KATHERINE BRUMBERG

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Legal name: Katherine Morgan

ACADEMIC APPOINTMENTS

Assistant Professor | ***Statistics*** Jul. 2024 – Present
University of Michigan

EDUCATION

Ph.D. | ***Statistics and Data Science*** Aug. 2019 – May 2024
The Wharton School of the University of Pennsylvania

"Novel Stratification and Matching Methods in Observational Studies", *advisors: Paul Rosenbaum and Dylan Small*

Certificate | ***Teaching and Learning*** Jan. 2023
Center for Teaching and Learning at the University of Pennsylvania

B.S. and M.A. | ***Statistics and Data Science*** Aug. 2015 – May 2019
Yale University

RESEARCH EXPERIENCE

Graduate Researcher Mar. 2020 – Present
The Wharton School: Paul Rosenbaum and Dylan Small

- Developed new methods for stratification and matching to achieve covariate balance in observational studies

Undergraduate Researcher Aug. 2016 – May 2019
Townsend Lab at Yale University

- Applied a population genetics and probabilistic framework to cancer evolution research, updating the group's prior model of mutation to account for altered selection due to epistatic interactions

Research Experience for Undergraduates at Mathematical Biosciences Institute Jun. 2017 – Aug. 2017
Ohio State University and Harvard School of Public Health

- Applied inverse probability weighting to adjust for selection bias in a secondary outcome study
- Used causality model selection techniques to determine ordering of events in prostate cancer study

TEACHING EXPERIENCE

Professor Fall 2024
University of Michigan Statistics Department

- Applied Regression Analysis

Instructor of Record Summers 2022 & 2023
Wharton Statistics and Data Science Department

- Taught the condensed six week summer course "Introductory Statistics" online (twice)
- Syllabi and evaluations available at www.kbrumberg.com/teaching

Graduate Teaching Assistant Fall 2021 & Spring 2022
Wharton Statistics and Data Science Department

- Led recitation sections, assisted the professor with course preparation, and graded for the course "Introductory Statistics"

Undergraduate Learning Assistant Fall 2017 – Spring 2019

Yale Statistics and Data Science Dept.

- Helped instruct students and grade for the courses "Computational Tools for Data Science," "Theory of Statistics,""Data Mining and Machine Learning," and "Data Analysis"

WORK EXPERIENCE

Modeling and Informatics Intern Summers 2018 & 2019

Vertex Pharmaceuticals

- Implemented permutation tests to run alongside the predictive models for compound activity to make sure that released models are performing better than random
- Implemented iterative focused screening to select the best compounds to include in high throughput screens
- Created an RShiny application to detect anomalies in the performance of control compounds over time

Research Assistant Summer 2018

Yale Statistics and Data Science Department

- Developed an RShiny application to help the department match undergraduate learning assistants with courses

PUBLICATIONS

6. Silber, J.H., Rosenbaum, P.R., Reiter, J.G., Jain, S., Ramadan, O.I., Hill, A.S., **Brumberg, K.**, Fleisher, L.A. (2024+). Grading Hospitals Using Multivariate Matching. *Submitted*.

5. **Brumberg, K.**, Small, D.S., & Rosenbaum, P.R. (2024). An Observational Study of the Effects of High School Football on Cognition Late in Life Using a New Matching Method. *Annals of Applied Statistics*. In press.
   Protocol available via *Zenodo*: https://doi.org/10.5281/zenodo.8349374.

4. **Brumberg, K.**, Small, D.S. & Rosenbaum, P.R. (2024). Optimal Refinement of Strata to Balance Covariates. *Biometrics*. 80(3). https://doi.org/10.1093/biomtc/ujae061.

3. **Brumberg, K.**, Ellis, D.E., Small, D.S., Hennessy, S. & Rosenbaum, P.R. (2023). Using Natural Strata When Examining Unmeasured Biases in an Observational Study of Neurological Side Effects of Antibiotics. *J R Stat Soc Series C*. 72(2):314-329. https://doi.org/10.1093/jrsssc/qlad010.

2. **Brumberg, K.**, Small, D.S. & Rosenbaum, P.R. (2022). Using Randomized Rounding of Linear Programs to Obtain Unweighted Natural Strata that Balance Many Covariates. *J R Stat Soc Series A*. 185(4):1931-1951. https://doi.org/10.1111/rssa.12848.

1. Sinnott, J.A, **Brumberg, K.**, Wilson, K.M., Ebot, E.M., Giovannucci, E.L., Mucci, L.A. & Rider, J.R (2018). Differential Gene Expression in Prostate Tissue. *European Urology*. 74(5):545-548. https://doi.org/10.1016/j.eururo.2018.05.006.

SOFTWARE PACKAGES

3. **Brumberg, K.** (2023). triplesmatch: Match Triples Consisting of Two Controls and a Treated Unit or Vice Versa. https://CRAN.R-project.org/package=triplesmatch.

2. **Brumberg, K.** (2022). optrefine: Optimally Refine Strata. https://CRAN.R-project.org/package=optrefine.

1. **Brumberg, K.** (2021). natstrat: Obtain Unweighted Natural Strata that Balance Many Covariates. https://CRAN.R-project.org/package=natstrat.

BOOKS

2. **Brumberg, K.** (2024). Novel Stratification and Matching Methods in Observational Studies. *Proquest*. https://repository.upenn.edu/handle/20.500.14332/60102.

1. Ewens, W., **Brumberg, K.** (2023). Introductory Statistics for Data Analysis. *Springer Nature*. https://doi.org/10.1007/978-3-031-28189-1.

HONORS AND AWARDS

LSA Collegiate Fellow 2024
University of Michigan

J. Parker Bursk Research Prize 2023
Wharton School

Brown Best Student Paper Award 2022
Wharton School

Donald S. Murray Teaching Prize 2022
Wharton School

George James Doctoral Fellowship 2019
Wharton School

Graduate Research Fellowship 2019
National Science Foundation

Statistics and Data Science Senior Award 2019
Yale University

Y-Work Award for Outstanding Student Employees 2019
Yale University

Henry S. McNeil Summer Fellowship 2016
Yale University

Yale Club of Boston Scholarship 2015, 2016, 2018
Yale University

Lori Laitman Rosemblum Scholarship 2015
Yale University

SERVICE

Peer Reviewer Aug. 2023 – Present
Journal of Causal Inference, Springer

Web Developer Mar. 2018 – Present
Learning Unlimited

- Developed and reviewed code for the website used by educational outreach Splash programs nationwide

President Sep. 2019 – Aug. 2023
Wharton Society for the Advancement of Women in Business Academia (WSAWBA)

- Led the organization which aims to support women in the Wharton doctoral programs

Pen-pal Sep. 2019 – Jun. 2023

Letters to a Pre-scientist

- Wrote letters to a middle school student at a underresourced school to broaden awareness of what STEM professionals look like and serve as a source of inspiration

Mentor Sep. 2022 – Dec. 2022

Wharton Pre-Doctoral Directed Reading Program

- Developed a reading plan with an undergraduate student and met weekly to discuss the reading

Advisory Board Member Sep. 2021 – May 2022

Wharton Pre-Doctoral Directed Reading Program

- Matched undergraduate students with graduate members for the program and helped to develop the new program

Committee Member Jan. 2022 – Apr. 2022

Wharton Statistics and Data Science Quinquennial Review

- Gathered doctoral student feedback for the quinquennial departmental review

Mentor Jan. 2021 – Jun. 2021

Graduate School Mentoring Initiative

- Mentored a first generation low income undergraduate student interested in applying to graduate school

Co-President Sep. 2015 – May 2019

Splash at Yale

- Led the nonprofit educational outreach organization which brings 1000 middle and high school students to campus to take hour long seminars taught by Yale students

Tutor

New Haven Reads Feb. 2016 – May 2017

- Volunteered as a tutor for underresourced students reading below grade level in the New Haven school district

External Conferences and Presentations

Optimal Stratification to Address Selection Bias in Observational Studies Oral presentation

University of Notre Dame Jan. 2024

Villanova University Dec. 2023

Wake Forest University Nov. 2023

University of Michigan Nov. 2023

Hamilton College Nov. 2023

Swarthmore College Nov. 2023

Vassar College Nov. 2023

Reed College Nov. 2023

Optimal Refinement of Strata to Balance Covariates Oral presentation

Joint Statistical Meetings Aug. 2023

Atlantic Causal Inference Conference May 2023

Lawrence D. Brown PhD Workshop Nov. 2022

Obtaining Unweighted Natural Strata that Balance Many Covariates Using Randomized Rounding of Linear Programs Speed presentation

Joint Statistical Meetings Aug. 2021

SKILLS

Softwares: R, RShiny, Python, MATLAB, Mathematica, Stata, SPSS
Environments: LaTex, Linux, Microsoft Office