Samuel I. Berchuck

214 Old Chemistry Building, Durham, NC 27703

🛛 (919) 452-9031 | 🔄 sib2@duke.edu | 🏾 www.sites.duke.edu/sib2 | 🖸 berchuck | 🛅 samberchuck

Research Interests

My research is motivated by the challenges in identifying and treating psychosocial distress in patients with chronic diseases, for which I was awarded an **NIH K99/R00 Pathway to Independence** grant by the National Eye Institute. As part of my K99/R00, I am developing scalable machine learning and statistical models to predict psychosocial distress in glaucoma patients using electronics health records (EHR) data. A focus of my research is developing scalable computational algorithms that permit uncertainty quantification in the context of Bayesian hierarchical models for high-dimensional data settings, including EHR, medical imaging, and mobile health data.

Education

University of North Carolina - Chapel Hill

Ph.D. IN BIOSTATISTICS

- Dissertation title: "Statistical methods for modeling the spatial structure on the visual field in glaucoma progression research".
- Advisors: Drs. Amy Herring and Joshua Warren
- Committee members: Drs. Joseph Ibrahim, Jason Fine, and Jean-Claude Mwanza

Duke University

- B.S. IN STATISTICAL SCIENCE, B.A. IN SPANISH, MINOR IN MATHEMATICS
- Graduated with Distinction from Department of Statistical Science.

Research Experience

| De | partment | of | Statistical | Science - | Duke | University |
|----|----------|------------|-------------|-----------|------|------------|
| PC | parement | U I | Juliation | Science - | Durc | Oniversity |

Postdoctoral Research Associate

- NIH K99/R00 Postdoctoral Fellow
- Duke University Forge Scholar in Duke Forge: Duke's Center for Actionable Health Data Science
- Member of the Vision, Imaging, Performance Laboratory in the Duke Eye Center
- Mentors: Sayan Mukherjee and Felipe Medeiros.

Duke Clinical Research Institute

BIOSTATISTICS INTERN

• Mentor: Laine Thomas and Karen Pieper.

Department of Biostatistics - UNC-Chapel Hill

STATISTICAL TRAINEE

- National Institute of Environmental Health Sciences Training Grant.
- Mentor: Amy Herring.

Funding.

PI INITITATED GRANTS

| K99EY033027-01 (PI: Berchuck) | NIH (NEI) |
|--|-----------------------|
| Principal Investigator | Sep. 2021 - June 2026 |
| • Development of a program to assess and treat distress in glaucoma patients using an automated EHR-derived AI algorithms and the second secon | thm |
| 2020 Bass Connections Data+ Program (PI: Berchuck, Medeiros, Mukherjee) | Duke University |
| Faculty Lead | May 2020 - Aug. 2020 |
| Predicting Blindness in Duke's Glaucoma Patient Population (Click here for website). | |
| Other Grants | |
| R61NS120246-01 (PI: Pencina) | NIH (NINDS) |
| Postdoctoral Associate/Statistician | Sep. 2020 - June 2025 |
| Improving stroke risk prediction with cohort data and machine learning methods | |
| R21EY031898-01 (PI: Medeiros) | NIH (NEI) |

R21EY031898-01 (PI: Medeiros) Postdoctoral Associate/Statistician

• Objective Quantification of Neural Damage for Screening, Diagnosis and Monitoring of Glaucoma with Fundus Photographs

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Sep. 2020 - Aug. 2022

Chapel Hill, NC

Durham, NC

Durham, NC

Jun. 2018 - Present

Aug. 2012 - May 2018

Aug. 2008 - May 2012

Chapel Hill, NC Aug. 2012 - Aug. 2017

T32ES007018-44 (PI: Herring)

TRAINEE

Biostatistics for Research in Environmental Health

Publications

PEER REVIEWED

- 1. Berchuck S., Jammal, A., Page, D, Somers, T., Medeiros F. "A framework for automating psychiatric distress screening in ophthalmology clinics using an EHR-derived AI algorithm." *Translational Vision Science & Technology* (2022).
- 2. Swaminathan, S., **Berchuck, S.**, Jammal, A., Rao, S., Medeiros, F. "Bayesian linear mixed models for estimating rates of change in glaucoma". *Translational Vision Science & Technology* (2022).
- 3. Pokorney, S, **Berchuck, S.**, Chiswell, K, Sun, L., Thomas, L., Jones, W., Patel, M., and Piccini J. "Branch Coronary Artery Stenosis as a Mechanism for Atrial Fibrillation". *Heart Rhythm* (2022).
- 4. Jammal, A.J., **Berchuck, S.**, Thompson, A., Medeiros, F. "The Effect of Ocular Perfusion Pressure on Increasing Susceptibility to Intraocular Pressure Damage in Glaucoma". *Ophthalmology* (2021).
- 5. Gondi, S., **Berchuck, S.**, Brown, R., Hinderlie, M., Easton, L., Smith, L., Berchuck, J., Burden, H., Berchuck, C. "A Community Partnership to House and Care for Complex Patients". *New England Journal of Medicine Catalyst: Innovations in Care Delivery* (2021).
- 6. Swaminathan, S., Jammal, A., **Berchuck, S.**, Medeiros, F. "Rapid initial OCT RNFL thinning is associated with large visual field losses during follow-up in glaucoma". *American Journal of Ophthalmology* (2021).
- 7. Subramandia, V., Engelhard, M., **Berchuck, S.**, Chen, L., Henao, R., and Carin, L. "SpanPredict: Extraction of Predictive Document Spans with Neural Attention." 2021 Annual Conference of the North American Chapter of the Association for Computational Linguistics.
- 8. Stagg, B., Mariottoni, E., **Berchuck, S.**, Jammal, A., Elam, A., Hess, R., Kawamoto, K., Haaland, B., and Medeiros, F. "Longitudinal Visual Field Variability and the Ability to Detect Glaucoma Progression in Black and White Individuals". *British Journal of Ophthalmology* (2021).
- Camm, J., Fox, K., Virdone, S., Bassand, J.P., Fitzmaurice, D., Berchuck, S., Gersh, B., Goldhaber, S., Goto, S., Haas, S., Misselwitz, F., Pieper, K., Turpie, A., Verheugt, F., Cappato, R., Kakkar, A., for the GARFIELD-AF Investigators. "Comparative effectiveness of oral anticoagulants in everyday practice: Results from the GARFIELD-AF prospective registry". *Heart* (2021).
- 10. Mariottoni, E.B., Jammal, A., **Berchuck, S.**, Tavares, I.M., Medeiros, F.A. "An Objective Structural and Functional Reference Standard for Diagnostic Studies in Glaucoma". *Scientific Reports* (2021).
- 11. Berchuck, S., Janko, M., Pan, W., Medeiros, F., and Mukherjee, S. "Bayesian Non-Parametric Factor Analysis for Longitudinal Spatial Surfaces". *Bayesian Analysis* (2021).
- 12. Jammal, A.J., **Berchuck, S.**, Thompson, A., Medeiros, F. "The Effect of Age on Increasing Susceptibility to Intraocular Pressure Damage in Glaucoma". *Investigative Ophthalmology and Visual Science* (2021). This paper won the Best International Paper at the Brazilian Ophthalmology Conference 2020.
- 13. Engelhard, M., **Berchuck, S.**, Garg, J., Rusincovitch, S., Dawson, G., and Collins, S. "Early Healthcare System Utilization among Children Later Diagnosed with Autism Spectrum Disorder or Attention Deficit Hyperactivity Disorder". *Scientific Reports* (2020).
- 14. Johnson, N., Jammal, A., **Berchuck, S.**, and Medeiros, F.A."Effect of diabetes control on rates of structural and functional loss in patients with glaucoma". *Ophthalmology Glaucoma* (2020).
- 15. Berchuck, S., Jammal, A., Mukherjee, S., Somers, T., Medeiros, F. "The Impact of Anxiety and Depression on Progression to Glaucoma Among Newly Diagnosed Glaucoma Suspects". *British Journal of Ophthalmology* (2020).
- 16. Estrela, T., Jammal, A.J., Mariottoni, E.B., Urata, C.N., Ogata, N.G., **Berchuck, S.I.**, Medeiros, F.A. "The Relationship between Asymmetries of Corneal Properties and Rates of Visual Field Progression in Glaucoma Patients". *Journal of Glaucoma* (2020).
- 17. Engelhard, M., **Berchuck, S.**, D'Arcy, J, Henao, R. "Neural Conditional Event Time Models". *Machine Learning for Healthcare Conference 2020*.
- 18. Jammal, A., Thompson, A., Mariottoni, E., Estrela, T., Shigueoka, L., **Berchuck, S.**, Tseng H., Asrani, S., Medeiros, F. "The Impact of Intraocular Pressure Control on Rates of Retinal Nerve Fiber Layer Loss in a Large Clinical Population". *Ophthalmology* (2020).
- 19. Thompson, A., Jammal, A., **Berchuck, S.**, Mariottoni, E., Wu, Z., Daga, F., Ogata, N., Urata, C., Estrela, T., and Medeiros, F. "Comparing the "Rule of 5" to Trend-based Analysis for Detecting Glaucoma Progression on Optical Coherence Tomography". *Ophthalmology Glaucoma* (2020).
- Armstrong, S., Bihlmeyer, N., Windom, M., Li J., Shah, S., Story, M., Zucher, N., Kraus, W., Pagidpati, N., Peterson, E., Wong, C., Wiedemeier, M., Sibley, L., Berchuck, S., Merrill, P., Zizzi, A., Sarria, C., Skinner, A. "Rationale and Design of "Hearts & Parks": A pragmatic randomized clinical trial of an integrated clinic-community intervention to treat pediatric obesity and cardiovascular risk." *BMC Pediatrics* (2020).
- 21. Jammal, A., Thompson, A., Mariottoni, E., **Berchuck, S.**, Urata, C., Estrela, T., Wakil, S., Costa, V., and Medeiros, F. "Rates of Glaucomatous Structural and Functional Change from Big Data: The Duke Glaucoma Registry Study". *American Journal of Ophthalmology* (2020).
- 22. Mariottoni, E., Datta, S., Dov, D., Jammal, A., **Berchuck, S**., Tavares, I., Carin, L., and Medeiros, F. "A Deep Learning-Based Mapping of Structure to Function in Glaucoma". *Translational Vision Science & Technology* (2020).
- 23. Mariottoni, E., Jammal, A., Urata, C., **Berchuck, S.**, Thompson, A., Estrela, T., and Medeiros, F. "Quantification of Retinal Nerve Fibre Layer Thickness on Optical Coherence Tomography with a Deep Learning Segmentation-Free Approach". *Scientific Reports* (2020).

- 24. Thompson, A., Jammal, A., **Berchuck, S.**, Mariottoni, E., and Medeiros, F. "Performance of a Segmentation-free Deep Learning Algorithm for Diagnosing Glaucoma from Optical Coherence Tomography Scans", *JAMA Ophthalmology* (2020).
- 25. Berchuck, S., Mukherjee, S., and Medeiros, F. "Estimating Rates of Progression and Predicting Future Visual Fields in Glaucoma Using a Deep Variational Autoencoder". Scientific Reports (2020).
- 26. Jammal, A., Thompson, A., Mariottoni, E., **Berchuck, S.**, Urata, C., Estrela, T., Wakil, S., Costa, V., and Medeiros, F. "Human versus Machine: Comparing the Performance of an OCT-trained Deep Learning Algorithm to Detect Perimetric Glaucoma on Fundus Photos". *American Journal of Ophthalmology* (2020).
- 27. Urata, C., Mariottoni, E., Jammal, A., Ogata, N., Thompson, A., **Berchuck, S.**, and Medeiros, F. "Comparison of Short- And Long-Term Variability On Standard Perimetry and Spectral Domain Optical Coherence Tomography in Glaucoma". *American Journal of Ophthalmology* (2020).
- 28. Susanna, B.N., Ogata, N.G., Jammal, A.A., Susanna, C.N., **Berchuck, S.** and Medeiros, F.A. "Corneal Biomechanics and Visual Field Progression in Eyes with Seemingly Well-Controlled Intraocular Pressure", *Ophthalmology* (2019).
- 29. Berchuck, S., Mwanza, J.C., Warren, J.L. "A Spatially Varying Change Points Model for Monitoring Glaucoma Progression Using Visual Field Data", *Spatial Statistics* (2019).
- 30. Berchuck, S., Mwanza, J.C., Tanna, A.P., Budenz, D.L., Warren, J.L. "Improved Detection of Visual Field Progression Using a Spatiotemporal Boundary Detection Method", *Scientific Reports* (2019).
- 31. Berchuck, S., Mwanza, J.C., & Warren, J. "Diagnosing Glaucoma Progression with Visual Field Data Using a Spatiotemporal Boundary Detection Method", *Journal of the American Statistical Association* (2019).
- 32. **Berchuck, S.**, Warren, J., Herring A.H., Evenson, K., Moore, K., Ranchod, Y., and Diez-Roux, A.V. "Spatially Modeling the Association Between Access to Recreational Facilities and Exercise: The Multi-Ethnic Study of Atherosclerosis", *Journal of the Royal Statistical Society: Series A* (2016).
- 33. Beamon, C., Carlson, L., Rambally, B., **Berchuck, S.**, Gearhart, M., Hammett-Stabler, C., & Strauss, R. "Predicting neonatal respiratory morbidity by lamellar body count and gestational age", *Journal of Perinatal Medicine* (2015).

SUBMITTED ARTICLES

*Indicates student first-author.

- 1. *Shi, A., **Berchuck, S.**, Jammal, A., Singh, G., Hunt, S., Roche, K., Mukherjee, S., Medeiros, F. "Identifying risk factors for blindness from glaucoma at first presentation to a tertiary clinic". Submitted to American Journal of Ophthalmology.
- 2. Hong, C., Pencina, M., Wojdyla, D., Hall, J., Judd, S., Cary, MP., Engelhard, M., **Berchuck, S.**, D'Agostino, R., Kissela, B., Henao, R. "Performance of risk prediction algorithms for new stroke onset across race, sex, and age groups in four US cohorts". Submitted to JAMA.
- 3. Engelhard, M., Henao, R., **Berchuck, S.**, Chen, J., Eichner, B., Herkert, D., Kollins, S., Olson, A., Perrin, E., Rogers, U., Sullivan, C., Zhu, J., Sapiro, G., Dawson, G. "Passive autism detection before age 1 from routine electronic health records". Submitted to JAMA Network Open.
- 4. Kelleher, S., Fisher, H., Hyland, K., Miller, S., Amaden, G., Diachina, A., Pittman, A., Winger, J., Sung, A., **Berchuck, S.**, Samsa, G., Somers, T. "A Hybrid-Delivered Cognitive Behavioral Symptom Management and Activity Coaching Intervention for Patients Undergoing Hematopoietic Stem Cell Transplant: Findings from Intervention Development and a Pilot Randomized Trial". Submitted to Psycho-Oncology.

WORKING MANUSCRIPTS

- 1. **Berchuck, S.**, Agazzi, A., Mukherjee, S. "Scalable generalized linear mixed model using stochastic gradient Markov chain Monte Carlo". In preparation to be submitted to Journal of the American Statistical Association.
- 2. *Shi, A., **Berchuck, S.**, Jammal, A., Singh, G., Hunt, S., Roche, K., Mukherjee, S., Medeiros, F. "Identifying risk factors for blindness from glaucoma at first presentation to a tertiary clinic". In preparation to be submitted to American Journal of Ophthalmology.
- 3. Berchuck, S., Jammal, A., Page, D., Somers, T., Medeiros, F. "A framework for automating psychiatric distress screening in glaucoma clinics using an EHR-derived AI algorithm". In preparation to be submitted to Ophthalmology.
- 4. *Baek, Y., **Berchuck, S.**, Jammal, A., Mukherjee, S., Medeiros, F. "Bayesian hierarchical regression for non-overlapping spatial surfaces". In preparation to be submitted to Journal of the American Statistical Association.
- 5. Berchuck, S., Medeiros, F., and Mukherjee, S. "Scalable Modeling of Spatiotemporal Data using the Variational Autoencoder: An Application in Glaucoma", arXiv:1908.09195v1.

POLICY BRIEF AND INVITED BLOG POSTS

- 1. Berchuck, S., and Warren, J.L. "Statistics in Glaucoma: Part III," R Views: An R community blog edited by RStudio, (December 2018).
- 2. Berchuck, S., and Warren, J.L. "Statistics in Glaucoma: Part II," R Views: An R community blog edited by RStudio, (December 2018).
- 3. Berchuck, S., and Warren, J.L. "Statistics in Glaucoma: Part I," R Views: An R community blog edited by RStudio, (November 2018).
- 4. Pathman, D., Holmes, G, **Berchuck, S.**, and Terry, J. "Assessing Shifts in Outpatient Visits to Physicians of Other Specialties in Rural Areas with Shortages of Cardiologists and Gastroenterologists: A Preliminary Analysis," Policy Brief for the *Health Resources and Services Administration*, (May 2015).

STATISTICAL SOFTWARE

- 1. Berchuck, S. (2019). spBFA: Spatial Bayesian Factor Analysis. R package version 1.0. https://CRAN.R-project.org/package=spBFA.
- 2. **Berchuck, S.** (2018). spCP: Spatially Varying Change Points With Spatiotemporal Slopes and Intercepts. R package version 1.0. https://CRAN.R-project.org/package=spCP.
- 3. Berchuck, S. (2017). womblR: Spatiotemporal Boundary Detection Model for Areal Unit Data. R package version 1.0.2. https://CRAN.R-project.org/package=womblR.
- 4. See Github for a more up to date list of software, https://github.com/berchuck/

Awards and Honors

| 2022 | Travel Award, International Society for Bayesian Analysis | Montreal, CAN |
|------|---|------------------|
| 2021 | NIH K99/R00 Pathway to Independence Award, Department of Statistical Science, Duke University | Durham, NC |
| 2021 | Exceptionally Good Review, Translational Vision Science & Technology | ARVO Journal |
| 2020 | Exceptionally Good Review, Investigative Ophthalmology and Visual Science | ARVO Journal |
| 2020 | Exceptionally Good Review, Translational Vision Science & Technology | ARVO Journal |
| 2020 | Best International Paper, Brazilian Ophthalmology Conference | Campinas, Brazil |
| 2019 | Top R Packages of October 2019 for spBFA, R Views, an R community blog edited by RStudio | Boston, MA |
| 2019 | Top Blog Posts of the Year, R Views, an R community blog edited by RStudio | Boston, MA |
| 2018 | Top R Packages of July 2018 for spCP, R Views, an R community blog edited by RStudio | Boston, MA |
| 2018 | RAB Distinguished Poster Award, Eastern North American Region, International Biometric Society | Atlanta, GA |
| 2016 | Junior travel support grant, International Society for Bayesian Analysis | Lenzerheide, SUI |
| 2012 | NIEHS Environmental Biostatistics T32 Training Grant Recipient, Department of Biostatistics, UNC-CH | Chapel Hill, NC |
| 2012 | Inducted Member of Sigma Xi, Duke University | Durham, NC |
| 2012 | Deans List with Distinction, Duke University | Durham, NC |
| 2011 | Deans List, Duke University | Durham, NC |
| 2007 | Summer of Discovery Recipient, National Institute of Environmental Health Sciences | RTP, NC |
| | | |

Teaching Experience

DEPARTMENT OF STATISTICAL SCIENCE - DUKE UNIVERSITY

| 2021 Spring | Instructor, Introduction to Biostatistics (STA 102) | Durham, NC |
|-------------|--|-----------------|
| 2020 Summer | Instructor, Introduction to Biostatistics (STA 102) | Durham, NC |
| 2019 Spring | Guest Lecturer, Probabilistic Machine Learning (STA 561D) | Durham, NC |
| 2012 Spring | Teaching Assistant, Bayesian and Modern Statistics (STA 122) | Durham, NC |
| 2011 Fall | Teaching Assistant, Regression Analysis (STA 121) | Durham, NC |
| 2011 Spring | Teaching Assistant, Introduction to Biostatistics (STA 102) | Durham, NC |
| Departmen | NT OF BIOSTATISTICS - UNC-CH | |
| 2015 Spring | Grader, Causal Inference (BIOS 776) | Chapel Hill, NC |
| 201E Fall | Teaching Accistant Bayacian Statistics (PLOS 770) | Chapal Hill NC |

| 2015 Fall | Teaching Assistant, Bayesian Statistics (BIOS 779) | Chapel Hill, NC |
|-----------|--|-----------------|
| 2014 Fall | Teaching Assistant, Principles of Statistical Inference (BIOS 600) | Chapel Hill, NC |
| 2013 Fall | Grader, Principles of Statistical Inference (BIOS 600) | Chapel Hill, NC |

Academic Presentations_

Talks

- 1. "Bayesian non-Gaussian hierarchical model for characterizing patient-specific rates of disease progression", International Society of Bayesian Analysis World Meeting, Virtual, (June 2021).
- 2. "Identifying risk factors for blindness from glaucoma at first presentation to a tertiary clinic", *The Association for Research in Vision and Ophthalmology Annual Meeting*, Virtual, (May 2021).
- 3. "Machine learning applications in electronic health records data: A glaucoma case study", *Duke Global Health Institute, Duke University*, Durham, North Carolina (March 2021).
- 4. "Bayesian Non-Parametric Factor Analysis for Longitudinal Spatial Surfaces: An Application in Glaucoma", *Department of Biostatistics and Bioinformatics, Duke University*, Durham, North Carolina (March 2021).
- 5. "Bayesian Non-Parametric Factor Analysis for Longitudinal Spatial Surfaces: An Application in Glaucoma", *Department of Biostatistics, Boston University*, Boston, Massachusetts (January 2021).

- 6. "Bayesian Non-Parametric Factor Analysis for Longitudinal Spatial Surfaces: An Application in Glaucoma", *Department of Biostatistics and Bioinformatics, Emory University*, Atlanta, Georgia (January 2021).
- 7. "Opportunities for research in healthcare at the intersection of Bayesian statistics and modern machine learning", *Duke University, AI Health Fellows Conference*, Durham, North Carolina (December 2020).
- 8. "Bayesian Non-Parametric Factor Analysis for Longitudinal Spatial Surfaces: An Application in Glaucoma", *Department of Biostatistics* and Epidemiology, Memorial Sloan Kettering Cancer Center, New York, New York (November 2020).
- 9. "Opportunities for research in healthcare at the intersection of Bayesian statistics and modern machine learning", *Duke University, Machine Learning in Medicine Conference*, Durham, North Carolina (October 2020).
- 10. "The Variational Autoencoder as a Scalable Alternative for Spatiotemporal Data in the Presence of Big Data: With an Application in Glaucoma", *R / Medicine*, Boston, Massachusetts (September 2019).
- 11. "An introduction to Bayesian statistics for clinicians", *Duke Clinical Research Institute Fellows Stats Conference*, Durham, North Carolina (December 2018).
- 12. "Statistical methods for modeling the spatial structure on the visual field in glaucoma progression research", UNC-CH Department of Biostatistics Dissertation Defense, Chapel Hill, North Carolina (March 2018).
- 13. "An introduction to Bayesian statistics for clinicians", *Duke Clinical Research Institute Fellows Stats Conference*, Durham, North Carolina (November 2017).
- 14. "An introduction to Bayesian statistics for clinicians", *Duke Clinical Research Institute Fellows Stats Conference*, Durham, North Carolina (April 2016).
- 15. "Statistical methods for modeling the spatial structure on the visual field in glaucoma progression research", *Environmental/Occupational Epidemiology Seminars*, Chapel Hill, North Carolina (February 2016).
- 16. "Learning Bayesian statistics from 'The Table Game' and an Application in the Multi-Ethnic Study of Atherosclerosis", *Duke Clinical Research Institute SIGMA Educational Meeting*, Durham, North Carolina (September 2015).

ABSTRACTS AND POSTER PRESENTATIONS

- 1. Berchuck, S., Agazzi, A., Mukherjee, S. "Scalable generalized linear mixed models using stochastic gradient MCMC", *International Society of Bayesian Analysis World Meeting*, Montreal, Canada, (June 2022).
- 2. Berchuck, S., Jammal, A., Weinfurt, K., Page, D., Somers, T., Medeiros, F. "A framework for automating psychosocial distress screening in ophthalmology clinics using an EHR- derived AI algorithm", *The Association for Research in Vision and Ophthalmology Annual Meeting*, Denver, Colorado, (May 2022).
- 3. Baek, Y., **Berchuck, S.**, Jammal, A., Mukherjee, S., Medeiros, F. "Discriminating between healthy and glaucomatous eyes using a Bayesian macular deviation map". *The Association for Research in Vision and Ophthalmology Annual Meeting*, Virtual, (May 2021).
- 4. Jammal, A., **Berchuck, S.**, Medeiros, F. "Ocular Perfusion Pressure and Rates of Glaucoma Progression in a Large Clinical Population", *American Glaucoma Society*, Virtual, (March 2021).
- 5. Swaminathan, S., Jammal, A., **Berchuck, S.**, Medeiros, F. "Rapid initial OCT RNFL thinning is predictive of greater visual field losses during follow-up in glaucoma", *American Glaucoma Society*, Virtual, (March 2021).
- 6. Stagg, B., Marriotoni, E., **Berchuck, S.**, Medeiros, F. "Estimating individualized frequencies of visual field testing to detect glaucoma progression based on clinical characteristics", *American Glaucoma Society*, Virtual, (March 2021).
- 7. *Baek, Y., **Berchuck, S.**, Mukherjee, S., Medeiros, F. "Bayesian hierarchical regression for non-overlapping spatial surfaces". *Joint Statistical Meetings*, Denver, Colorado, (August 2020).
- 8. Mariottoni, E., **Berchuck, S.**, Medeiros, F. "Clustering Spectral-Domain Optical Coherence Tomography Images using a Deep Variational Auto-encoder", *The Association for Research in Vision and Ophthalmology Annual Meeting*, Baltimore, Maryland, (May 2020).
- Stagg, B., Mariottoni, E., Berchuck, S., Jammal, A., Hess, R., Kawamoto, K, Medeiros, F. "The association between race and longitudinal visual field variability", *The Association for Research in Vision and Ophthalmology Annual Meeting*, Baltimore, Maryland, (May 2020).
- 10. Berchuck, S., Jammal, A., Mariottoni, E, Mukherjee, S., Medeiros, F.. "The relationship between concomitant mental health disorders and disease severity among glaucoma patients", *The Association for Research in Vision and Ophthalmology Annual Meeting*, Baltimore, Maryland, (May 2020).
- 11. Thompson, A., **Berchuck, S.**, Marriotoni, E., Jammal, A., Medeiros, F. "Performance of a Segmentation-free Deep Learning Algorithm for Diagnosing Glaucoma from Optical Coherence Tomography Scans", *American Glaucoma Society*, Washinton D.C., (February 2020).
- 12. Jammal, A., **Berchuck, S.**, Mariottoni, E., Thompson, A., Medeiros, F., "Rates of Glaucomatous Structural and Functional Change from Big Data: The Duke Glaucoma Registry Study", *American Glaucoma Society*, Washington D.C., (February 2020).
- 13. Shigueoka, L., Mariottoni, E., Thompson, A., Estrela, T., **Berchuck, S.**, Jammal, A., and Medeiros, F., "Can Age be Predicted from Peripapillary Optical Coherence Tomography Scans?", *American Glaucoma Society*, Washington D.C., (February 2020).
- 14. Berchuck, S., Janko, M., Medeiros, F, and Mukherjee, S. "Factor Analysis for Spatial Surfaces using a Bayesian Non-Parametric Prior", *Joint Statistical Meetings*, Denver, Colorado, (July 2019).
- 15. Berchuck, S., Mukherjee, S., and Medeiros, F. "Simulating glaucomatous visual fields using a variational autoencoder", *The Association for Research in Vision and Ophthalmology Annual Meeting*, Vancouver, British Columbia, Canada, (April 2019).
- 16. Pokorney, S., Berchuck, S., Chiswell, K., Shaw, L., Thomas, L., Jones, W., Patel, M., and Piccini, J. "Atrial ischemia as a mechanism of atrial fibrilation". *Journal of the American College of Cardiology*, (March 2018).

- 17. Berchuck, S., Mwanza, J.C., and Warren, J.L. "A Spatially Varying Change Point Model for Determining Glaucoma Progression Using Visual Field Data", *ENAR Spring Meeting*, Atlanta, Georgia, (March 2018).
- 18. Berchuck, S., Warren, J.L., and Herring, A.H. "Bayesian spatial boundary detection for diagnosing progression of glaucoma using visual field data", *Sixth IMS-ISBA Joint Meeting BAYES COMP*, Lenzerheide, Switzerland, (January 2016).
- 19. Janko, M., **Berchuck, S.**, Spencer, J., and Emch, M. "Incorporating both space and place in medical geography using Bayesian hierarchical spatial modeling," *Association of American Geographies Annual Meeting*, (April 2015).
- 20. Park, J.K., Singh, S., **Berchuck, S.**, Couchman, G., and Meyer, W. "Aneuploidy prevalence is no different between embryos biopsied on day 5 vs day 6," *Fertility and Sterility*, (September 2013).
- 21. Meyer, W.R., Oddone, A., **Berchuck, S.**, and Park, J.K. "Intrauterine insemination pregnancy rates do not differ between physicians and nurses," *Fertility and Sterility*, (September 2012).

Professional Activities

UNIVERSITY SERVICE

AI Health vLE Host, "Proposal Studio on Structured Data Analyses, Part 2" (April 21, 2021), with Michael Pencina. Proposal concepts included AI-based pulmonary function testing, sickle cell severity, long-term follow up for diabetic retinopathy, and ovarian cancer care recommender.

Seminar Committee, Department of Biostatistics, UNC Chapel Hill

COMMUNITY SERVICE

Invited Session Organizer, "Recent applications of scalable Bayesian inference using stochastic gradient MCMC". International Society of Bayesian Analysis World Meeting 2022.

Journal Reviewer, American Journal of Ophthalmology, Annals of Applied Statistics, Annals of Statistics, Annals of Medicine, Clinical Ophthalmology, IEEE Journal of Biomedical and Health Informatics, International Journal of Environmental Research and Public Health, Investigative Ophthalmology and Visual Science, JAMA Ophthalmology, Journal of the American Statistical Association - Theory & Methods, Journal of Glaucoma, Journal of Machine Learning Research, Ophthalmology, Scientific Reports, Statistics in Biosciences, Statistics in Medicine, R Journal, Translational Vision Science & Technology

PROFESSIONAL MEMBERSHIPS

The Association for Research in Vision and Ophthalmology (ARVO), American Statistical Association (ASA), Eastern North American Region of the International Biometric Society (ENAR), International Society for Bayesian Analysis (ISBA)

Students Mentored

Dylan Liu, M.S. 2019, Department of Statistical Science, Duke University **Rebecca Thiem**, Ph.D. Candidate, Department of Statistics, NC State (while at DCRI) **Youngsoo Baek**, Ph.D. Candidate, Department of Statistical Science, Duke University

Technical Skills_

Statistical Software Machine Learning Productivity Software Other Software Language R, C++/Rcpp, SAS, MATLAB, Stan, QGIS, WinBUGS Python, Tensorflow, Keras, Jupyter Notebook Github, Sweave, Knitr, Markdown, Overleaf, Beamer Linux computing systems, ETEX, all Microsoft Office tools English (native), Spanish (conversational)