

SISCER Module 2

Causal Inference with Observational Data: Common Designs and Statistical Methods

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University of Washington & University of Cambridge

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Welcome to SISCER Module 2

Welcome!

- ▶ Causal Inference with Observational Data: Common Designs and Statistical Methods

More on the scope and content in a few slides ...

About Ting

Ting Ye, PhD (she/her); I am an Associate Professor in Biostatistics at UW

- ▶ Research: causal inference (observational studies and clinical trials)
 - ▶ I develop new methods and apply causal inference methods to answer scientific questions
- ▶ Background
 - ▶ PhD in Statistics, University of Wisconsin-Madison
 - ▶ Postdoc in Statistics, UPenn

About Qingyuan

Qingyuan Zhao, PhD (he/his); I am a Professor in the Statistical Laboratory at the University of Cambridge.

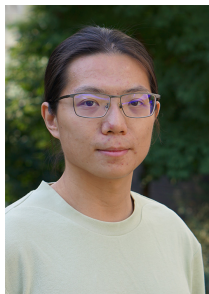
I am interested in improving the general quality and appraisal of statistical research, including

- ▶ New methodology and better understanding of causal inference;
- ▶ Novel study designs;
- ▶ Sensitivity analysis;
- ▶ Multiple testing;
- ▶ Selective inference.

Our fabulous TA

Yuhan Qian, MS (he/his); second year PhD student in Biostatistics at UW

- ▶ Research: causal inference and the integration of AI methods in biomedical and clinical research
- ▶ MS in Statistics at UW



Who are you?

We have a wonderful diverse set of background here

- ▶ Biostatistics, Biomedical Informatics, Medicine, *definitely others...*
- ▶ Academic, government, biopharmaceutical company

Learning goal and learning process

The objective is to study methods for **designing and analyzing** observational studies to make them **provide more reliable evidence**.

To achieve this goal, we will

- ▶ Learn common designs of observational studies and how to analyze them
- ▶ Gain experience from practicing with real data

You are highly encouraged to apply the methods to your own data!

What are we going to learn?

6 lectures over 3 days

- ▶ Lecture 1: Randomization inference
- ▶ Lecture 2: Matching
- ▶ Lecture 3: Sensitivity analysis, DAG
- ▶ Lecture 4: G-computation, IPW, and AIPW
- ▶ Lecture 5: Instrumental variables, Mendelian randomization
- ▶ Lecture 6: Difference-in-differences, time-varying treatments

Achieving our goals

Each day will be structured as follows (with one 20 mins breaks)

- ▶ Two (roughly) 45min lectures
- ▶ 30 minutes practical data analysis with R
- ▶ 15 minutes discussion of exercises

We will assume basic background in statistical inference and some knowledge of R.

Please note: the 3 day course moves quickly. So, **please ask questions!** – as "chat" or "raise hand" in Zoom calls, or on our Slack channel.