Topic 3: Brain size and intelligence.

There are various anecdotes associating high intelligence with a large brain, mostly using brains collected during autopsies. The data for this project come from a study that used MRI to measure brain size *in situ*. The goal is to quantify the relationship between brain size and IQ, measured in a standard way. Brain size may relate to the size of an individual, so your comparison needs to adjust for an appropriate set of covariates.

The researchers did their study at a large southwestern university. They selected a sample of 40 right-handed Anglo introductory psychology students who had indicated no history of alcoholism, unconsciousness, brain damage, epilepsy, or heart disease. These subjects were drawn from a larger pool of introductory psychology students with total Scholastic Aptitude Test Scores higher than 1350 or lower than 940 who had agreed to satisfy a course requirement by allowing the administration of four subtests (Vocabulary, Similarities, Block Design, and Picture Completion) of the Wechsler (1981) Adult Intelligence Scale-Revised. With prior approval of the University's research review board, students selected for MRI were required to obtain prorated full-scale IQs of greater than 130 or less than 103, and were equally divided by sex and IQ classification.

The MRI Scans were performed at the same facility for all 40 subjects. The scans consisted of 18 horizontal MR images. The computer counted all pixels with non-zero gray scale in each of the 18 images and the total count served as an index for brain size. Information about gender and body size (height and weight) for most individuals are also included. The researchers withheld the weights of two subjects and the height of one subject for reasons of confidentiality.

Conceptually, it makes most sense to model Y=intelligence as a function of X=brain size. That ***should not*** be done for these data. Instead, model Y = brain size as a function of X = intelligence, including relevant individual characteristics. Why? Individuals were not randomly selected; instead, there are two random samples, one sample of students with FSIQ > 130 and one sample of students with FSIQ < 103. That is fine when intelligence is the X variable; it is trouble if you try to use intelligence as the response.

Variable Names:

    Gender: Male or Female

    FSIQ: Full Scale IQ scores based on the four Wechsler (1981) subtests

    Weight: body weight in pounds

    Height: height in inches

    MRI\_Count: total pixel count from the 18 MRI scans