README.Rmd

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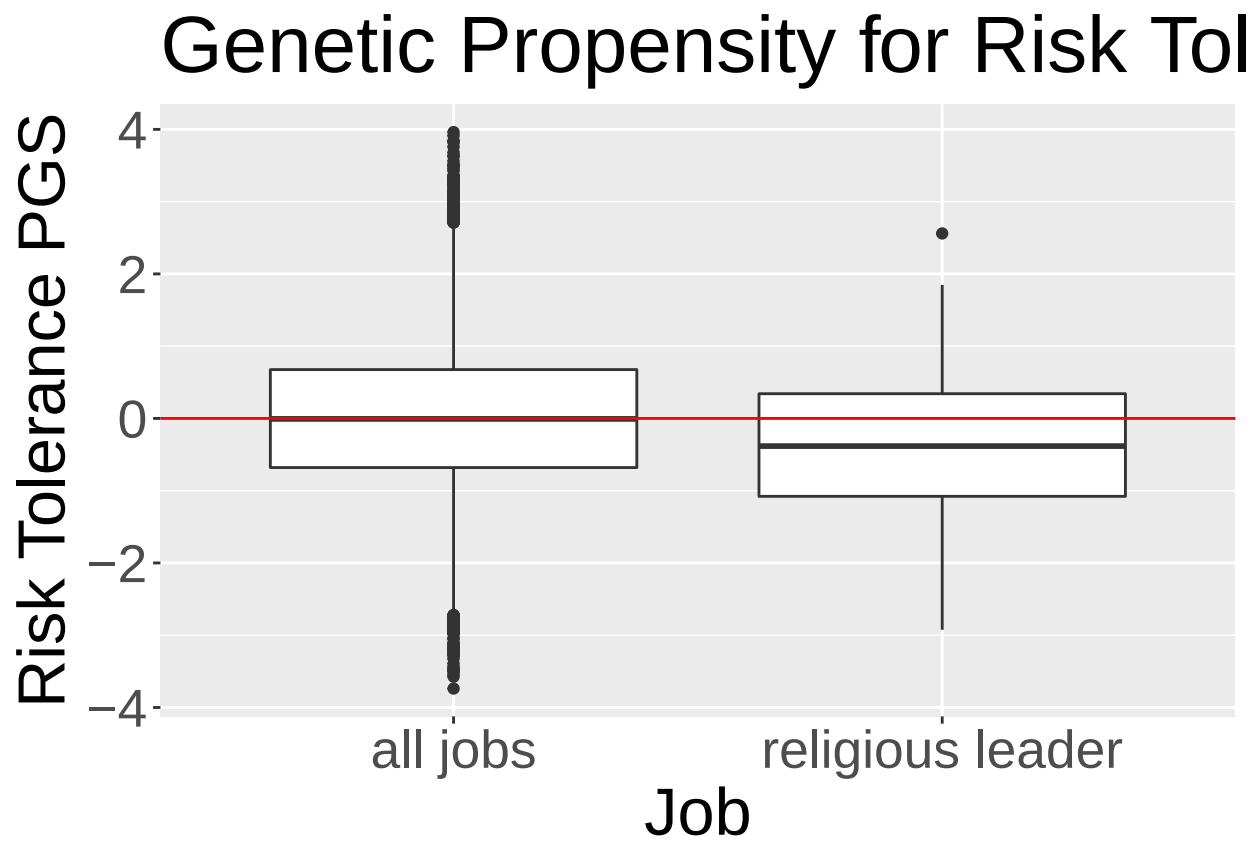
Introduction

"What do you want to be when you grow up?"–it's a question we are asked in childhood that can be equally difficult to answer as an adult. Choosing an enjoyable career is a difficult task for many people, and this can be multipled for those with mental disorders. Perhaps, one may gain insight about an ideal career from particular qualities they possess. For example, someone who enjoys a high level of control may be more likely to choose and enjoy a career as an manager than a lower level position. Several studies have shown an association between psychiatric disorders and careers. One of the most famous links authors with an increased risk of a variety of diagnoses including schizophrenia and bipolar disorder.[1] A recent study also suggests that musicianship may share underlying genetic or environmental factors with mental health problems.[2] This project will be an exploratory analysis investigating whether genetic aptitude for a particular trait, specifically loneliness, risk tolerance, or cognitive performance, has any association with job choice and/or satisfaction.

Figure

```
wd_clergy %>%
  ggplot(aes(x = as.factor(clergy_binary), y = resid_pgs)) +
  geom_boxplot() +
  geom_hline(yintercept = 0, color = 'red') +
  labs(title = 'Genetic Propensity for Risk Tolerance in Religious Leaders',
       x = 'Job', y = 'Risk Tolerance PGS') +
  theme(text = element_text(size = 25), axis.text = element_text(size = 20)) +
  scale_x_discrete(breaks=c('0','1'), labels=c('all jobs', 'religious leader'))
```




```
t.test(wd_clergy$resid_pgs ~ wd_clergy$clergy_binary)
```

```
##
##  Welch Two Sample t-test
##
## data:  wd_clergy$resid_pgs by wd_clergy$clergy_binary
## t = 4.5057, df = 145.39, p-value = 1.35e-05
## alternative hypothesis: true difference in means between group 0 and group 1 is not equal to 0
## 95 percent confidence interval:
##  0.2068582 0.5301467
## sample estimates:
## mean in group 0 mean in group 1
##     0.001700871    -0.366801554
```

This figure is an example of a box plot I created comparing the polygenic scores for risk tolerance in religious leaders versus the entire employed cohort. This is one of my most interesting finds so far, because it shows that people who are religious leaders tend to have a lower genetic propensity for taking risks than the population. This is also statistically significant. My final box plot(s) will look similar to this one, but the resulting figure might also be a figure of several similar boxplots. The only difference is that in the final figure, the x axis will be a binary comparison of whether or not someone is satisfied with their job.

Materials and Methods

Individuals were genotyped using the UKBiobank Axiom array. Genotypes were then imputed using the Haplotype Reference Consortium (HRC) and UK10K haplotype resource. The cohort for this project was

limited to individuals who identified as currently employed at the time of the job satisfaction survey (2008?). Most recent job was used for the purposes of this project. Polygenic scores were calculated using LDPred2 from publicly available GWAS summary statistics[3,4,5] and corrected for genetic ancestry using the first ten principal components (PCs). PGS were correlated using Pearson's method with job data from currently employed UKBiobank participants using the cor.test() function in R. Box plots comparing the PGS of a particular career subset to all respondents were created using ggplot. (Everything up until here has already been done.) I will pick the most notable cases to reference during the next steps. Correlations and box plots will be made between PGS and job satisfaction of the employed UKBiobank cohort generally. Then, I will subset the cohort to the careers in the notable cases from earlier, and again correlate PGS and job satisfaction and create box plots. (The most interesting box plot will be used as my final graph, but there are many graphs that can be made along the way in case I cannot complete it this far. I will likely be able to create multiple plots. If I have time, I might make a forest plot to account for interactions between phenotypes.)

References

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2. Wesseldijk, L.W., Ullén, F. & Mosing, M.A. The effects of playing music on mental health outcomes. Sci Rep 9, 12606 (2019). https://doi.org/10.1038/s41598-019-49099-9

3. Day, F.R., Ong, K.K. & Perry, J.R.B. Elucidating the genetic basis of social interaction and isolation. Nat Commun 9, 2457 (2018). https://doi.org/10.1038/s41467-018-04930-1

4. Karlsson Linnér, R., Biroli, P., Kong, E. et al. Genome-wide association analyses of risk tolerance and risky behaviors in over 1 million individuals identify hundreds of loci and shared genetic influences. Nat Genet 51, 245–257 (2019). https://doi.org/10.1038/s41588-018-0309-3

5. Lee JJ, Wedow R, Okbay A, et al. Gene discovery and polygenic prediction from a genome-wide association study of educational attainment in 1.1 million individuals. Nat Genet. 2018;50(8):1112-1121. Published 2018 Jul 23. doi:10.1038/s41588-018-0147-3