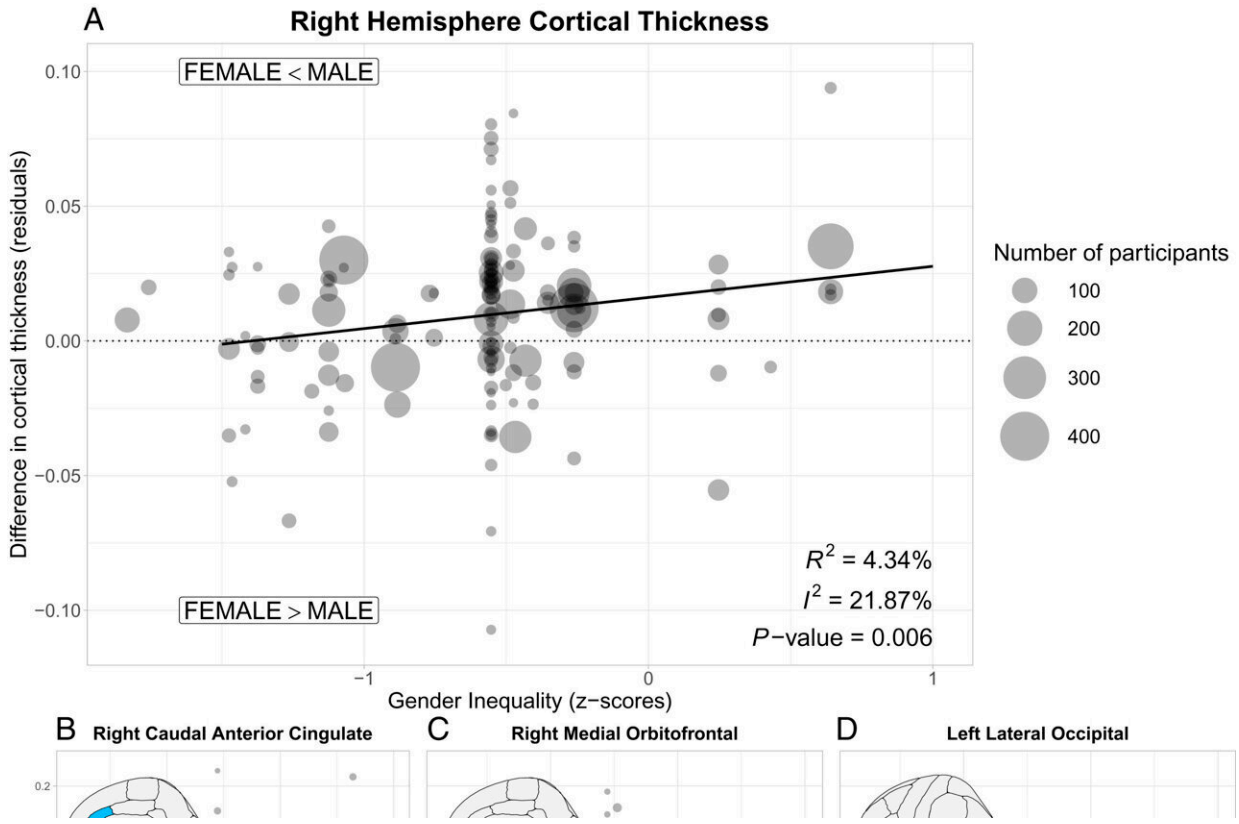
A large international team of neuroscientists, psychologists and mental health specialists has found evidence that gender discrimination during the formative years may be making parts of the female brain thinner. In their study, reported in *Proceedings of the National Academy of Sciences*, the group analyzed datasets from 29 countries looking for possible impacts on the brains of women who experience gender discrimination during their childhoods.

Prior research has hinted at the possibility that gender discrimination has an impact on brain function—some studies have shown it can lead to mental health problems and lower academic achievement. In this new effort, the researchers wanted to know if such treatment results in physical signs of impairment.

To find out, they studied patient data for 7,876 people from 29 countries who had undergone MRI scans. Included in the data was information such as their social standing and their academic records. As part of their analysis, they also included inequality indexes calculated to describe the degree of gender discrimination associated with a given country.

The researchers found a pattern—women from countries with a high inequality index had three brain regions that were thinner than for

women in countries where there was little gender inequality. They also found that the higher the index number, the thinner the brain regions.



Associations between country-level gender inequality and the average difference of the cortical thickness between women and men. (A) Right hemisphere. Circles represent the thickness difference between men and women in a specific sample; their size represents the number of participants. Negative values of the gender inequality index describe a higher equality between men and women. Solid line represents fit of main analysis. (B–D) Significant associations between gender inequality and regional cortical thickness after controlling for multiple comparisons. Credit: *Proceedings of the National Academy of Sciences* (2023). DOI: 10.1073/pnas.2218782120

The three regions were all in the right hemisphere; the right medial orbitofrontal cortex, the left lateral occipital cortex and the right caudal anterior cingulate—parts of the brain that are negatively impacted in children of both genders in conditions of adverse childhood experiences.

The researchers suggest a self-fulfilling prophecy may be occurring in some countries. If leaders believe women are less intelligent than men, laws and social practices may lead to gender discrimination that harms the brains of women as they grow, perhaps impacting intelligence in the process. They suggest the way to prevent this is for leaders to reject stereotypes and break such cycles.

More information: André Zugman et al, Country-level gender inequality is associated with structural differences in the brains of women and men, *Proceedings of the National Academy of Sciences* (2023). DOI: 10.1073/pnas.2218782120