# Brian David Williamson

*Curriculum Vitae*

*last updated: 12 March, 2024*

## Biographical Information


Brian D. Williamson, PhD
Assistant Investigator
Kaiser Permanente Washington Health Research Institute (KPWHRI)
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## Education

2019 **Ph.D., Biostatistics**, *University of Washington*.
Committee: Marco Carone (co-chair), Noah Simon (co-chair), Scott Emerson, Peter Gilbert
Dissertation title: *A unified approach to model-agnostic variable importance*

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

2014 **B.A., Mathematics**, *Pomona College*.

## Licensure

Not applicable

## Professional Positions

09/2021–Present **Assistant Investigator**, *Biostatistics Division, Kaiser Permanente Washington Health Research Institute*.

01/2020–09/2021 **Post-doctoral research fellow**, *Vaccine and Infectious Disease Division, Fred Hutchinson Cancer Research Center*.

09/2015–12/2019 **Research Assistant**, *Statistical Center for HIV/AIDS Research and Prevention, Fred Hutchinson Cancer Research Center*.

06/2013–08/2013 **Integrative Cancer Biology Program Research Fellow**, *Stanford University*.

### Affiliations

03/2023–Present **Affiliate Assistant Professor**, *Department of Biostatistics, University of Washington*.

01/2022–Present **Affiliate Investigator**, *Biostatistics, Bioinformatics, and Epidemiology Program, Vaccine and Infectious Disease Division, Fred Hutchinson Cancer Center*.

## Honors, Awards, and Scholarships

### Research Communication and Travel Awards

2019 Nonparametrics Section Travel Award, American Statistical Association (ASA)

2018 Biometrics Section Travel Award, ASA

2017 Most Outstanding Oral Paper Award, Western North American Region (WNAR) of the International Biometric Society

2017 Graduate School Fund for Excellence and Innovation Travel Award, University of Washington (UW)

2017 Graduate and Professional Student Senate Travel Grant, UW

2013 Best Insight Award, UCLA DataFest

### Teaching and Service Awards

2022 ICML Best Reviewer (top 10% of reviewers for ICML 2022)

2019 Exceptional Service in Biostatistics Award, UW Department of Biostatistics

2018 Excellence in Teaching Award, UW Department of Biostatistics

### Academic Honors and Awards

2014 Top Scholar Incoming Student Award, UW Department of Biostatistics

2014 Distinction in the Senior Exercise, Pomona College

## Organizational Service

### At KPWHRI:

05/2022–09/2022 Member: Open-rank Collaborative Biostatistician Search Committee

11/2021–Present Member: Equity, Inclusion, and Diversity Standing Committee

### At Fred Hutchinson Cancer Research Center:

2022 Co-chair, Keynote and short talks, Hutch United Symposium

03/2020–09/2021 Member: Hutch United Outreach Committee

### At University of Washington Department of Biostatistics:

02/2019–06/2019 Member: Chair's Task Force on Professionalism; resulted in the UW Biostatistics Code of Conduct

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

09/2016–12/2019 Peer Mentor: UW Biostatistics Peer Mentoring Program

09/2015–09/2018 Member: Educational Policy and Teaching Evaluation Committee

## External Professional Activities

### Mentorship roles

2020, 2021 Mentor: Graduate Student Mentorship Initiative, Científico Latino

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

### National Service

2024 Session chair (WNAR contributed session), "Efficient Statistical Methods and Study Designs for Addressing Complex Research Questions", Joint Statistical Meetings

2024 Organizer (invited session), "Recent developments in the design and analysis of cluster-randomized trials", WNAR of the International Biometric Society Meeting

2023, 2024 Member: WNAR Student Paper Competition Committee

2022 Organizer and session chair (invited session), "Methods for inference on variable importance using machine learning", International Chinese Statistical Association (ICSA) Applied Statistics Symposium

2021, 2022 Member: ASA Biometrics Section Byar Award Committee

05/2021–09/2023 Member: Justice, Equity, Diversity, and Inclusion Committee of WNAR

2017 Session chair (invited session), "Quantification, Association Testing, and Integration of the Microbiome", Joint Statistical Meetings

### Manuscript reviewer

Annals of Statistics

Biometrics

Data Mining and Knowledge Discovery

Epidemiology

International Conference on Learning Representations (ICLR)

International Conference on Machine Learning (ICML)

International Journal of Biostatistics

Journal of the American Statistical Association (Theory & Methods)

Journal of Machine Learning Research

Journal of the Royal Statistical Society: Series B (Statistical Methodology)

Machine Learning in Computational Biology (2019–2021)

Neural Information Processing Systems (NeurIPS)

Observational Studies

Statistics in Medicine

Vaccine

### Ad hoc reviewer for research proposals from granting agencies

Patient-Centered Outcomes Research Institute (PCORI) Cardiovascular Health Merit Review Panel, Cycle 3 2023

### Memberships in professional organizations

American Statistical Association

International Biometric Society, Western North America Region (WNAR)

## Bibliography

(a) Refereed research articles

( the symbol ★ denotes joint first-author contribution )

( the symbol △ denotes contribution as primary analyst )

( the symbol ⋈ denotes contribution as a team statistician )

( the symbol ♢ denotes contribution as lead statistician )

( the symbol ♡ denotes contribution as a subject-matter mentor )

( the symbol ♠ indicates that the lead author is a student-advisee )

( *Published or in press* )

(29) Magaret CA, Li L, deCamp AC, Rolland M, Juraska M, ⋈**Williamson BD**, Ludwig J, Molitor

C, Benkeser D, Carpp LN, Greninger A, Roychoudhury P, Sadoff J, Gray GE, Vandebosch A, Grinsztejn B, Goepfert PA, Truyers C, Van Dromme I, Swann E, Marovich MA, Neuzil KM, Corey L, Hyrien O, and Gilbert PB. Quantifying how single dose Ad26.CoV2S vaccine efficacy depends on spike sequence features. *Nature Communications*, 2024. doi: 10.1038/s41467-024-46536-w

(28) Juraska M, Bai H, deCamp AC, Magaret CA, Li L, Gillespie K, Carpp LN, Giorgi EE, Ludwig J, Molitor C, Hudson A, ♡**Williamson BD**, Espy N, Simpkins B, Rudnicki E, Shao D, Rossenkhan R, Edlefsen P, Westfall DH, Deng W, Chen L, Zhao H, Bhattacharya T, Murrell B, Yssel A, Matten D, York T, Geaume N, Gwashu-Nyangiwe A, Ndabambi N, Thebus R, Karuna ST, Morris L, Montefiori DC, Hural JA, Cohen MS, Corey L, Rolland M, Gilbert PB, Williamson C, and Mullins JI. Prevention efficacy of the broadly neutralizing antibody VRC01 depends on HIV-1 envelope sequence features. *Proceedings of the National Academy of Sciences*, 2023. doi: 10.1073/pnas.2308942121

(27) Hsu C, **Williamson BD**, Becker M, Berry B, Cook AJ, Derus A, Estrada C, Gacuiri M, Kone A, McCracken C, McDonald B, Piccorelli AV, Senturia K, Volney J, Wilson KB, and Green BB. Engaging staff to improve COVID-19 vaccination response at long term care facilities (ENSPIRE): protocol for a cluster randomized trial of co-designed, tailored vaccine promotion materials. *Contemporary Clinical Trials*, 2023. doi: 10.1016/j.cct.2023.107403

(26) Smith JC, ♢△**Williamson BD**, Cronkite D, Park D, Whitaker JM, McLemore MF, Osmanski JT, Winter R, Ramaprasan A, Kelley A, Shea M, Wittayanukorn S, Stojanovic D, Zhao Y, Dutcher S, Toh D, Johnson KB, Aranoff DM, and Carrell DC. Data-driven automated classification algorithms for acute health conditions: applying PheNorm to COVID-19 disease. *Journal of the American Medical Informatics Association*, 2023. doi: 10.1093/jamia/ocad241

(25) **Williamson BD** and Huang Y. Flexible variable selection in the presence of missing data. *International Journal of Biostatistics*, 2023. doi: 10.1515/ijb-2023-0059

(24) **Williamson BD**, Coley RY, Hsu C, McCracken CE, and Cook AJ. Considerations for subgroup analyses in cluster-randomized trials based on aggregated individual-level predictors. *Prevention Science*, 2023. doi: 10.1007/s11121-023-01606-1

(23) Dang LE, Gruber S, Lee H, Dahabreh I, Stuart EA, **Williamson BD**, Wyss R, Díaz I, Ghosh D, Kıcıman E, Alemayehu D, Hoffman KL, Vossen CY, Huml RA, Ravn H, Kvist K, Pratley R, Shih M, Pennello G, Martin D, Waddy SP, Barr CE, Akacha M, Buse JB, van der Laan M, and Petersen M. A causal roadmap for generating high-quality real-world evidence. *Journal of Clinical and Translational Sciences*, 2023. doi: 10.1017/cts.2023.635

(22) ★**Williamson BD**, ★Wyss R, Stuart EA, Dang LE, Mertens AN, Neugebauer RS, Wilson A, and Gruber S. An application of the causal roadmap in two safety monitoring case studies: Covariate-adjustment and outcome prediction using electronic health record data. *Journal of Clinical and Translational Sciences*, 2023. doi: 10.1017/cts.2023.632

(21) △**Williamson BD**, Magaret CA, Karuna S, Carpp LN, Gelderblom HC, Huang Y, Benkeser D, and Gilbert PB. Application of the SLAPNAP statistical learning tool to broadly neutralizing antibody HIV prevention research. *iScience*, 2023. doi: 10.1016/j.isci.2023.107595

(20) Balderson BH, Gray SL, Fujii MM, Nakata KG, **Williamson BD**, Cook AJ, Wellman R, Theis MK, Lewis CC, Key D, and Phelan EA. A health-system-embedded deprescribing intervention targeting patients and providers to prevent falls in older adults (STOP-FALLS trial): Study protocol for a pragmatic cluster-randomized controlled trial. *Trials*, 2023. doi: 10.1186/s13063-023-07336-7

(19) Benkeser D, Montefiori DC, McDermott AB, Fong Y, Janes HE, Deng W, Zhou H, Houchens CR, Martins K, Jayashankar L, Castellino F, Flach B, Lin BC, O'Connell S, McDanal C, Eaton A, Sarzotti-Kelsoe M, Lu Y, Yu C, Borate B, van der Laan LWP, Hejazi NS, Kenny A, Carone M, ⋈**Williamson BD**, Garver J, Altonen E, Rudge T, Huynh C, Miller J, El Sahly HM, Baden LR, Frey S, Malkin E, Spector SA, Andrasik MP, Kublin JG, Corey L, Neuzil KM, Carpp LN, Pajon R, Follmann D, Donis RO, Koup RA, Gilbert PB, Immune Assays Team, Coronavirus Prevention Network (CoVPN)/2019nCoV-301 Principal Investigators and Study Team, and United States Government (USG)/CoVPN Biostatistics Team. Comparing and combining antibody assays

as correlates of protection against COVID-19 in the COVE mRNA-1273 vaccine efficacy trial. *Science Translational Medicine*, 2023. doi: 10.1126/scitranslmed.ade9078

(18) Chen YT, **Williamson BD**, Okonek T, Wolock C, Spieker AJ, Hee Wai TY, Hughes JP, Emerson SS, and Willis AD. rigr: regression, inference, and general data analysis tools in R. *The Journal of Open Source Software*, 2022. doi: 10.21105/joss.04847

(17) Huang Y, Zhang Y, Seaton KE, De Rosa S, Heptinstall J, Carpp LN, Randhawa AK, McKinnon LR, McLaren P, Viegas E, Gray GE, Churchyard G, Buchbinder SP, Edupuganti S, Bekker LG, Keefer MC, Hosseinipour MC, Goepfert PA, Cohen KW, ♡**Williamson BD**, McElrath MJ, Tomaras GD, Thakar J, Kobie J, HVTN 703/SAAVI 102 Protocol Leadership Team, HVTN 086/SAAVI 103 Protocol Leadership Team, HVTN 094 Protocol Leadership Team, HVTN 097 Protocol Leadership Team, HVTN 098 Protocol Leadership Team, HVTN 100 Protocol Leadership Team, HVTN 105 Protocol Leadership Team, HVTN 111 Protocol Leadership Team, and HVTN 205 Protocol Leadership Team. Baseline host determinants of robust human HIV-1 vaccine-induced immune responses: a meta-analysis of 26 vaccine regimens. *eBioMedicine*, 84, 2022. doi: 10.1016/j.ebiom.2022.104271

(16) Hughes JP, △**Williamson BD**, Krakauer C, Chau G, Ortiz B, Wakefield J, Hendrix C, Amico KR, Holtz TH, Bekker LG, and Grant R. Combining information to estimate adherence in studies of pre-exposure prophylaxis for HIV prevention: application to HPTN 067. *Statistics in Medicine*, 2022. doi: 10.1002/sim.9321

(15) Han S, **Williamson BD**, and Fong Y. Improving random forest predictions in small datasets from two-phase sampling designs. *BMC Medical Informatics and Decision Making*, 21:322, 2021. doi: 10.1186/s12911-021-01688-3

(14) **Williamson BD**, Gilbert PB, Simon NR, and Carone M. A general framework for inference on algorithm-agnostic variable importance. *Journal of the American Statistical Association (Theory & Methods)*, 2021. doi: 10.1080/01621459.2021.2003200

(13) Huang Y, △**Williamson BD**, Moodie Z, Carpp LN, Chambonneau L, DiazGranados CA, and Gilbert PB. Analysis of neutralizing antibodies as a correlate of instantaneous risk of hospitalized dengue in placebo recipients of dengue vaccine efficacy trials. *The Journal of Infectious Diseases*, 2021. doi: 10.1093/infdis/jiab342

(12) **Williamson BD**, Hughes JP, and Willis AD. A multi-view model for relative and absolute microbial abundances. *Biometrics*, 2021. doi: 10.1111/biom.13503

(11) △**Williamson BD**, Magaret CA, Gilbert PB, Nizam S, Simmons C, and Benkeser D. Super LeArner Prediction of NAb Panels (SLAPNAP): a containerized tool for predicting combination monoclonal broadly neutralizing antibody sensitivity. *Bioinformatics*, 2021. doi: 10.1093/bioinformatics/btab398

(10) **Williamson BD**, Gilbert PB, Carone M, and Simon N. Nonparametric variable importance assessment using machine learning techniques (with discussion). *Biometrics*, 2020. doi: 10.1111/biom.13392 *(one of the top-cited papers published in Biometrics during 2020–2021)*

(9) Duke ER, ♡**Williamson BD**, Borate B, Golob JL, Wychera C, Stevens-Ayers T, Huang M-L, Cossrow N, Wan H, Mast CT, Marks MA, Flowers ME, Jerome KR, Corey L, Gilbert PB, Schiffer JT, and Boeckh MJ. Cytomegalovirus viral load kinetics as surrogate endpoints after allogeneic transplantation. *The Journal of Clinical Investigation*, 2020. doi: 10.1172/JCI133960

(8) ★**Williamson BD** and ★Feng J. Efficient nonparametric statistical inference on population feature importance using Shapley values. In *Proceedings of the 37th International Conference on Machine Learning*, volume 119 of *Proceedings of Machine Learning Research*, pages 10282–10291, 2020. URL http://proceedings.mlr.press/v119/williamson20a.html *(Acceptance rate: 22%)*

(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 *Proceedings of the 35th International Conference on Machine Learning*, volume 80 of *Proceedings of Machine Learning Research*, pages 1495–1504, 2018. URL http://proceedings.mlr.press/v80/feng18a.html *(Acceptance rate: 25%)*

(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. doi: 10.1073/pnas.1711365115

(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. doi: 10.7448/IAS.19.1.21096

(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. doi: 10.1097/QAI.0000000000000988

( *Submitted or under revision* )

(10) Shi X, Zhai Y, Yu X, Li X, Hazlehurst B, Nyongesa D, Sapp D, **Williamson B**, Carrell D, Healy L, Cushing-Haugen K, Wong J, Wang S, Floyd J, Shattuck K, McGowan S, Alam S, Hernández-Muñoz J, Li J, Ma Y, Stojanovic D, Raman S, Davis S, Cai T, Nelson J, and Heagerty P. Harmonizing electronic health record data across FDA sentinel initiative data partners using privacy-protecting unsupervised learning: Case study and lessons learned. 2024

(9) Yu X, Zhai Y, Hazlehurst B, **Williamson BD**, Hernández-Muñoz J, Ma Y, Cai T, Nelson J, Heagerty P, and Shi X. Comparing medical code endorsement between healthcare systems using privacy-enhancing tests. 2024

(8) Bann MA, Carrell DS, Gruber S, Heagerty PJ, △**Williamson BD**, Nelson JC, Hazlehurst B, Felcher A, Nyongesa DB, Slaughter MT, Sapp DS, Cronkite DJ, Ball R, and Floyd JS. A comparison of manual and automated approaches to developing computable algorithms for identifying acute pancreatitis. 2024

(7) Kahn GD, ♡**Williamson BD**, Stuart EA, and Shortreed SM. Use of knockoffs for variable selection to identify predictors of self-harm in an adolescent population. 2024

(6) Phelan EA, △**Williamson BD**, Balderson BH, Cook AJ, Piccorelli AV, Fujii MM, Nakata KG, Graham VF, Theis MK, Turner JP, Tannenbaum C, and Gray SL. Reducing central nervous system-active medications to prevent falls and injuries in older adults: a pragmatic, cluster-randomized controlled clinical trial. 2023

(5) **Williamson BD**, Wu L, Huang Y, Hudson A, and Gilbert PB. Predicting neutralization susceptibility to combination HIV-1 monoclonal broadly neutralizing antibody regimens. *bioRxiv*, 2023. doi: 10.1101/2023.12.14.571616

(4) **Williamson BD** and Huang Y. flevr: flexible, ensemble-based variable selection in R. 2023

(3) **Williamson BD**, King D, and Huang Y. Practical considerations for variable screening in the Super Learner. *arXiv*, 2023. URL https://arxiv.org/pdf/2311.03313.pdf

(2) **Williamson BD**, Moodie EEM, and Shortreed SM. Inference on summaries of a model-agnostic longitudinal variable importance trajectory. *arXiv*, 2023. URL https://arxiv.org/pdf/2311.01638.pdf

(1) Carrell DS, Floyd JS, Gruber S, Hazlehurst BL, Heagerty PJ, Nelson JL, **Williamson BD**, and Ball R. Towards a scalable approach to computable phenotyping using EHR data. 2023

(b) Other refereed scholarly publications

(6) Frutos AM, Price AM, Harker E, Reeves EL, Ahmad HM, Murugan V, Martin ET, House S, Saade EA, Zimmerman RK, Gaglani M, Wernli KJ, Walter EB, Michaels MG, Staat MA, Weinberg GA, Selvarangan R, Boom JA, Klein EJ, Halasa NB, Ginde AA, Gibbs KW, Zhu Y, Self WH, Tartof SY, Klein NP, Dascomb K, DeSilva MB, Weber ZA, Yang D, Ball SW, Surie D, DeCuir J, Dawood FS, Moline HL, Toepfer AP, Clopper B, Link-Gelles R, Payne AB, Chung JR, Flannery B, Lewis NM, Olson SM, Adams K, Tenforde MW, Garg S, Grohskopf LA, Reed C, Ellington S, and **CDC Influenza Vaccine Effectiveness Collaborators (incl. Williamson BD)**. Interim estimates of 2023–24 seasonal influenza vaccine effectiveness — United States, 2024

(5) Benkeser D, Fong Y, Janes HE, Kelly EJ, Hirsch I, Sproule S, Stanley AM, Maaske J, Villafana T, Houchens CR, Martins K, Jayashankar L, Castellino F, Ayala V, Petropoulos CJ, Leith A, Haugaard D, Webb B, Lu Y, Yu C, Borate B, van der Laan LWP, Hejazi NS, Carpp LN, Randhawa AK, Andrasik MP, Kublin JG, Isaacs MB, Makhene M, Tong T, Robb ML, Corey L, Neuzil KM, Follmann D, Hoffman C, Falsey AR, Sobieszczyk M, Koup RA, Donis RO, Gilbert PB, AstraZeneca AZD1222 Clinical Study Group, Immune Assays Team, and **United States Government (USG)/CoVPN Biostatistics team (incl. ⋈Williamson BD)**. Immune correlates analysis of a phase 3 trial of the AZD1222 (ChAdOx1 nCoV-19) vaccine. *npj Vaccines*, 8(1):36, 2023

(4) Fong Y, Huang Y, Benkeser D, Carpp LN, Áñez G, Woo W, McGarry A, Dunkle LM, Cho I, Houchens CR, Martins K, Jayashankar L, Castellino F, Petropoulos CJ, Leith A, Haugaard D, Webb B, Lu Y, Yu C, Borate B, van der Laan LWP, Hejazi NS, Randhawa AK, Andrasik MP, Kublin JG, Hutter J, Keshtkar-Jahromi M, Beresnev TH, Corey L, Neuzil KM, Follmann D, Ake JA, Gay CL, Kotloff KL, Koup RA, Donis RO, Gilbert PB, Immune Assays Team, Coronavirus Prevention Network (CoVPN)/2019nCoV-301 Principal Investigators and Study Team, and **United States Government (USG)/CoVPN Biostatistics Team (incl. ⋈Williamson BD)**. Immune correlates analysis of the PREVENT-19 COVID-19 vaccine efficacy clinical trial. *Nature Communications*, 2022. doi: 10.1101/2022.06.22.22276362

(3) Fong Y, McDermott AB, Benkeser D, Roels S, Stieh DJ, Vandenbosch A, Le Gars M, Van Roey GA, Houchens CR, Martins K, Jayashankar L, Castellino F, Amoa-Awua O, Basappa M, Flach B, Lin BC, Moore C, Naisan M, Naqvi M, Narpala S, O'Connell S, Mueller A, Serebryanny L, Castro M, Wang J, Petropoulos CJ, Luedtke A, Hyrien O, Lu Y, Yu C, Borate B, van der Laan LWP, Hejazi NS, Kenny A, Carone M, Wolfe DN, Sadoff J, Gray GE, Grinsztejn B, Goepfert PA, Little SJ, Paiza de Sousa L, Maboa R, Randhawa AK, Andrasik MP, Hendricks J, Truyers C, Struyf F, Schuitemaker H, Douoguih M, Kublin JG, Corey L, Neuzil KM, Carpp LN, Follmann D, Gilbert PB, Koup RA, Donis RO, Janssen Team, Coronavirus Vaccine Prevention Network (CoVPN)/ENSEMBLE Team, and **United States Government (USG)/CoVPN Biostatistics Team (incl. ⋈Williamson BD)**. Immune correlates analysis of a single Ad26.COV2.S dose in the ENSEMBLE COVID-19 vaccine efficacy clinical trial. *Nature Microbiology*, 2022. doi: 10.1038/s41564-022-01262-1

(2) Gilbert PB, Montefiori DC, McDermott AB, Fong Y, Benkeser D, Deng W, Zhou H, Houchens CR, Martins K, Jayashankar L, Castellino F, Flach B, Lin BC, O'Connell S, McDanal C, Eaton A, Sarzotti-Kelsoe M, Lu Y, Yu C, Borate B, van der Laan LWP, Hejazi N, Huynh C, Miller J, El Sahly HN, Baden LR, Baron M, De La Cruz L, Gay C, Kalams S, Kelley CF, Andrasik MP, Kublin JG, Corey L, Neuzil KM, Carpp LN, Pajon R, Follmann D, Donis RO, Koup RA, Immune Assays Team,

Moderna Inc. Team, Coronavirus Prevention Network (CoVPN)/Coronavirus Efficacy (COVE) Team, and **United States Government (USG)/CoVPN Biostatistics Team (incl. ⋈Williamson BD)**. Immune correlates analysis of the mRNA-1273 COVID-19 vaccine efficacy clinical trial. *Science*, 2021. doi: 10.1126/science.abm3425

(1) **Williamson BD**, Gilbert PB, Carone M, and Simon N. Rejoinder to "Nonparametric variable importance assessment using machine learning techniques". *Biometrics*, 2020. doi: 10.1111/biom.13389

(c) Books and book chapters

N/A

(d) Other non-refereed scholarly publications

(1) Gilbert PB, Fong Y, Benkeser D, Andriesen J, Borate B, Carone M, Carp LN, Díaz I, Fay MP, Fiore-Gartland A, Hejazi NS, Huang Y, Huang Y, Hyrien O, Janes HE, Juraska M, Li K, Luedtke A, Nason M, Randhawa AK, van der Laan L, ⋈**Williamson BD**, Zhang W, and Follman D. USG COVID-19 Response Team / CoVPN Vaccine Efficacy Trial Immune Correlates Statistical Analysis Plan. 2021. doi: 10.6084/m9.figshare.13198595

## 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)

`lvimp` perform inference on longitudinal summaries of algorithm-agnostic variable importance

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

SLAPNAP Super Learner Predictions using NAb Panels (available on DockerHub)

`rigr` regression, inference, and general data analysis tools for R (available on CRAN)

`flevr` flexible, ensemble-based variable selection with potentially missing data (available on CRAN)

## Patents and Intellectual Property

Not applicable

## Funding History

(a) Current funded projects

(1) Co-investigator (20% FTE), **Subset calibration methods**; FDA (75F40122F19005); PI: Shaw; total direct costs: $445,409; 04/2023–09/2024

(2) Co-investigator (20% FTE), **Statistical Methods for Correlated Outcomes and Covariate Errors in Studies of HIV/AIDS**; NIAID (R01 AI131771); PIs: Shepherd and Shaw; total direct costs: $3,217,800; 02/2023–01/2028

(3) Co-investigator (10–20% FTE), **Evaluating Influenza, SARS-CoV-2, and Other Respiratory Virus Vaccine Effectiveness in Prevention of Acute Illness in Washington State 2022–2027**; CDC (U01 IP001191); PI: Wernli; total direct costs: $6,100,000; 01/2023–09/2027.

(4) Co-investigator (5–15% FTE), **Advancing scalable natural language processing approaches for unstructured electronic health record data**; FDA (75F40119D10037); PIs: Carrell and Smith; total direct costs: ; 08/2022–01/2023.

(5) Co-investigator (20–40% FTE), **Reducing CNS-active Medications to Prevent Falls and Injuries in Older Adults**; CDC (U01 CE002967); PI: Phelan; total direct costs: $1,303,841; 09/30/2018–09/29/2023.

(6) Co-investigator (10–20% FTE), **Engaging Staff to Improve COVID-19 Vaccination Rates at Long Term Care Facilities (ENSPIRE)**; PCORI (COVID-2021C2-1368); PI: Hsu; total direct costs: $3,979,799; 8/1/2021–1/31/2025.

(7) Co-investigator (15–25% FTE), **Improved tailoring of depression care using customized clinical decision support**; NIMH (R01 MH114873); PIs: Shortreed and Moodie; total direct costs: $1,000,000; 09/14/2021–09/29/2022.

(8) Co-investigator (5–15% FTE), **The Sentinel Operations Center Learning Phenotype Laboratory, Phase 3 Task Order**; FDA (75F40119D10037); PIs: Carrell and Nelson; total direct costs: $230,509; 09/14/2021–09/29/2022.

(b) Completed or past funded projects

(1) Postdoctoral research fellow, **SDMC: HIV Vaccine Trials Network**; NIAID (UM1 AI068635); PIs: Gilbert, Huang, and Janes; 07/2021–09/2021.

(2) Postdoctoral research fellow, **Nutrition and Physical Activity Assessment Study**; NCI (R01 CA119171); PI: Neuhouser; 03/2021–09/2021.

(3) Postdoctoral research fellow, **Statistical Methods for HIV-1 Immune Correlates Studies**; NIAID (R01 AI122991); PI: Fong; 04/2021–07/2021.

(4) Postdoctoral research fellow, **Detection and Prognosis of Early-Stage Pancreatic Cancer by Interdependent Plasma Markers**; NCI (U01 CA152653); PI: Haab; 03/2020–07/2021.

(5) Postdoctoral research fellow, **A Clinical Validation Center for Early Detection of Pancreatic Cancer**; NCI (U01 CA152653); PI: Maitra; 02/2020–03/2021.

(6) Postdoctoral research fellow, **Statistical Methods for Selection and Evaluation of Biomarkers**; NIGMS (R01 GM106177); PI: Huang; 01/2020–01/2021.

(7) Postdoctoral research fellow, **Statistical Methods in HIV Vaccine Efficacy Trials**; NIAID (R37 AI054165); PI: Gilbert; 03/2020–06/2020.

(8) Postdoctoral research fellow, **How Did a Vaccine Enhance HIV Acquisition?**; NIAID (R01 AI118590); PI: Miller; 01/2020–05/2020.

(9) Principal investigator (50% FTE), **Evaluating predictors of HIV vaccine efficacy: Statistical methods for estimation, testing, and inference**; NIAID (F31 AI140846); PI: Williamson; 09/2018–12/2019.

(10) Research assistant (50% FTE), **Statistical Methods for AIDS Research**; NIAID (R01 AI029168); PI: Hughes; 09/2015–09/2018.

## Conferences and Symposiums

Invited Presentations
International:

7. “Placeholder”. Joint Statistical Meetings. Portland, Oregon, 2024. *(one of 40 invited posters)*

6. “Inference for Model-Agnostic Variable Importance”. Statistics Seminar at Institut Curie. Paris, France, 2024. (presented virtually)

5. “Inference for Model-Agnostic Longitudinal Variable Importance”. IMS International Conference on Statistics and Data Science. Lisbon, Portugal, 2023.

4. “Scalable Phenotyping for Safety Outcomes Using Electronic Health Record Data”. Forum on the Integration of Observational and Randomized Data. Washington, DC, 2022.

3. “Inference for Model-Agnostic Longitudinal Variable Importance”. 15th International Conference of the European Consortium for Informatics and Mathematics Working Group on Computational and Methodological Statistics (CMStatistics). London, United Kingdom, 2022. (presented virtually)

2. "Inference for Model-Agnostic Variable Importance". ICSA Applied Statistics Symposium. Gainesville, Florida, 2022.

1. "Inference for Model-Agnostic Variable Importance". ASA Statistical Learning and Data Science Section Webinar Series. Virtual, 2022.

National:

4. "Design considerations for subgroup analyses in cluster-randomized trials based on aggregated individual-level predictors". WNAR of the International Biometric Society Meeting. Fort Collins, Colorado, 2024.

3. "Inference for Model-Agnostic Longitudinal Variable Importance". Mental Health Research Network Methods Scientific Interest Group. Virtual, 2023.

2. "Inference for Algorithm-Agnostic Variable Importance". WNAR of the International Biometric Society Meeting. Virtual, 2021.

1. "A Unified Approach to Inference on Algorithm-Agnostic Variable Importance". Vanderbilt University Department of Biostatistics Seminar. Virtual, 2020.

Local:

6. "Statistics in Infectious Disease Research". University of Washington Biostatistics 111 Seminar. Seattle, Washington, 2023.

5. "Model-Agnostic Variable Importance and Selection". University of Washington Department of Biostatistics Seminar. Virtual, 2022.

4. "Inference for Model-Agnostic Variable Importance". Third Annual Hutch United Symposium. Virtual, 2021. *(keynote)*

3. "Inference for Model-Agnostic Variable Importance". Kaiser Permanente Washington Health Research Institute Seminar. Virtual, 2021.

2. "Statistical Inference and Containerization in Computational Pipelines". Fred Hutchinson Cancer Research Center Biostatistics Program Seminar. Virtual, 2021.

1. "Assessing Variable Importance Nonparametrically using Machine Learning Techniques". University of Washington Department of Biostatistics Colloquium. Seattle, Washington, 2018.

Contributed Presentations

10. "Efficient Nonparametric Statistical Inference on Population Feature Importance using Shapley Values". Thirty-seventh International Conference on Machine Learning. Virtual, 2020.

9. "Guiding HIV-1 Antibody Regimen Down-Selection and Prevention Efficacy Trial Design Using Machine Learning". 27th International Dynamics and Evolution of HIV and Other Human Viruses Meeting. Virtual, 2020.

8. "A Unified Approach to Nonparametric Variable Importance Assessment". Joint Statistical Meetings. Denver, Colorado, 2019 (selected for an ASA Nonparametrics Section Travel Award).

7. "Assessing Variable Importance Nonparametrically using Machine Learning Techniques". Joint Statistical Meetings. Vancouver, BC, Canada, 2018 (selected for an ASA Biometrics Section Travel Award).

6. "Nonparametric Variable Importance Using an Augmented Neural Network with Multi-Task Learning". Thirty-fifth International Conference on Machine Learning. Stockholm, Sweden, 2018.

5. "Assessing Variable Importance Nonparametrically using Machine Learning Techniques". WNAR of the International Biometric Society. Santa Fe, New Mexico, 2017 (selected as the Most Outstanding Oral Paper).

4. "Assessing Variable Importance Nonparametrically using Machine Learning Techniques". University of Washington Department of Biostatistics Student Seminar. Seattle, Washington, 2017.

3. "An Introduction to Targeted Learning". University of Washington Department of Biostatistics Student Seminar. Seattle, Washington, 2017.

2. "Shrinkage Estimators for High-Dimensional Covariance Matrices". Pomona College Mathematics Seminar. Claremont, California, 2014.

1. "Automating Cell Gating and Creating a Nested Effects Model to Compare Drug Effects". Stanford University Center for Cancer Systems Biology Meeting. Stanford, California, 2013.

Poster presentations:

5. "Nonparametric Variable Importance using an Augmented Neural Network with Multi-Task Learning". Thirty-fifth International Conference on Machine Learning. Stockholm, Sweden, 2018.

4. "HIV-1 Sequence Predictors of VRC01 Neutralization Sensitivity". 25th International Dynamics and Evolution of HIV and Other Human Viruses Meeting. Leavenworth, Washington, 2018.

3. "Assessing Variable Importance Nonparametrically using Machine Learning Techniques". University of Washington Biostatistics Department Retreat. Seattle, Washington, 2017.

2. "Assessing Variable Importance Nonparametrically using Machine Learning Techniques". Joint Statistical Meetings. Baltimore, Maryland, 2017.

1. "Assessing Variable Importance Nonparametrically". University of Washington Biostatistics Department Retreat. Blaine, Washington, 2015.

Non-technical, Outreach, and Mentoring presentations:

6. Panelist, "Alumni Panel". Pomona College Mathematics Department. Claremont, California, 2024.

5. Moderator for "Interdisciplinary Science Panel". Seattle Central College MESA-LSAMP Program. Virtual, 2021.

4. "Statistics in Infectious Disease Research". Roanoke Valley Governor's School for Science and Technology Computational Biology Course. Virtual, 2020.

3. Panelist for "LSAMP Virtual Research Panel". Seattle Central College MESA-LSAMP Program. Virtual, 2020.

2. "Fellowships, scholarships, and grants". Biostatistics Student Seminar, University of Washington. Seattle, Washington, 2018.

1. "Travel grants and conference funding". University of Washington Department of Biostatistics. Seattle, Washington, 2018.

## Teaching History

(a) Formal Courses, including Distance Learning

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

Summer 2016 (co-taught with G Tarr): 175 students

Summer 2017 (co-taught with J Williams-Nguyen): 175 students

Summer 2018 (co-taught with J Williams-Nguyen): 175 students

At the University of Washington

(1) Pre-Doctoral Instructor, Biostatistics 311 – Regression Methods in the Health Sciences
Spring 2018 (co-taught with K Grinde), enrollment: 12; median evaluation: 4.9/5.0

(2) Biostatistics 582 – Student Seminar
Spring 2022, Spring 2023

(b) Other Teaching

N/A

(c) Independent Study

(1) Ziyi Chen, MS Capstone candidate (with RY Coley and SM Shortreed), 01/2022–06/2022

(2) Emily Minus, MS Thesis candidate (with RY Coley and SM Shortreed), 01/2022–09/2022

(3) Runjia Zou, MS Capstone candidate (with RY Coley and SM Shortreed), 01/2022–06/2022

## Advising and Formal Mentoring

(a) PhD Dissertations, chair

N/A

(b) Master's Theses, chair

N/A

(c) Mentored Scientists and Postdocs

(1) Geoff Kahn, PhD, Postdoctoral fellow at Henry Ford Health System (10/2021–07/2023) (currently: Assistant scientist, Henry Ford Health System)

(d) MS and PhD committees in non-chair role

(1) Emily Minus (MS, Biostatistics; chair: RY Coley) (completed 06/2023) (currently: medical student, University of Pennsylvania)

(e) Other mentoring

(1) Liana Wu, SeattleStatSummer Intern, 06/2023–08/2023 (currently: undergraduate student, University of Washington)

(2) Charlie Wolock, Independent research supervision, 01/2022–08/2023 (currently: postdoctoral research fellow, University of Pennsylvania)

(3) Drew King, Fred Hutch / Seattle Central College MESA Intern (with Y Huang), 03/2021–08/2021 (currently: undergraduate student, University of Washington)

(4) Courtney Simmons, Emory University MS Capstone Project (chair: D Benkeser), 02/2021–05/2021 (currently: biostatistician, Wake Forest Baptist Health)