# Nicholas Williams

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## EDUCATION

| | | |
|---|---|---|
| Ph.D. | Ongoing | Biostatistics, University of California, Berkeley |
| M.P.H. | 2019 | Biostatistics, Columbia University |
| B.A. | 2017 | Psychology, University of Colorado at Boulder |

## PROFESSIONAL

### Academic

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|---|---|
| 2021- | Columbia University, Mailman School of Public Health<br>Senior Data Analyst III<br>Department of Epidemiology |
| 2019-21 | Weill Cornell Medical College<br>Research Biostatistician I<br>Division of Biostatistics, Department of Population Health Sciences |
| 2018 | Columbia University, Mailman School of Public Health<br>Research Assistant for Christine Mauro, Ph.D.<br>Department of Biostatistics |

### Consulting

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| 2021 | Bayer AG, Independent Consultant |

## RESEARCH INTERESTS

Nonparametric causal inference.

Research software engineering.

## PUBLICATIONS

### Research in statistics

2025      **Williams, N.**, Liu, R., Hoffman, K., Forrest, S., Rudolph, K. and Díaz, I. "Two-stage targeted minimum-loss based estimation for non-negative two-part outcomes." *Statistical Methods in Medical Research*. DOI: 10.1177/09622802251340245

2025    Díaz, I., **Williams, N.**, Hoffman, K. L. and Hejazi, N. S. "Author correction to: 'Causal survival analysis under competing risks using longitudinal modified treatment policies.'" *Lifetime Data Analysis*.

2025    Rudolph, K. E., **Williams, N. T.**, Stuart, E. A. and Díaz, I. "Improving efficiency in transporting average treatment effects." *Biometrika*.

2024    Rudolph, K. E., **Williams, N. T.** and Díaz, I. "Practical causal mediation analysis: Extending nonparametric estimators to accommodate multiple mediators and multiple intermediate confounders." *Biostatistics*.

2024    Rudolph, K. E., **Williams, N.** and Díaz, I. "Using instrumental variables to address unmeasured confounding in causal mediation analysis." *Biometrics*.

2023    Díaz, I., **Williams, N.** and Rudolph, K. E. "Efficient and flexible mediation analysis with time-varying mediators, treatments, and confounders." *Journal of Causal Inference*.

2023    Rudolph, K. E., **Williams, N. T.**, Miles, C. H., Antonelli, J. and Díaz, I. "All models are wrong, but which are useful? Comparing parametric and nonparametric estimation of causal effects in finite samples." *Journal of Causal Inference*.

2023    Rudolph, K. E., **Williams, N.** and Díaz, I. "Efficient and flexible estimation of natural direct and indirect effects under intermediate confounding and monotonicity constraints." *Biometrics*.

2022    **Williams, N.**, Rosenblum, M. and Díaz, I. "Optimizing Precision and Power by Machine Learning in Randomized Trials, with an Application to COVID-19." *Journal of the Royal Statistical Society: Series A*. DOI: 10.1111/rssa.12915

2021    Díaz, I., **Williams, N.**, Hoffman, K. and Schenck, E. "Non-parametric causal effects based on longitudinal modified treatment policies." *Journal of the American Statistical Association - Theory and Methods*. DOI: 10.1080/01621459.2021.1955691

**Applied Epidemiology**

2025    Rudolph, K.E., Inose, S., **Williams, N.T.**, Hoffman, K.L., Forrest, S.E., Ross, R.K., Milazzo, F., Diaz, I., Doan, L., Samples, H., Olfson, M., Crystal, S., Cerda, M. and Gao, Y.N. "Mediation of chronic pain and disability on opioid use disorder risk by pain management practices among adult Medicaid patients, 2016-2019." *American Journal of Epidemiology*.

2025    Perry, A., Krawczyk, N., Samples, H., Martins, S.S., Hoffman, K., **Williams, N.T.**, Hung, A., Ross, R., Doan, L., Rudolph, K.E. and Cerda, M. "Opioid Dose, duration, and risk of use disorder in Medicaid patients with musculoskeletal pain." *Pain Medicine*. DOI: 10.1093/pm/pnaf077

2024    Rudolph, K. E., **Williams, N. T.**, Díaz, I., Forrest, S., Hoffman, K. L., Samples, H., Olfson, M., Doan, L., Cerdá, M. and Ross, R. K. "Pain management treatments and opioid use disorder risk in Medicaid patients." *American Journal of Preventive Medicine*.

2024    Hoffman, K. L., Milazzo, F., **Williams, N. T.**, Samples, H., Olfson, M., Díaz, I., Doan, L., Cerdá, M., Crystal, S. and Rudolph, K. E. "Independent and joint contributions of physical disability and chronic pain to incident opioid use disorder and opioid overdose among Medicaid patients." *Psychological Medicine*.

2023    Rudolph, K.E., **Williams, N.**, Díaz, I., Luo, S.X., Rotrosen, J. and Nunes, E.V. "Optimally

choosing medication type for patients with opioid use disorder." *American Journal of Epidemiology*. DOI: 10.1093/aje/kwac217

2023    Rudolph, K. E., **Williams, N. T.**, Milazzo, F., Venkataramani, A. and O'Brien, R. "Has the opening of Amazon fulfillment centers affected demand for disability insurance?" *PLOS ONE*.

2022    Rudolph, K. E., **Williams, N. T.**, Goodwin, A. T. S., Shulman, M., Fishman, M., Díaz, I., Luo, S., Rotrosen, J. and Nunes, E. V. "Buprenorphine & methadone dosing strategies to reduce risk of relapse in the treatment of opioid use disorder." *Drug and Alcohol Dependence*.

2022    Hoffman, K.L., Schenck, E.J., Satlin, M.J., Whalen, W., Pan, D., **Williams, N.** and Díaz, I. "Comparison of a target trial emulation framework vs Cox regression to estimate the association of corticosteroids with COVID-19 mortality." *JAMA Network Open*. DOI: 10.1001/jamanetworkopen.2022.34425

2022    Min. J.Y., Simmons, W., Banerjee, S., Wang, F., **Williams, N.**, Zhang, Y., Reese, A.B., Mushlin, A.I. and Flory, J.H. "Association between antidiabetic drug use and the risk of COVID-19 hospitalization in the INSIGHT Clinical Research Network in New York City." *Diabetes, Obesity and Metabolism*. DOI: 10.1111/dom.14704

2022    Min, J.Y., **Williams, N.**, Simmons, W., Banerjee, S., Wang, F., Zhang, Y., Reese, A.B., Mushlin, A.I. and Flory, J.H. "Baselin Haemoglobin A1c and the Risk of COVID-19 Hospitalization Among Patients with Diabetes in the INSIGHT Clinical Research Network." *Diabetic Medicine*. DOI: 10.1111/dme.14815

2022    Hoffman, J.W., Bitar, R.C., **Williams, N.**, Steineman, B.D., Sturnick, D.R., Garrison, G.W., Demetracopoulos, C.A., Drakos, M.C. and O'Malley, M.J. "Orthosis and foot structure affect the fifth metatarsal principal strains during simulated level walking." *The American Journal of Sports Medicine*. DOI: 10.1177/03635465221079652

2022    Punjani, N., Alawamlh, O.H., Kim, S.J., Salter, C.A., Wald, G., Feliciano, M., **Williams, N.**, Dudley, V., and Goldstein, M. "Changes in semen analysis over time: A temporal trend analysis of 20 years of subfertile non-azoospermic men." *World Journal of Mens Health*. DOI: 10.5534/wjmh.210201

2021    Winston, G., Guadix, S., Lavieri, M., Uribe-Cardenas, R., Kocharian, G., **Williams, N.**, Sholle, E., Grinspan, Z., and Hoffman, C. "Closed-Loop Vagal Nerve Stimulation for Intractable Epilepsy: A Single-Center Experience." *Seizure: European Journal of Epilepsy*. DOI: 10.1016/j.seizure.2021.03.030

2021    Goel, A.R., Bruce, H.A, **Williams, N.** and Alexiades, G. "Long-Term Effects of Hearing Aids on Hearing Ability in Patients with Sensorineural Hearing Loss." *Journal of the American Academy of Audiology*.

2020    Thiesmeyer, J.W., Ullmann, T.M., Greenberg, J., **Williams, N.T.**, Limberg, J., Stefanova, D., Beninato, T., Finnerty, B.M., Vignaud, T., Leclerc, J., Fahey III, T.J., Mirallie, E.M., Brunaud, L. and Zarnegar, R.. "Hypertension resolution after adrenalectomy for primary hyperaldosteronism: Which is the best predictive model?" *Surgery*. DOI: 10.1016/j.surg.2020.04.017

2020    Riley, C.A., Zheng, Z., **Williams, N.**, Smith, T.L., Orlandi, R.R. and Tabaee, A. "Concordance of self-reported practice patterns of American Rhinologic Society members

with the International Consensus Statement of Allergy and Rhinology: Rhinosinusitis" *International Forum of Allergy and Rhinology*. DOI: 10.1002/alr.22533

2020   Day, J., Conti, M.S., **Williams, N.**, Ellis, S.J., Deland, J.T. and Cody, E.A. "Contribution of First-Tarsometatarsal Joint Fusion to Deformity Correction in the Treatment of Adult-Acquired Flatfoot Deformity." *Foot and Ankle Orthopaedics*. DOI: 10.1177/2473011420927321

2020   Day, J., Kim, J., Conti, M.S., **Williams, N.**, Deland, J.T. and Ellis, S.J. "Outcomes of Idiopathic Flexible Flatfoot Deformity Reconstruction in the Young Patient." *Foot and Ankle Orthopaedics*. DOI: 10.1177/2473011420937985

2020   Cronin, S., Conti, M., **Williams, N.** and Ellis., S.J. "Relationship Between Demographic and Radiographic Characteristics and Second Ray Pathology in Hallux Valgus Patients." *Foot and Ankle Orthopaedics*. DOI: https://doi.org/10.1177/2473011420909088

2019   Hussain, I., Winston, G.M., Goldberg, J., Curri, C., **Williams, N.**, Chazen, J.L., Greenfield, J.P. and Baaj, A.A. "Impact of imaging modality, age, and gender on craniocervical junction angles in adults without structural pathology." *Journal of Craniovertebral Junction and Spine*. PMID: 32089618

## Software

2024   **Williams, N.** and Rudolph, K. E. "A drug classification pipeline for Medicaid claims using RxNorm." *arXiv preprint arXiv:2404.01514*.

2023   **Williams, N.** and Díaz, I. "lmtp: An R package for estimating the causal effects of modified treatment policies." *Observational Studies*, 9(2): 103–122.

## Commentaries

2025   **Williams, N.**, Hung, A. and Rudolph K. "Re: Don't Let Your Analysis Go to Seed: On the Impact of Random Seed on Machine Learning-based Causal Inference." *Epidemiology*. DOI: 10.1097/EDE.0000000000001860

2025   **Williams, N.**, Rudolph, K.E. and Díaz, I. "Comment on 'Do we need flexible machine-learning algorithms to assess the effect of long-term exposure to fine particulate matter on mortality?'." *Environmental Epidemiology*. DOI: 10.1097/EE9.0000000000000407

## Preprints and manuscripts under review

2025   **Williams, N. T.**, Hines, O. J. and Rudolph, K. E. "Riesz representers for the rest of us." *arXiv preprint arXiv:2507.19413*.

2025   **Williams, N.**, Rudolph, K. and Díaz, I. "Nonparametric estimation of an optimal treatment rule with fused randomized trials and missing effect modifiers." *arXiv preprint 2506.10863*.

2024   Liu, R., **Williams, N. T.**, Rudolph, K. E. and Díaz, I. "General targeted machine learning for modern causal mediation analysis." *arXiv preprint arXiv:2408.14620*.

2024   Susmann, H., **Williams, N. T.**, Rudolph, K. E. and Díaz, I. "Longitudinal generalizations of the average treatment effect on the treated for multi-valued and continuous treatments." *arXiv preprint arXiv:2405.06135*.

| 2024 | Vo, T.-T., **Williams, N.**, Liu, R., Rudolph, K. E. and Díaz, I. "Recanting twins: Addressing intermediate confounding in mediation analysis." *arXiv preprint arXiv:2401.04450.* |
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| 2024 | Gilbert, B., Hoffman, K. L., **Williams, N.**, Rudolph, K. E., Schenck, E. J. and Díaz, I. "Identification and estimation of mediational effects of longitudinal modified treatment policies." *arXiv preprint arXiv:2403.09928.* |

## SOFTWARE

**Maintainer**

| `lmtp` | R: Non-Parametric Causal Effects of Feasible Interventions Based on Modified Treatment Policies |
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| `crumble` | R: Mediation Analysis Using Modified Treatment Policies, Recanting Twins, and Riesz Representers |
| `mlr3superlearner` | R: Super learner fitting and prediction using mlr3 |
| `adjrct` | R: Doubly-Robust and Efficient Estimators for Survival and Ordinal Outcomes in RCTs Without Proportional Hazards or Odds Assumptions |

**Contributer**

| `broom` | R: Convert Statistical Objects into Tidy Tibbles |
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## CONFERENCE ACTIVITY

**Short courses**

"Beyond the ATE." Materials available at beyondtheate.com.

2025 *Society for Epidemiologic Research*, Boston, MA.

2025 *Lifetime Data Science*, Brooklyn, NY.

2025 *American Causal Inference Conference*, Detroit, MI.

2024 *Society for Epidemiologic Research*, Austin, TX.

"Modern Causal Mediation Analysis."

2025 *Society for Epidemiologic Research*, Boston, MA.

**Conference Presentations**

Talks

| 2026 | **Williams, N.T.**, Hoffman, K., Rudolph, K.E., and Díaz, I. "Learning optimal dynamic treatment regimes from longitudinal data." *Society for Epidemiologic Research Midyear Meeting*, Virtual. |
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| 2025 | **Williams, N.T.**, Rudolph, K.E., and Díaz, I. "Nonparametric estimation of the optimal dynamic treatment rule in fused randomized trials with a missing effect modifier." *American Causal Inference Conference*, Detroit, MI. |

Posters

2024    **Williams, N.T.**, Liu, R., Hoffman, K.E., Forrest, S., Rudolph, K.E., and Díaz, I. "Two-step targeted minimum-loss based estimation for non-negative two-part outcomes." *American Causal Inference Conference*, Seattle, WA.

## SERVICE

### Academic Journal Peer Review

*The R Journal*

## GRANTS AND AWARDS

### Awards and Honors

2017    Graduate with Distinction, University of Colorado at Boulder

### Grants and Fellowships

2015    Virginia Summer Undergraduate Research Initiative. Project: "The relationship between cognitively oriented verbs and affect."

## TEACHING

### Weill Cornell Medicine

Data Science I – Teaching Assistant

### Columbia University

Categorical Data Analysis – Lead Teaching Assistant
Research Methods, Quantitative Foundations – Teaching Assistant

## PROFESSIONAL AFFILIATIONS

2020–    American Statistical Association
2023–    American Mountain Guides Association – Certified Single Pitch Instructor

## TECHNICAL SKILLS

R        expert
Julia    intermediate
SAS
SQL

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C++        novice
Ruby
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