

STAT 578 Bayesian Analysis and Computation

Final Project Proposal

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Option 1

Research Background

In the past few decades, the population in most developed countries has been aging rapidly. Owing to this global trend, ideas such as “active aging” and “successful aging” have become increasingly popular and widely used in the field of geriatrics and gerontology. One of the most essential components of successful aging is that individuals can maintain a high level of subjective well-being even in later life. Previous studies have shown that higher physical abilities are positively associated with independence and longevity among older adults. However, more research is still needed to better understand the relations between older adults’ physical function and their psychological well-being. In the present study, our goal is to examine the extent to which physical abilities, measured by grip strength, gait speed, and balance function, are associated with subjective well-being among older adults in the United States.

Research Question

- Are better physical abilities associated with higher levels of subjective well-being in American older adults aged 65 or older?

Data description

We obtained the 2012 Health and Retirement Study (HRS) data from the Institute for Social Research (ISR) Survey Research Center (SRC) at the University of Michigan. HRS is a national longitudinal study of multi-faceted statuses including health status of older Americans. We selected variables from the respondent-level physical performance measures and biomarkers for our research purposes. The variables we chose and their definitions are as follows:

HHID: household identification number, which uniquely identifies each household in the 2012 study.

PN: person number, which, in combination with HHID, uniquely identifies a respondent or respondent's spouse or partner.

Wellbeing: life satisfaction, which represents the respondent's satisfaction level (on a 5 Liker-type scale; from 1 being not at all satisfied, to 5 being completely satisfied) of their life as a whole.

Age: respondent's current age (in years).

Education: respondent's years of education.

BMI: body mass index, which is a measure of body fat based on a person's height and weight.

Gait speed: average results from two walking tests, which record the time (in seconds) the respondent took to walk 12 feet at their usual walking speed.

Grip: average results of two hand strength tests, which record the measurements from a dynamometer (in kilograms) for the respondent squeezing a handle for a few seconds.

Balance time: balance test result, which records the time length (in seconds) the respondent was able to stand and place the heel of one foot touching the toes of the other foot for either 30 or 60 seconds.

Empirical Strategy:

- 1. Collect datasets and start with the data mining process to extract usable data from the original datasets.
- 2. Create probability density histograms for our dependent variable and other independent variables to make a raw assumption of the noninformative prior distributions.
- 3. Create a correlation matrix for all the variables and make variable selections based on the result. Construct our Bayesian hierarchical model according to the previous assumptions and the surviving variables.
- 4. Simulate dependent samples based on Markov chain Monte Carlo (MCMC).
- 5. Check the convergence and mixing for our result sampling.
- 6. Make inferences for our dependent variables and visualize the results.

Reference:

1. Data source: Health and Retirement Study. <http://hrsonline.isr.umich.edu>