Brian David Williamson — Curriculum Vitae — 25 June 2020

Contact Information

Biostatistics, Bioinformatics, & Epidemiology (BBE)
Vaccine and Infectious Disease Division (VIDD)
Fred Hutchinson Cancer Research Center
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Education

Ph.D., Biostatistics, University of Washington — 2019
- Co-chairs: Marco Carone, Noah Simon
- Committee: Scott Emerson, Peter Gilbert, Annette Fitzpatrick (GSR)
- Dissertation: *A unified approach to model-agnostic variable importance*

M.S., Biostatistics, University of Washington — 2017

B.A., Mathematics, Pomona College — 2014
- Thesis adviser: Johanna Hardin

Professional Positions

Post-doctoral research fellow, Fred Hutchinson Cancer Research Center — 01/2020–Present

Funding

F31AI140836 (PI: Williamson) — 09/2018–12/2019
Ruth L. Kirschstein Predoctoral Individual National Research Service Award
- Title: *Evaluating predictors of HIV vaccine efficacy: Statistical methods for estimation, testing, and inference*

Honors and Awards

Department of Biostatistics, University of Washington:
- Exceptional Service in Biostatistics Award — 06/2019
- Excellence in Teaching Award — 09/2018
- Graduate School Fund for Excellence and Innovation Travel Award — 06/2017
- Graduate and Professional Student Senate Travel Grant — 06/2017
- Top Scholar Incoming Student Award — 09/2014

Professional Societies:

American Statistical Association (ASA):
- Nonparametrics Section Travel Award — 04/2019
- Biometrics Section Travel Award — 01/2018

Western North American Region (WNAR) of the International Biometric Society:
- Most Outstanding Oral Paper Award — 06/2017

Pomona College:
- Distinction in the Senior Exercise — 05/2014
- UCLA DataFest Best Insight Award — 06/2013

Research Experience

Interests: inference with high-dimensional data using targeted maximum likelihood estimation; data science; statistical machine learning; statistical methods for HIV/AIDS research; statistical methods for cancer research

Employment:
- Research Assistant, Fred Hutchinson Cancer Research Center — 2015–2019
- Integrative Cancer Biology Program Research Fellow, Stanford University — 06/2013–08/2013

Teaching Experience

Pre-Doctoral Instructor *with Kelsey Grinde*

Biostatistics 311 – Regression Methods in the Health Sciences — Spring 2018

Enrollment: 12; Median evaluation: 4.9/5.0.

Instructor

University of Washington School of Public Health Math and R Skills Preparatory Workshop

with Gillan Tarr — 09/2016

with Jessica Williams-Nguyen — 09/2017, 09/2018

Enrollment: 175; Evaluation not conducted.

Lead Teaching Assistant

Biostatistics 511 – Medical Biometry I — Fall 2017

Enrollment: 149; Evaluation not conducted.

Teaching Assistant

University of Washington

Biostatistics 311 – Regression Methods in the Health Sciences — Spring 2017

Enrollment: 22; Evaluation not conducted.

Biostatistics 571 – Advanced Regression Methods for Dependent Data — Winter 2017

Enrollment: 45; Evaluation not conducted.

Summer Institute in Statistics for Big Data — 07/2015, 07/2016, 07/2017

Pomona College

Math 58b – Introduction to Biostatistics — Spring 2014

Math 58 – Introduction to Statistics — Fall 2013

University Service

Department of Biostatistcs, University of Washington

Chair's Task Force on Professionalism — 02/2019–06/2019

Equity, Diversity, and Inclusion Committee — 09/2016–12/2019

Educational Policy and Teaching Evaluation Committee — 09/2015–09/2018

Website Committee — 03/2015–06/2015

Peer Mentor — 09/2016–12/2019

Professionally-related Service

Manuscript Reviewer

International Journal of Biostatistics (2019)

Epidemiology (2020)

Conferences

Ordinary Program Committee Member

14th Machine Learning in Computational Biology Meeting — 2019

Session chair, Joint Statistical Meetings

Quantification, Association Testing, and Integration of the Microbiome — 2017

Mentoring

Alumni Mentor, SagePost 47, Pomona College — 06/2015–Present

Consulting

Sierra Streams Institute, Nevada City, California — 03/2016–06/2016

Publications

* denotes joint first-author contribution

8. **Williamson BD**, Gilbert PB, Carone M, and Simon N. Nonparametric variable importance assessment using machine learning techniques. *Biometrics*, 2020+ (accepted with discussion)
7. Neidich SD, Fong Y, Li SS, Geraghty DE, **Williamson BD**, Young WC, Goodman D, Seaton KE, Shen X, Sawant S, Zhang L, deCamp AC, Blette BS, Shao M, Yates NL, Feely F, Pyo CW, Ferrari G, Frank I, Karuna ST, Swann E, Mascola J, Graham BS, Hammer SM, Sobieszczyk ME, Corey L, Janes H, McElrath MJ, Gottardo R, Gilbert PB, and Tomaras GD. Antibody Fc effector functions and IgG3 associate with decreased HIV-1 risk. *The Journal of Clinical Investigation*, 2019. doi: 10.1172/JCI126391
6. *Magaret CA, *Benkeser DC, ***Williamson BD**, Borate BR, Carpp LN, Georgiev IS, Setliff I, Dingens AS, Simon N, Carone M, Simpkins C, Montefiori D, Alter G, Yu WH, Juraska M, Edlefsen PT, Karuna S, Mgodi NM, Edugupanti S, and Gilbert PB. Prediction of VRC01 neutralization sensitivity by HIV-1 gp160 sequence features. *PLOS Computational Biology*, 2019. doi: 10.1371/journal.pcbi.1006952
5. Hanscom B, Hughes JP, **Williamson BD**, and Donnell D. Adaptive non-inferiority margins under observable non-constancy. *Statistical Methods in Medical Research*, 2018. doi: 10.1177/0962280218801134
4. *Feng J, ***Williamson BD**, Carone M, and Simon N. Nonparametric variable importance using an augmented neural network with multi-task learning. In *International Conference on Machine Learning*, volume 80, pages 1495–1504, 2018
3. Anchang B, Davis KL, Fienberg H, **Williamson B**, Bendall SC, Karacosta L, Tibshirani R, Nolan GP, and Plevritis SK. DRUG-NEM: optimizing drug combinations using single-cell perturbation response to account for intratumoral heterogeneity. *Proceedings of the National Academy of Sciences*, 115(18):E4294–E4303, 2018
2. Safren SA, Hughes JP, Mimiaga MJ, Moore AT, Friedman RK, Srithanaviboonchai K, Limbada M, **Williamson BD**, Elharrar V, Cummings V, Magidson JF, Gaydos CA, Celentano D, and Mayer KH for the HPTN063 Study Team. Frequency and predictors of estimated HIV transmissions and bacterial STI acquisition among HIV-positive patients in HIV care across three continents. *Journal of the International AIDS Society*, 19, 2016
1. Ritchwood TD, Hughes JP, Jennings L, MacPhail C, **Williamson B**, Selin A, Kahn K, Gómez-Olivé XF, and Pettifor A. Characteristics of age-discordant partnerships associated with HIV risk among young South African women (HPTN 068). *Journal of Acquired Immune Deficiency Syndromes*, 72:423–429, 2016

Preprints

5. *Benkeser D, ***Williamson BD**, Magaret CA, Nizam S, and Gilbert PB. Super LeArner Prediction of NAb Panels (SLAPNAP): a containerized tool for predicting combination monoclonal broadly neutralizing antibody sensitivity. *bioRxiv*, 2020. URL https://doi.org/10.1101/2020.06.23.167718
4. ***Williamson BD** and *Feng J. Efficient nonparametric statistical inference on population feature importance using Shapley values. *arXiv*, 2020. URL https://arxiv.org/abs/2006.09481
3. **Williamson BD**, Gilbert PB, Simon NR, and Carone M. A unified approach for inference on algorithm-agnostic variable importance. *arXiv*, 2020. URL https://arxiv.org/abs/2004.03683
2. **Williamson BD**, Hughes JP, and Willis AD. A multi-view model for relative and absolute microbial abundances. *bioRxiv*, 2019. doi: 10.1101/761486. URL https://www.biorxiv.org/content/early/2019/09/08/761486
1. **Williamson BD**, Gilbert PB, Simon N, and Carone M. Nonparametric variable importance assessment using machine learning techniques. *University of Washington Department of Biostatistics Working Paper Series*, (422), 2017. URL https://biostats.bepress.com/uwbiostat/paper422/

Software

`vimp`: perform inference on algorithm-agnostic variable importance (available on CRAN)

`vimpy`: perform inference on algorithm-agnostic variable importance in Python (available on PyPI)

`paramedic`: Predicting Absolute and Relative Abundance by Modeling Efficiency to Derive Intervals and Concentrations

`uwIntroStats`: R software for introductory biostatistics students

Presentations

"Efficient nonparametric statistical inference on population feature importance using Shapley values"

2020 *Thirty-seventh International Conference on Machine Learning*, Virtual meeting (planned for Vienna, Austria)

"Guiding HIV-1 Antibody Regimen Down-Selection and Prevention Efficacy Trial Design Using Machine Learning"

2020 *27th International Dynamics and Evolution of HIV and Other Human Viruses Meeting*, Virtual meeting (planned for Lake Arrowhead, CA)

"A Unified Approach to Nonparametric Variable Importance Assessment"

2019 *Joint Statistical Meetings*, Denver, CO (selected for an *ASA Nonparametrics Section Travel Award*)

"Assessing Variable Importance Nonparametrically using Machine Learning Techniques"

2018 *University of Washington Department of Biostatistics Colloquium*, Seattle, WA *(Invited speaker)*

Joint Statistical Meetings, Vancouver, BC, Canada (selected for an *ASA Biometrics Section Travel Award*)

2017 *WNAR of the International Biometric Society*, Santa Fe, NM (selected as the *Most Outstanding Oral Paper*)

University of Washington Statistical Learning Applied to Biostatistics Lab, Seattle, WA

2016 *University of Washington Department of Biostatistics Student Seminar*, Seattle, WA

"Nonparametric variable importance using an augmented neural network with multi-task learning"

2018 *Thirty-fifth International Conference on Machine Learning*, Stockholm, Sweden

"An Introduction to Targeted Learning"

2017 *University of Washington Department of Biostatistics Student Seminar*, Seattle, WA

"Shrinkage Estimators for High-Dimensional Covariance Matrices"

2014 *Pomona College Mathematics Seminar*, Clarement, CA

"Automating Cell Gating and Creating a Nested Effects Model to Compare Drug Effects"

2013 *Stanford University Center for Cancer Systems Biology Meeting*, Stanford, CA

Poster Presentations

5. Feng J, **Williamson BD**, Carone M, and Simon N. Nonparametric variable importance using an augmented neural network with multi-task learning. 35th International Conference on Machine Learning. July 2018, Stockholm, Sweden.
4. **Williamson BD**, Magaret CA, Borate B, Carpp LN, Georgiev I, Setliff I, Dingens A, Benkeser DC, Simon N, Carone M, Simpkins C, Montefiori D, Alter G, Yu WH, DeCamp AC, Juraska M, Edlefsen PT, Karuna S, Edugupanti S, and Gilbert PB. HIV-1 Sequence Predictors of VRC01 Neutralization Sensitivity. 25th Internatnional Dynamics and Evolution of HIV and Other Human Viruses Meeting. April 2018, Leavenworth, WA.
3. **Williamson B**, Gilbert P, Simon N, and Carone M. Assessing Variable Importance Nonparametrically using Machine Learning Techniques. University of Washington Biostatistics Department Retreat. November 2017, Seattle, WA.

2. **Williamson B**, Gilbert P, Simon N, and Carone M. Assessing Variable Importance Nonparametrically using Machine Learning Techniques. Joint Statistical Meetings. July 2017, Baltimore, MD.

1. **Williamson B**, Carone M, and Simon N. Assessing Variable Importance Nonparametrically. University of Washington Biostatistics Department Retreat. September 2015, Blaine, WA.

Professional Societies

WNAR of the International Biometric Society	08/2014–Present
American Statistical Association	03/2013–Present
Sigma Xi: the Scientific Research Honor Society	05/2014–Present