

Martha Barnard

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Education

- May 2026 **PhD, Biostatistics**
(Anticipated) University of Minnesota
“Statistical methods for mobile health data and causal effect estimation under positivity violations”
Advisors: Drs. Julian Wolfson and Jared Huling
- May 2021 **BA, Mathematics**, *summa cum laude*
St. Olaf College
Distinction in Mathematics, Concentrations in Statistics & Data Science and Mathematical Biology

Publications

Statistical Methodology:

* Contributed Equally

4. **Barnard, M.**, Huling, J. D., and Wolfson, J. (2025+c). Partially Retargeted Balancing Weights for Causal Effect Estimation Under Positivity Violations. 10.48550/arXiv.2510.22072. URL <http://arxiv.org/abs/2510.22072>
3. **Barnard, M.**, Huling, J. D., and Wolfson, J. (2025+b). A Unified Framework for Causal Estimand Selection. URL <https://arxiv.org/abs/2410.12093>. (Revision submitted to *Biometrics*)
2. **Barnard, M.**, Fan, Y., and Wolfson, J. (2025a). 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>
1. *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

Interdisciplinary:

10. 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>
9. 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>
8. 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>
 7. 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
 6. 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
 5. 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
 4. 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
 3. Holgersson, 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
 1. Friedhorsky, 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

Honors and Awards

2025	R&D 100 Award (LANL EpiEarth Team)
2025	R&D Gold Medal for Corporate Social Responsibility (LANL EpiEarth Team)
2025	Student Paper Travel Award , International Conference on Health Policy Statistics

2022-2026	Graduate Research Fellowship , National Science Foundation
2022-2024	Jean Roberts Biostatistics Research Fellowship , University of Minnesota
2022	Dean's Ph.D. Scholars Award , University of Minnesota
2022	Distinguished Student Performance Award , Los Alamos National Laboratory
2020	Phi Beta Kappa , St. Olaf College
2019	Pi Mu Epsilon Honorary Math Society , St. Olaf College
2017-2021	Buntrock Scholarship , St. Olaf College

Research Experience

2024–	Graduate Researcher Department of Family Medicine & Community Health, University of Minnesota Grant Title: “Examination of the longitudinal impact of within- and between-day fluctuations in food parenting practices on child dietary intake” Supervisors: Drs. Katie Loth and Julian Wolfson
2022–	NSF Graduate Research Fellow Division of Biostatistics & Health Data Science, University of Minnesota Supervisors: Drs. Julian Wolfson and Jared Huling
2021–2022	Postbachelor Researcher A-1 Information Systems & Modeling, Los Alamos National Laboratory Supervisors: Drs. Geoffrey Fairchild, Carrie Manore, Ashlynn Daughton, Sara Del Valle
2020	Research Assistant St. Olaf College Supervisor: Dr. Meredith Holgerson
2019	Research Assistant Dordt University Supervisor: Dr. Nathan Tintle

Teaching Experience

St. Olaf College:

Fall 2020	Teaching Assistant , Abstract Algebra I
Spring 2020	Teaching Assistant , Statistical Modeling
Fall 2018	Teaching Assistant , Calculus I
Spring 2019	

Presentations

Contributed Talks:

Aug 2025	<i>A Unified Framework for Causal Estimand Selection</i> , JSM 2025, Nashville, TN
Mar 2025	<i>A Unified Framework for Causal Estimand Selection</i> , ENAR 2025, New Orleans, LA
Jan 2025	<i>A Unified Framework for Causal Estimand Selection</i> , International Conference on Health Policy Statistics 2025, San Diego, CA

Contributed Posters:

Sep 2024	<i>A Unified Framework for Causal Estimand Selection</i> , Advances in Learning Health System Sciences 2024, Minneapolis, MN
Mar 2024	<i>Adjacency Matrix Decomposition Clustering for Human Activity Data</i> , ENAR 2024, Baltimore, MD
Sep 2023	<i>The usefulness of overlap weighting for causal inference in a learning health system: a simulation study</i> , Advances in Learning Health System Sciences 2023, St. Paul, MN
Apr 2021	<i>Native fishes and larval salamanders of the Chehalis river basin exhibit trophic niche shifts when co-occurring with non-native vertebrates</i> , Midwest Interdisciplinary Symposium for Scientific Thought 2021, Virtual
Apr 2021	<i>Modeling novel indicators of student retention at St. Olaf College</i> , National Conference on Undergraduate Research 2021, Virtual

Conferences/Workshops Attended:

Feb 2025	Workshop on Emerging Statistical Methods for Digital Health Data, Banff International Research Station, Banff, AB
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Service

Professional Membership:

2024–	American Statistical Association
2023–	International Biometrics Society - ENAR

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

2023–	Student Advisory Council
2022–	Biostatistics Outreach and Engagement Committee

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

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

Referee for:

Annals of Applied Statistics

Computing

Software:

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| <code>amdc_clustering</code> | A Git repository that provides code and documentation for adjacency matrix decomposition clustering, a computationally efficient and flexible clustering procedure for categorical mobile health data |
| <code>estimand_selection</code> | A Git repository that provides code and documentation to systematically select an average causal estimand according to the estimand target population and the statistical bias and variance of the corresponding estimator under positivity violations. |

Languages: R, Python, Linux, L^AT_EX