Leah I. B. Andrews

landrew2@uw.edu • linkedin.com/in/leahibandrews • Google Scholar

Education

PhD in Biostatistics, University of Washington (UW), Seattle, WA   *09/19 – 12/25*
    Dissertation: Statistical Methods for Assessing COVID-19 Vaccine Effectiveness and Immune Correlates
                in Test-Negative Design Studies
    Advisor: Peter Gilbert

MS in Biostatistics, UW, Seattle, WA   *09/19 – 12/24*

BA in Mathematics and Chemistry, St. Olaf College, Northfield, MN   *09/15 – 05/19*
    Honors: Summa Cum Laude

Skills

Statistical Expertise: Causal Inference, Targeted Maximum Likelihood Estimation (TMLE), Machine Learning, Negative Control Methods, Generalized Linear Models, Survival Analysis, Dependent Data Analysis, Missing Data

Technical Skills: R, STATA, MATLAB, Mathematica, High Performance Computing (HPC), SLURM Job Scheduling, REDCap, LaTeX, Zotero, Endnote, Microsoft Office

Professional and Interpersonal Skills: Collaboration, Organization, Attention to Detail, Analytical Thinking, Written Communication, Presentation Skills

Research Experience

COVID-19 Prevention Network (CoVPN)   *03/23 – 12/25*
Graduate Research Assistant   UW, Seattle, WA
- Led 30-person team of biostatisticians, epidemiologists, clinicians, and statistical programmers to evaluate key assumptions and sources of bias in COVID-19 vaccine effectiveness test-negative design (TND) studies
- Developed robust causal inference methods involving TMLE, machine learning, negative control variables, and inverse probability weighting to evaluate COVID-19 vaccine effectiveness and immune correlates in TND studies
- Conducted simulation studies to evaluate estimators in R using HPC clusters and SLURM job scheduling
- Reanalyzed 5 phase 3 CoVPN vaccine efficacy trials as TND studies to validate TND and demonstrate applications
- Presented at 3 conferences, awarded WNAR Student Most Outstanding Paper, and published peer-reviewed paper

Laryngeal Cancer Voice Rehabilitation   *03/22 – 12/23*
Graduate Student Consultant   UW, Seattle, WA
- Provided statistical support to 3 otolaryngologists and 1 speech language pathologist to identify clinical and surgical characteristics associated with successful electrolarynx use in total laryngectomy cancer patients
- Analyzed electronic health records using Poisson regression and robust standard errors in R
- Wrote client-accessible report of findings and contributed to conference poster and peer-reviewed publication

Multi-Ethnic Study of Atherosclerosis (MESA)   *09/19 – 03/23*
Graduate Research Assistant   UW, Seattle, WA
- Collaborated with 11 cardiologists, staff researchers, and biostatisticians to investigate how calcification and arterial stiffness are associated with atherosclerosis and cardiovascular disease using longitudinal MESA cohort study
- Assessed data quality and accuracy of calcium measurements from cardiac CT scans by reconciling data source discrepancies, summarizing measurements, and reporting intrareader and interreader reproducibility
- Designed statistical analyses that accounted for confounding, survival data, and missing data for 8 project proposals
- Cleaned data, conducted statistical analyses, and visualized results in R and STATA
- Wrote reports, discussed findings with collaborators, and contributed to 5 conference posters and 4 publications

Statistical Consulting Program   *03/22 – 06/22*
Graduate Student Consultant   UW, Seattle, WA
- Provided statistical support to 23 clients from various disciplines (e.g., public health, health services, psychology)
- Discussed client's research questions and advised on study design, statistical analyses, and data visualization
- Wrote and shared consulting session summaries with client-specific recommendations and references

Neurology Intensive Care Units Palliative Care   *07/20 – 10/20*
Graduate Research Assistant   UW, Seattle, WA
- Collaborated with 6 neurologists and 1 biostatistician to assess discordance between family members and physicians' prognosis predictions for patients with severe acute brain injury and identify those at risk for poor health outcomes
- Extracted data from questionnaires and electronic health records using REDCap
- Cleaned and analyzed data using generalized linear models and mixed-effects models in R and STATA
- Generated tables, communicated findings to collaborators, and co-authored peer-reviewed publication

Research Experiences for Undergraduates in Mathematics   *06/18 – 07/18*
Applied Math Undergraduate Researcher   Indiana University Purdue University Indianapolis, Indianapolis, IN
- Collaborated with applied mathematician, statistician, and immunologist to simulate regulatory T cell (Treg) adoptive transfer and immunosuppression in differential equations model of murine heart transplant rejection in MATLAB
- Identified optimal Treg delivery and dose to minimize graft destruction and maximize endogenous Treg activation
- Varied Treg delivery, immunosuppression class, and immunosuppression dose to determine optimal combinatorial treatments that prevent graft rejection and minimize immunosuppression dose
- Delivered 2 oral conference presentations, presented at program poster session, and published peer-reviewed paper

Mathematics Practicum   *01/18*
Statistics Undergraduate Researcher   St. Olaf College, Northfield, MN
- Collaborated in 5-person undergraduate team to evaluate how smoking cessation and student bullying responses vary by survey mode, response time, and demographics in R using paradata from Quitline and Olweus program surveys
- Co-authored report and communicated strategies for reducing bias and missing data in future surveys to Professional Data Analysts, Inc. leadership

Nephrology and Urology Summer Undergraduate Research Fellowship   *05/17 – 08/17*
Molecular Biology Undergraduate Researcher   Mayo Clinic, Rochester, MN
- Developed *phosphodiesterase 3a* knockout in *Danio rerio* embryos using CRISPR/Cas9 gene-editing to investigate role of Phosphodiesterase 3a in polycystic kidney disease
- Analyzed DNA sequences to assess mutation efficiency and identify mutations
- Delivered oral presentation at program symposium and presented poster at conference

Collaborative Undergraduate Research and Inquiry Program   *06/16 – 08/16*
Molecular Biology Undergraduate Researcher   St. Olaf College, Northfield, MN
- Investigated role of SUMOylation in vegetative growth, mitosis, meiosis, and DNA repair in *Tetrahymena thermophila* using *ulp1* and *ulp2* knockdown strains
- Quantified relative gene expression of knockdowns and developed construct to fluorescently tag ULP1 and ULP2
- Delivered poster presentation at program symposium

Innovative Minds Partnering to Advance Curative Therapies Program   *11/15 – 03/16*
Undergraduate Researcher   Mayo Clinic, Rochester, MN
- Collaborated in 5-person undergraduate team to research scientific literature to hypothesize cause of Hypoplastic Left Heart Syndrome (HLHS) and propose experiment to test hypothesis using regenerative medicine
- Wrote report hypothesizing that genetic mutations and autoimmune damage disrupt cardiogenesis and cause HLHS
- Presented poster, selected to deliver oral presentation, and awarded silver medal out of 20 teams in HLHS category

Selected Course Projects

Clinical Trial Grant Proposal for Right Heart Failure   *03/22 – 06/22*
Study Statistician   UW, Seattle, WA
- Collaborated in 5-person multidisciplinary graduate student team to write grant proposal to design, implement, and justify clinical trial to evaluate famotidine on right ventricular failure in pulmonary arterial hypertension patients
- Proposed generalized linear models and mixed-effects models and conducted sample size and power calculations
- Defended proposal to professors and students at mock site visit and reviewed another team's grant proposal

Predicting Country Characteristics Using Machine Learning   *02/19 –5/19*
Data Analyst   St. Olaf College, Northfield, MN
- Collaborated with undergraduate to compare use of World Bank country classifications vs. holistic country characteristics to reflect national wellbeing using World Bank repository
- Applied supervised machine learning methods (e.g., k-nearest neighbors, decision trees, shrinkage methods) in R to predict World Bank country classifications and 25-year changes in gross national income
- Implemented unsupervised machine learning algorithms (e.g., k-means clustering, principal component analysis, hierarchical clustering) to analyze how countries group by economic, health, environmental, and social characteristics

Teaching Experience

UW, Department of Biostatistics
Graduate Teaching Assistant
- BIOST 537: Survival Data Analysis in Epidemiology   *01/23 – 03/23*

St. Olaf College, Department of Mathematics, Statistics, and Computer Science
Teaching Assistant
- MATH 242: Modern Computational Mathematics   *02/18 – 05/18, 02/19 – 05/19*
- MATH 330: Differential Equations II   *09/18 – 12/18*

Publications

Andrews, L.I.B., van der Laan, L., and Gilbert, P.B. "Targeted Maximum Likelihood Estimation of Vaccine Effectiveness and Immune Correlates in Test-Negative Design Studies with Missing Data." {*In Progress*}

Follmann, D., Dang, L., Chu, E., Fintzi, J., Janes, H., Gilbert, P.B., **Andrews, L.I.B.**, Serebryannyy, L., Carroll, R., Lin, B., Koup, R., Toma, J., Deng, L.W., Priddy, F., Dixit, A., Zhou, H., Baden, L., and El Sahly, H.M (2025). "A Test-Negative Design for Immune Correlates Approximates a Traditional Exposure Proximal Design but Requires Far Fewer Blood Samples." The Journal of Infectious Diseases. doi: 10.1093/infdis/jiaf572

Andrews, L.I.B., Halloran, M.E., Neuzil, K.M., van der Laan, L., Huang, Y., Andriesen, J., Patel, M., Fisher, L.H., Janes, H., Rouphael, N., Walsh, S.R., Theodore, D.A., Tieu, H.V., Sobieszczyk, M., El Sahly, H.M., Baden, L.R., Falsey, A.R., Campbell, T.B., Kelley, C.F., Healy, C.M., Immergluck, L., Luft, B., Hirsch, I., de Bruyn, G., Truyers, C., Priddy, F., Sumner, K.M., Flannery, B., Follmann, D., and Gilbert, P.B (2025). "Evaluating the Test-Negative Design for COVID-19 Vaccine Effectiveness Using Randomized Trial Data." JAMA Network Open, 8(5):e2512763. doi: 10.1001/jamanetworkopen.2025.12763

Pan, C., **Andrews, L.I.B.**, Johnson, E., Bhatt, N.K., and Rizvi, Z.H (2024). "Factors associated with successful electrolarynx use after total laryngectomy, a multi-institutional study." Laryngoscope Investigative Otolaryngology, 9(1):e1212. doi: 10.1002/lio2.1212

Brumback, L.C., **Andrews, L.I.B.**, Jacobs, D.R. Jr., Duprez, D.A., Hom Thepaksorn, E.K., Kaufman, J.D., Denenberg, J.O., and Allison, M.A (2023). "The association between arterial compliance, as assessed by PTC1 and PTC2 from radial artery waveforms, with age, gender, and race/ethnicity." Journal of Hypertension, 41(7):1117-1126. doi: 10.1097/HJH.0000000000003441

Brumback, L.C., **Andrews, L.I.B.**, Jacobs, D.R. Jr., Duprez, D.A., Hom Thepaksorn, E.K., Kaufman, J.D., Denenberg, J.O., and Allison, M.A (2023). "Reproducibility of PTC1 and PTC2, indices of arterial compliance, from the radial artery waveform: The Multi-Ethnic Study of Atherosclerosis." Vascular Medicine, 28(2):141-143. doi:10.1177/1358863X221151089

Duprez, D.A., Jacobs, D.R. Jr., **Andrews, L.I.B.**, Brumback, L.C., Denenberg, J.O., McClelland, R.L., Thomas, I.C., Criqui, M.H., and Allison, M.A (2023). "Inter-arm systolic blood pressure difference: non-persistence and association with incident cardiovascular disease in the Multi-ethnic Study of Atherosclerosis." Journal of Human Hypertension, 37(3):197-204. doi: 10.1038/s41371-022-00669-x

Lapp, M.M., Lin, G., Komin, A., **Andrews, L.**, Knudson, M., Mossman, L., Raimondi, G., and Arciero, J.C (2022). "Modeling the Potential of Treg-Based Therapies for Transplant Rejection: Effect of Dose, Timing, and Accumulation Site." Transplant International, 35:10297. doi: 10.3389/ti.2022.10297

Kiker, W.A., Voumard, R.R., **Andrews, L.I.B.**, Holloway, R.G., Brumback, L.C., Engelberg, R.A., Curtis, J.R., and Creutzfeldt, C.J. (2021). "Assessment of Discordance Between Physicians and Family Members Regarding Prognosis in Patients With Severe Acute Brain Injury." JAMA Network Open, 4(10):e2128991. doi: 10.1001/jamanetworkopen.2021.28991

Brumback, L.C., **Andrews, L.I.B.**, Jacobs, D.R. Jr., Duprez, D.A., Shah, S.J., Dougherty, C.M., Denenberg, J.O., and Allison, M.A (2021). "The Association Between Indices of Blood Pressure Waveforms (PTC1 and PTC2) and Incident Heart Failure." Journal of Hypertension, 39(4):661-666. doi: 10.1097/HJH.0000000000002707

Oral Presentations

* indicates presenting author

*****Andrews, L.I.B.**, van der Laan, L., and Gilbert, P.B. "Semiparametric Methods for Vaccines and Immune Markers Using Test-Negative Designs with Missing Data." Abstract 2901 at 2024 Joint Statistical Meetings, Oregon Convention Center, Portland, OR. August 2024.

*****Andrews, L.I.B.**, Halloran, M.E., Neuzil, K.M., van der Laan, L., Huang, Y., Andriesen, J., Patel, M., Angier, H., Fisher, L.H., Janes, H., Sumner, K., Flannery, B., Follmann, D., and Gilbert, P.B. "COVID-19 Vaccine Effectiveness: An Evaluation of the Test-Negative Design Using Randomized Placebo-Controlled Clinical Trials." Abstract 1085 at 2024 Society for Epidemiology Research Annual Meeting, Austin Marriott Downtown, Austin, TX. June 2024.

*****Andrews, L.**, van der Laan, L., and Gilbert, P. "Semiparametric Methods for Evaluating COVID-19 Vaccine Regimens in Test-Negative Design Studies with Missing Data." 2024 Western North American Region/International Biometric Society/Graybill Annual Meeting, Colorado State University, Fort Collins, CO. June 2024.

*****Andrews, L.**, Lapp, M., Raimondi, G., and Arciero, J. "Modeling Optimal Treatment Strategies for Transplant Patients." Abstract 406 at 10th Annual Research Conference at the Interface of Biology and Mathematics, University of Tennessee Conference Center, Knoxville, TN. October 2018.

***Andrews, L.**, *Lapp, M., Raimondi, G., and Arciero, J. "Modeling Optimal Treatment Strategies for Murine Heart Transplant." Abstract 4 at Indiana Undergraduate Mathematics Research Conference, Indiana University, Bloomington, IN. July 2018.

***Andrews, L.**, *Johnson, K., *Neville, Q., *Nguyen, Q., and *Peterson, R. "Professional Data Analysts, Inc. Project: Investigation of Quit Rates and Survey Paradata." Professional Data Analysts Inc. Meeting, Professional Data Analysts Inc. Headquarters, Minneapolis, MN. January 2018.

***Andrews, L.** and Sussman, C. "Developing a *pde3a* mutant to Determine the Role of PDE3A in the PKD Pathway." NuSURF Program Student Extravaganza, Mayo Clinic, Rochester, MN. August 2017.

***Andrews, L.**, *Olson, P., *Salij, A., *Smith, P., and *Rakotomahenina, L. "Blocking of Cardiac Gap Junctions: A Proposed Trigger of HLHS." Abstract 5 at Innovative Minds Partnering to Advance Curative Therapies Symposium, Mayo Clinic, Rochester, MN. March 2016.

Poster Presentations

* indicates presenting author

*Duprez, D.A., Jacobs, D.R. Jr., Daniels, M., **Andrews, L.I.B.**, Brumback, L.C., Denenberg, J.O., Watanabe K., Cornelissen G., Criqui M.H., Szklo, M., and Allison, M.A. "Associations of Subclavian Artery Calcification with Future Cardiovascular Events and Death: The Multi-Ethnic Study of Atherosclerosis." Abstract 13805 at the American Heart Association Scientific Sessions, Pennsylvania Convention Center, Philadelphia, PA. November 2023.

*Duprez, D.A., Jacobs, D.R. Jr., Daniels, M., **Andrews, L.I.B.**, Brumback, L.C., Denenberg, J.O., Watanabe K., Cornelissen G., Criqui M.H., Szklo, M., and Allison, M.A. "Subclavian Artery, Thoracic Aorta, and Coronary Artery Calcification, Age, Race/Ethnicity, and Sex Distributions: The Multi-Ethnic Study of Atherosclerosis." Abstract 13729 at the American Heart Association Scientific Sessions, Pennsylvania Convention Center, Philadelphia, PA. November 2023.

*Watanabe, K., Allen, T.S, **Andrews, L.I.B.**, Brumback, L.C., Cornelissen-Guillaume, G.G., Duprez, D.A., Jacobs, D.R. Jr., Criqui, M.H., and Allison, M.A. "Thoracic Aorta Calcification and Left Ventricular Structure and Function Relevant to Heart Failure: The Multi-Ethnic Study of Atherosclerosis (MESA)." Abstract P665 at the American Heart Association EPI | Lifestyle Scientific Sessions, Omni Boston Seaport, Boston, MA. March 2023.

*Pan, C., **Andrews, L.I.B.**, Johnson, E., and Rizvi, Z.H. "Factors Associated with Successful Use of Electrolarynx Following Total Laryngectomy, A Multi-Institutional Study." Abstract A187 at Triological Society Combined Sections Meeting, Hotel del Coronado, Coronado, CA. January 2023.

*Allen, T.S., **Andrews, L.I.B.**, Brumback, L.C., Daniels, M.R., Denenberg, J.O., Thomas, I.C., Cornelissen-Guillaume, G.G., Duprez, D.A., Jacobs, D.R. Jr., Criqui, M.H., and Allison, M.A. "Association of Thoracic Aorta Calcification and Aortic Arch Stiffness: The Multi-Ethnic Study of Atherosclerosis." Abstract P139 at the American Heart Association Hypertension Scientific Sessions, Hilton San Diego Bayfront, San Diego, CA. September 2022.

*Duprez, D.A., Jacobs, D.R. Jr., Denenberg, J.O., McClelland, R.L., **Andrews, L.I.B.**, Thomas, I.C., and Allison, M.A. "Inter-Arm Systolic Blood Pressure Differences and Incident Cardiovascular Disease and Total Mortality in a Multi-Ethnic Population without Overt Cardiovascular Disease: The MESA Study." Abstract 1161-083 at American College of Cardiology 2020 Together with World Congress of Cardiology, Virtual. March 2020.

*Sussman, C.R., Pearson, E**., Andrews, L.**, Johnson, K., Koleilat, A., Ekker, S., Schimmenti, L., Harris, P., and Torres, V. "Hearing Impairment, A Novel Functional Readout, in Pkd2 Mutant Zebrafish." Abstract TH-PO692 at American Society of Nephrology Kidney Week, San Diego Convention Center, San Diego, CA. October 2018.

***Andrews, L.**, Johnson, K., and Sussman, C.R. "Developing a *pde3a* Mutant Zebrafish to Determine its Role in the PKD Pathway." Abstract 2 at St. Olaf College Natural Sciences and Mathematics Honors Day Poster Session, St. Olaf College, Northfield, MN. May 2018.

***Andrews, L.**, *Lapp, M., Arciero, J., and Raimondi, G. "Modeling Optimal Treatment Strategies for Transplant Patients." Abstract 52 at Indiana University Purdue University Indianapolis Center for Research and Learning Summer Poster Session, Indiana University Purdue University Indianapolis, Indianapolis, IN. July 2018.

***Andrews, L.**, Johnson, K., and Sussman, C.R. "Developing a *pde3a* Mutant Zebrafish to Determine its Role in the PKD Pathway." Division of Kidney, Urologic, and Hematologic Diseases Summer Undergraduate Research Conference, DoubleTree Hotel Bethesda, Bethesda, MD. August 2017.

*Johnson, K., **Andrews, L.**, and Sussman, C. "Identification of the genetic mutation and phenotypic defects in *spinner* mutant zebrafish." Division of Kidney, Urologic, and Hematologic Diseases Summer Undergraduate Research Conference, DoubleTree Hotel Bethesda, Bethesda, MD. August 2017.

***Andrews, L.**, Hanson, K., and Kandl, K. "Downregulation of *ULP2* Alters Nuclear Division, DNA Repair, and Pairing During Conjugation in *Tetrahymena thermophila*." Collaborative Undergraduate Research and Inquiry Poster Symposium, St. Olaf College, Northfield, MN. August 2016.

***Andrews, L.**, *Smith, P., *Salij, A., *Rakotomahenina, L., and *Olson, P. "Blocking of Cardiac Gap Junctions: A Proposed Trigger of Hypoplastic Left Heart Syndrome." Abstract 5 at Innovative Minds Partnering to Advance Curative Therapies Symposium, Mayo Clinic, Rochester, MN. March 2016.

Honors and Awards

Department of Biostatistics Exceptional Service Award, UW	*2025*
Student Most Outstanding Paper, Western North American Region of the International Biometric Society	*2024*
Graduate School Conference Presentation Award, UW	*2024*
GSFEI Top Scholar Award, UW	*2019*
School of Public Health Award of Excellence, UW	*2019*
Phi Beta Kappa, St. Olaf College	*2019*
Phi Lambda Upsilon, St. Olaf College	*2019*
Pi Mu Epsilon Honors Society, St. Olaf College	*2018 – 2019*
Buntrock Scholarship, St. Olaf College	*2015 – 2019*
Cassler Scholarship, St. Olaf College	*2015 – 2019*
Innovative Minds Partnering to Advance Curative Therapies Silver Medal, Mayo Clinic	*2016*

Service and Leadership

UW Biostatistics Activities and Events Squad, Member	*04/21 – 06/25*
UW Biostatistics Peer Mentoring Program, Peer Mentor	*09/20 – 06/25*
UW Intramural Soccer, Captain	*04/22 – 08/24*
UW Biostatistics Student-Invited Seminar Speaker Committee, Member	*10/23 – 02/24*
UW Graduate and Professional Student Senate, Biostatistics Senator	*10/20 – 09/21*

Editorial Responsibilities

Journal of Causal Inference, Referee	*2026*
Statistics in Medicine, Referee	*2024, 2025*
The Journal of Infectious Diseases, Referee	*2023*
NPJ Vaccines, Referee	*2023*
BMC Public Health, Referee	*2020*

Professional Affiliations

American Statistical Association, Student Member	*2024 – 2025*
Western North American Region of the International Biometric Society, Student Member	*2021 – 2025*
Society for Causal Inference, Student Member	*2024 – 2025*
Association for Women in Mathematics, Student Member	*2018 – 2019*
Mathematical Association of America, Student Member	*2017 – 2019*

Languages

English: Native
Spanish: Intermediate
Chinese: Basic

Additional Activities

UW Board Games Club, Member	*01/20 – 06/22*
String Quartet, Violist	*09/11 – 03/20*
St. Olaf Orchestra, Violist	*09/15 – 05/19*
St. Olaf Public Safety, Dispatcher	*09/15 – 05/19*
St. Olaf Intramurals, Soccer Player	*09/15 – 05/19*