Martha Barnard

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Education

Ph.D., Biostatistics — Spring 2026 (Anticipated)
University of Minnesota, Minneapolis, MN
Advisors: Drs. Julian Wolfson and Jared Huling

B.A., Mathematics — May 2021
Concentrations in Statistics and Data Science and Mathematical Biology
St. Olaf College, Northfield, MN
Graduated Summa Cum Laude with Distinction in Mathematics

Research Experience

Graduate Research Assistant — June 2024–August 2024
University of Minnesota, Minneapolis, MN — *Advisors: Drs. Katie Loth and Julian Wolfson*

Independent Research Study — July 2023–Present
University of Minnesota, Minneapolis, MN — *Advisors: Drs. Julian Wolfson and Jared Huling*

Independent Research Study — September 2022–Present
University of Minnesota, Minneapolis, MN — *Advisor: Dr. Julian Wolfson*

Post Bachelor Researcher — June 2021–June 2022
Los Alamos National Lab, Los Alamos, NM — *Advisors: Drs. Geoffrey Fairchild, Carrie Manore, Ashlynn Daughton, Sara Del Valle*

Research Assistant — June 2020–August 2020
St. Olaf College, Northfield, MN — *Advisor: Dr. Meredith Holgerson*

Research Assistant — June 2019–August 2019
Dordt University, Sioux Center, IA — *Advisor: Dr. Nathan Tintle*

Teaching Experience

St. Olaf College:

Teaching Assistant, Abstract Algebra I — Fall 2020

Teaching Assistant, Statistical Modeling — Spring 2020

Teaching Assistant, Calculus I — Fall 2018, Spring 2019

Honors and Awards

Student Paper Travel Award, International Conference on Health Policy Statistics   2025

Graduate Research Fellowship, National Science Foundation   2022-2026

Jean Roberts Biostatistics Research Fellowship, University of Minnesota   2022-2024

Distinguished Student Performance Award, Los Alamos National Lab   2022

Dean's Ph.D. Scholars Award, University of Minnesota   2022

Phi Beta Kappa, St. Olaf College   2020

Pi Mu Epsilon Honorary Math Society, St. Olaf College   2019

Buntrock Scholarship, St. Olaf College   2017–2021

Publications

∗ Authors contributed equally

13. **Barnard, M.**, Huling, J. D., and Wolfson, J. (2025+b). A Unified Framework for Causal Estimand Selection. URL `https://arxiv.org/abs/2410.12093`. (<u>Under Review</u>)

12. **Barnard, M.**, Fan, Y., and Wolfson, J. (2025+a). Adjacency Matrix Decomposition Clustering for Human Activity Data. *Journal of the American Statistical Association*. 10.1080/01621459 .2025.2506196. URL `https://doi.org/10.1080/01621459.2025.2506196`

11. Loth, K. A., Wolfson, J., **Barnard, M.**, Hogan, N., Brandt, T. J., Fulkerson, J. A., and Fisher, J. O. (2025). Examining the Longitudinal Impact of Within- and Between-Day Fluctuations in Food Parenting Practices on Child Dietary Intake: Protocol for a Longitudinal Cohort Study Within a Sample of Preschooler-Parent Dyads. *JMIR Research Protocols*, 14(1):e73276. 10.2196/73276. URL `https://www.researchprotocols.org/2025/1/e73276`

10. Harp, R. D., Holcomb, K. M., Retkute, R., Prusokiene, A., Prusokas, A., Ertem, Z., Ajelli, M., Kummer, A. G., Litvinova, M., Merler, S., Piontti, A. P. y., Poletti, P., Vespignani, A., Wilke, A. B. B., Zardini, A., Smith, K. H., Armstrong, P., DeFelice, N., Keyel, A., Shepard, J., Smith, R., Tyre, A., Humphreys, J., Cohnstaedt, L. W., Hosseini, S., Scoglio, C., Gorris, M. E., **Barnard, M.**, Moser, S. K., Spencer, J. A., McCarter, M. S. J., Lee, C., Nolan, M. S., Barker, C. M., Staples, J. E., Nett, R. J., and Johansson, M. A. (2025). Evaluation of the 2022 West Nile virus forecasting challenge, USA. *Parasites & Vectors*, 18(1):152. 10.1186/s13071-025-06767-2. URL `https://doi.org/10.1186/s13071-025-06767-2`

9. Moser, S. K., Spencer, J. A., **Barnard, M.**, Hyman, J. M., Manore, C. A., and Gorris, M. E. (2024). Exploring Climate-Disease Connections in Geopolitical Versus Ecological Regions: The Case of West Nile Virus in the United States. *GeoHealth*, 8(6):e2024GH001024. 10.1029/ 2024GH001024. URL `https://onlinelibrary.wiley.com/doi/abs/10.1029/2024GH001024`

8. Mancuso, M., Martinez, K. M., Manore, C. A., Milner, F. A., **Barnard, M.**, and Godinez, H. (2023). Fusing time-varying mosquito data and continuous mosquito population dynamics models. *Frontiers in Applied Mathematics and Statistics*, 9:1207643

7. Moser, S. K., **Barnard, M.**, Frantz, R. M., Spencer, J. A., Rodarte, K. A., Crooker, I. K., Bartlow, A. W., Romero-Severson, E., and Manore, C. A. (2023). Scoping review of Culex mosquito life history trait heterogeneity in response to temperature. *Parasites & Vectors*, 16(1):200. 10.1186/s13071-023-05792-3

6. Beesley, L. J., Patelli, P., Kaufeld, K., Schwenk, J., Martinez, K. M., Pitts, T., **Barnard, M.**, McMahon, B., and Valle, S. Y. D. (2023). Multi-dimensional resilience: A quantitative exploration of disease outcomes and economic, political, and social resilience to the COVID-19 pandemic in six countries. *PLOS ONE*, 18(1):e0279894. 10.1371/journal.pone.0279894

5. Trejo, I., **Barnard, M.**, Spencer, J. A., Keithley, J., Martinez, K. M., Crooker, I., Hengartner, N., Romero-Severson, E. O., and Manore, C. (2023). Changing temperature profiles and the risk of dengue outbreaks. *PLOS Climate*, 2(2):e0000115. 10.1371/journal.pclm.0000115

4. Holgerson, M. A., **Barnard, M.**, Ahn, B., Hayes, M. P., and Strecker, A. L. (2022). Freshwater floodplain habitats buffer native food webs from negative effects of nonnative centrarchids and bullfrogs. *Freshwater Science*, 41(2):327–341. 10.1086/720137

2. Daughton, A. R., Shelley, C. D., **Barnard, M.**, Gerts, D., Ross, C. W., Crooker, I., Nadiga, G., Mukundan, N., Chavez, N. Y. V., Parikh, N., Pitts, T., and Fairchild, G. (2021). Mining and Validating Social Media Data for COVID-19–Related Human Behaviors Between January and July 2020: Infodemiology Study. *Journal of Medical Internet Research*, 23(5):e27059. 10.2196/27059

2. *Wolf, J.M., ***Barnard, M.**, Xia, X., Ryder, N., Westra, J., and Tintle, N. (2019). Computationally efficient, exact, covariate-adjusted genetic principal component analysis by leveraging individual marker summary statistics from large biobanks. In *Pacific Symposium in Biocomputing 2020*, pages 719–730, Kohala Coast, Hawaii, USA. ISBN 9789811215629 9789811215636. 10.1142/9789811215636_0063

1. Priedhorsky, R., Daughton, A. R., ***Barnard, M.**, *O'Connell, F., and Osthus, D. (2019). Estimating influenza incidence using search query deceptiveness and generalized ridge regression. *PLOS Computational Biology*, 15(10):e1007165. 10.1371/journal.pcbi.1007165

Presentations

∧ Author, but did not present

8. **Barnard, M.**, Huling, J. D., and Wolfson, J. A Unified Framework for Causal Estimand Selection. *ENAR*, New Orleans, LA, March 2025 (Contributed Presentation)

7. **Barnard, M.**, Huling, J. D., and Wolfson, J. A Unified Framework for Causal Estimand Selection. *International Conference on Health Policy Statistics*, San Diego, CA, January 2025 (Contributed Presentation)

6. **Barnard, M.**, Huling, J. D., and Wolfson, J. A Unified Framework for Causal Estimand Selection. *Advances in Learning Health System Sciences*, Minneapolis, MN, September 2024 (Contributed Poster)

5. **Barnard, M.**, Fan, Y., and Wolfson, J. Adjacency Matrix Decomposition Clustering for Human Activity Data. *ENAR*, Baltimore, MD, March 2024 (Contributed Poster)

4. **Barnard, M.**, Loth, M., Wolfson, J., and Huling, J. The usefulness of overlap weighting for causal inference in a learning health system: a simulation study. *Advances in Learning Health System Sciences*, St. Paul, MN, September 2023 (Contributed Poster)

3. Holgerson, M. A., **Barnard, M.**, Ahn, B., Hayes, M. P., and Strecker, A. L. Native fishes and larval salamanders of the chehalis river basin exhibit trophic niche shifts when co-occurring with non-native vertebrates. *Midwest Interdisciplinary Symposium for Scientific Thought*, Northfield, MN, April 2021 (Contributed Poster)

2. **Barnard, M.**, Jansen, L., Rudberg, K., Feiler, L., Chapp, C., and Roback, P. Modeling novel indicators of student retention at St. Olaf College. *National Conference on Undergraduate Research*, Virtual, April 2021 (Contributed Poster)

1. Wolf, J. M., **Barnard, M.**, Xia, X., Ryder, N., Westra, J., and Tintle, N. Computational efficient, exact, covariate-adjusted genetic principal component analysis by leveraging individual marker summary statistics from large biobanks. *Pacific Symposium in Biocomputing*, Waimea, HI, January 2020 (Contributed Presentation)^

Service

University of Minnesota, Division of Biostatistics and Health Data Science:

Member, Student Advisory Council	2023-Present
Member, Biostatistics Outreach and Engagement Committee	2022-Present

St. Olaf College, Department of Mathematics, Statistics, and Computer Science:

President, Math Club Pi Mu Epsilon Honor Society	2020-2021
Vice President, Association for Women in Mathematics Chapter	2020-2021