

**Stat 992: Causal Inference**  
Fall 2019 Syllabus  
University of Wisconsin-Madison  
Class Project

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For the class project, you can work alone or in a group of two to four. You will be expected to (i) present a talk on your project to the class similar to a JSM-contributed session talk (15 minutes in length) and (ii) write a short paper using the LaTeX template for the *Annals of Applied Statistics* or an R package with a vignette (depending on the project below).

The due dates and talks will be scheduled during the latter half of the class.

I recommend that you choose one of the project topics below. However, should you choose to work on a project different than what's listed below, please come talk to me before October 1<sup>st</sup> before writing up a 1-page proposal.

Project 1: Does considerable loss in income late in life cause an increase in all-cause mortality? Is there treatment heterogeneity in this causal effect? See <https://jamanetwork.com/journals/jama/article-abstract/2677445>

This project would replicate the analysis presented in the paper, but by using any causal method of your choice from class. One suggestion that I have is matching-based technique called risk-set matching:

1. Li, Propert, and Rosenbaum  
<https://amstat.tandfonline.com/doi/abs/10.1198/016214501753208573>
2. Haviland, Nagin, Rosenbaum: <https://psycnet.apa.org/record/2007-12911-001>
3. Chapter 12 of Rosenbaum's Design of Observational Studies.

You'll compare the results from using approach to analyzing this causal question to the time-varying IPW weighting that was used in the paper. You'll also conduct a sensitivity analysis to see if the conclusions are sensitive to unmeasured confounders. You are required to document all of your coding/data cleaning work with Rmarkdown. Visualizing your data analysis for wider consumption (i.e. i.e. grandma can understand it) is strongly encouraged.

If you cannot obtain the full public data (HRS at UMich. and RAND Corporation), come talk to me EARLY in the semester (before Oct. 1<sup>st</sup>) and we can define a slightly new goal.

You're also more than welcome to study a different exposure-outcome in the HRS data. For example, there is considerable interest in studying the causal effect of when/how you retire on important health outcomes.