Dr. Luke J. Keele

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Education

Ph.D. in Political Science, University of North Carolina at Chapel Hill, (2003).

M.A. in Political Science, University of North Carolina at Chapel Hill, (2000).

B.A. in Political Science, Calvin College Grand Rapids, MI (1997).

Professional Experience

Research Professor, University of Pennsylvania (July 2025—Present)

Research Associate Professor, University of Pennsylvania (July 2018—June 2025)

Professor, Georgetown University (July 2016—June 2018)

Associate Professor, Penn State University (July 2011—June 2016)

Associate Professor, Ohio State University (2010—June 2011)

Assistant Professor, Ohio State University (2006—2009)

Post-doctoral Fellowship in Quantitative Research Methods, Nuffield College and Department of Politics, Oxford University (2003—2005)

Publications

Peer-Reviewed Articles

Statistics and Social Sciences

Keele, L., Bonvini, M., Storås, A., Shirvaikar, V., Li, H., Jørgensen, N.B., Salsali, A., Medici, M., Mertens, A., and Kvist, K. (2026). "Exploring heterogeneous treatment effects for GLP-1 receptor agonists in patients with type 2 diabetes." *American Journal of Epidemiology*. (Online first.)

Shen, A., Ben-Michael, E., Feller, A., **Keele, L.**, and Murray, J. (2026). "Forest kernel balancing weights: Outcome-guided features for causal inference." *Statistics in Medicine*. 45:20–22, e70720.

Huang, M., Ben-Michael, E., McHugh, M., and **Keele, L.** (2026). "Sensitivity analysis for clustered observational studies with an application to the effectiveness of magnet nursing hospitals." *Journal of the Royal Statistical Society, Series A*. (Online first.)

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Levis, A.W., Bonvini, M., Zeng, Z., **Keele, L.**, and Kennedy, E.H. (2025). "Covariate-assisted bounds on causal effects with instrumental variables." *Journal of the Royal Statistical Society, Series B*. 87:5, 1508–1527.

Ben-Michael, E., Feller, A., Kelz, R., and **Keele, L.** (2025). "Estimating racial disparities in emergency general surgery." *Journal of the Royal Statistical Society, Series A*. 188:4, 1125–1148.

Pashley, N., **Keele, L.**, and Miratrix, L. (2025). "Improving instrumental variable estimators with post-stratification." *Journal of the Royal Statistical Society, Series A*. 188:3, 765–790.

Thelen, H., Miano, T., and **Keele, L.** (2025). "A primer on using balancing weights to estimate inverse probability weights." *American Journal of Epidemiology*. 194:10, 2761–2764.

Keele, L., and Grieve, R. (2025). "So many choices: A guide to selecting among methods to adjust for observed confounders." *Statistics in Medicine*. 44:5, e10336.

Takatsu, K., Levis, A., Kennedy, E., Kelz, R., and **Keele, L.** (2025). "Doubly robust machine learning-based estimation methods for instrumental variables with an application to surgical care for cholecystitis." *Journal of the Royal Statistical Society, Series A*. 188:4, 1003–1028.

Ye, T., **Keele, L.**, Hasegawa, R., and Small, D. (2024). "A negative correlation strategy for bracketing in difference-in-differences." *Journal of the American Statistical Association*. 119:547, 2256–2268.

Ye, T., Westling, T., Page, L., and **Keele, L.** (2024). "Nonparametric identification of causal effects in clustered observational studies with differential selection." *Journal of the Royal Statistical Society, Series A*. 187:4, 1013–1036.

Keele, L., Lenard, M., and Page, L. (2024). "Overlap violations in clustered observational studies of educational interventions." *Journal of Research on Educational Effectiveness*. 17:1, 1–18.

Ben-Michael, E., Page, L., and **Keele, L.** (2024). "Approximate balancing weights for clustered observational studies." *Statistics in Medicine*. 43:12, 2332–2358.

Keele, L., Lenard, M., Miratrix, L., and Page, L. (2023). "A software tutorial for matching in clustered observational studies." *Observational Studies*. 9:4, 73–96.

Cattaneo, M., **Keele, L.**, and Titiunik, R. (2023). "A guide to regression discontinuity designs in medical applications." *Statistics in Medicine*. 42:24, 4484–4513.

Ben-Michael, E., and **Keele, L.** (2023). "Using balancing weights to target the treatment effect on the treated when overlap is poor." *Epidemiology*. 34:5, 637–644.

Keele, L., Ben-Michael, E., Feller, A., Kelz, R., and Miratrix, L. (2023). "Hospital quality risk standardization via approximate balancing weights." *The Annals of Applied Statistics*. 17:2, 901–928.

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The Annals of Applied Statistics. 17:2, 1701–1721.

Keele, L., and Kang, H. (2022). "An introduction to spillover effects in cluster randomized trials with noncompliance." *Clinical Trials*. 19:4, 375–379.

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Fogarty, C., Lee, K., Kelz, R., and **Keele, L.** (2021). "Biased encouragements and heterogeneous effects in an instrumental variable study of emergency general surgical outcomes." *Journal of the American Statistical Association*. 116:536, 1625–1636.

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Keele, L., and Stevenson, R. (2021). "Causal interaction and effect modification: Same model, different concepts." *Political Science Research and Methods*. 9:3, 641–649.

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Keele, L., Cubbison, W., and White, I. (2021). "Suppressing Black votes: A historical case study of voting restrictions in Louisiana." *American Political Science Review*. 115:2, 694–700.

Keele, L., O'Neill, S., and Grieve, R. (2021). "Comparing the performance of statistical adjustment methods by recovering the experimental benchmark from the REFLUX trial." *Medical Decision Making*. 41:3, 340–353.

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Keele, L., Elwert, F., and Stevenson, R. (2020). "The causal interpretation of estimated associations in regression models." *Political Science Research and Methods*. 8:1, 1–13.

Kennedy, E., Harris, S., and **Keele, L.** (2019). "Survivor-complier causal effects in the presence of selection on treatment, with an application studying prompt ICU admission." *Journal of the American Statistical Association*. 114:525, 93–104.

Keele, L., and White, I. (2019). "African-American turnout in majority-minority districts." *Political Science Research and Methods*. 7:3, 431–449.

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Kang, H., Peck, L., and **Keele, L.** (2018). "Inference for instrumental variables: A randomization inference approach." *Journal of the Royal Statistical Society, Series A*. 181:4, 1231–1254.

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Stephens, A., **Keele, L.**, and Joffe, M. (2016). "Generalized structural mean models for evaluating depression as a post-treatment effect modifier of a jobs training intervention." *Journal of Causal Inference*. 4:2, 87–93.

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Keele, L., Linn, S., and Webb, C. (2016). "Concluding comments." *Political Analysis*. 24:1, 83–86.

Keele, L., and Titiunik, R. (2016). "Natural experiments based on geography." *Political Science Research and Methods*. 4:1, 65–95.

Keele, L. (2015). "Causal mediation analysis: Warning! Assumptions ahead." *American Journal of Evaluation*. 36:4, 500–513.

Pimentel, S., Yoon, F., and **Keele, L.** (2015). "Variable ratio matching with fine and near-fine balance: An observational study of the Peer Health Exchange." *Statistics in Medicine*. 34:30, 4070–4082.

Keele, L., Tingley, D., and Yamamoto, T. (2015). "Identifying mechanisms behind policy interventions via causal mediation analysis." *Journal of Policy Analysis and Management*. 34:4, 937–963.

Keele, L. (2015). "The statistics of causal inference." *Political Analysis*. 23:3, 313–335.

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Yamamoto, T., Tingley, D., **Keele, L.**, and Imai, K. (2014). "`mediation`: An `R` package for causal mediation analysis." *Journal of Statistical Software*. 59:5, 1–38.

Keele, L., Malhotra, N., and McCubbins, C. (2013). "Do term limits restrain state fiscal policy? Approaches for causal inference in assessing the effects of legislative institutions." *Legislative Studies Quarterly*. 38:3, 291–326.

Keele, L., and Minozzi, W. (2013). "How much is Minnesota like Wisconsin? Assumptions and counterfactuals in causal inference with observational data." *Political Analysis*. 21:2, 193–216.

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Keele, L., and Wolak, J. (2008). "Contextual sources of ambivalence." *Political Psychology*. 29:5, 653–673.

DeBoef, S., and **Keele, L.** (2008). "Taking time seriously: Dynamic regression." *American Journal of Political Science*. 52:1, 184–200.

Shor, B., Bafumi, J., **Keele, L.**, and Park, D. (2007). "A Bayesian multilevel modeling approach to time-series cross-sectional data." *Political Analysis*. 15:2, 165–181.

Keele, L. (2007). "Social capital and the dynamics of trust in government." *American Journal of Political Science*. 51:2, 241–255.

Keele, L., and Kelly, N. (2006). "Dynamic models for dynamic theories: The ins and outs of lagged dependent variables." *Political Analysis*. 14:2, 186–205.

Keele, L., and Wolak, J. (2006). "Value conflict and volatility in party identification." *British Journal of Political Science*. 36:4, 671–690.

Keele, L. (2005). "The authorities really do matter: Party control and trust in government." *Journal of Politics*. 67:3, 432–451.

Keele, L. (2005). "Macro measures and mechanics of social capital." *Political Analysis*. 13:2, 139–156.

Keele, L. (2005). "3-D graphics in R." *The Political Methodologist*. 13:2, 2–7.

Keele, L., Stimson, J., and Fogarty, B. (2004). "The impact of presidential visits in the 2002 congressional elections." *PS: Political Science and Politics*. 37:4, 971–986.

Clinical and Biomedical Applications

Goldberg, D., **Keele, L.**, Wirtalla, C., Sharpe, J., Rosenthal, J., Kaufman, E., and Kelz, R. (2026). "An assessment of hospital performance in emergency general surgery using direct and indirect standardization." *Annals of Surgery Open*. 7:1, e632.

Yu, H., **Keele, L.**, Brom, H., Pittman, H., Varghese, R., McHugh, M., and Aiken, L. (2026). "The impact of Magnet recognition on nurse managers' assessments of work environment, quality, and safety: A cross-sectional study." *Journal of Nursing Management*. 2026, 1847111.

Rosenthal, J., Brown, D., Rosen, C., Roberts, S., **Keele, L.**, Wirtalla, C., Kaufman, E., and Kelz, R. (2025). "The conditional effect of serious mental illness on emergency general surgery outcomes: An instrumental variable analysis." *The American Journal of Surgery*. 250, 116488.

Roberts, S., Rosen, C., **Keele, L.**, Kaufman, E., Wirtalla, C., Syvyk, S., Reilly, P., Neuman, M., McHugh, M., and Kelz, R. (2023). "Conditional effects of race on operative and nonoperative outcomes of emergency general surgery conditions." *Medical Care*. 61:9, 587–594.

Rosen, C., Roberts, S., Wirtalla, C., **Keele, L.**, Kaufman, E., Halpern, S., Reilly, P., Neuman, M., and Kelz, R. (2023). "The conditional effects of multimorbidity on operative versus nonoperative management of emergency general surgery conditions: A retrospective observational study using an instrumental variable analysis." *Annals of Surgery*. 278:4, e855–e862.

Kaufman, E., **Keele, L.**, Wirtalla, C., Rosen, C., Roberts, S., Mavroudis, C., Reilly, P., Holena, D., McHugh, M., Small, D., and Kelz, R. (2023). "Operative and nonoperative outcomes of emergency general surgery conditions: An observational study using a novel instrumental variable." *Annals of Surgery*. 278:1, 72–78.

Hutchings, A., O'Neill, S., Lugo-Palacios, D., Moler-Zapata, S., Silverwood, R., Cromwell, D., **Keele, L.**, Bellingan, G., Moonesinghe, S., Smart, N., Hinchliffe, R., and Grieve, R. (2022). "Effectiveness of emergency surgery for five common acute conditions: An instrumental variable analysis of a national routine database." *Anaesthesia*. 77:8, 865–881.

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Shoval, G., Visoki, E., Moore, T., DiDomenico, G., Argabright, S., Huffnagle, N., Alexander-Bloch, A., Waller, R., **Keele, L.**, Benton, T., Gur, R., and Barzilay, R. (2021). "Evaluation of attention-deficit/hyperactivity disorder medications, externalizing symptoms, and suicidality in children." *JAMA Network Open*. 4:6, e2111342.

Hoffman, D., Santos, P., Goldbach, M., **Keele, L.**, Taunk, N., Bogen, H., Burkbauer, L., Jankowitz, R., Fosnot, J., Wu, L., Freedman, G., and Tchou, J. (2021). "Immediate breast reconstruction for inflammatory breast cancer: Trends in use and clinical outcomes 2004–2016." *Annals of Surgical Oncology*. 28:13, 8789–8801.

Kelz, R., Airoldi, E., and **Keele, L.** (2021). "Strengths and limitations of machine learning in surgical care." *Journal of the American College of Surgeons*. 232:6, 919–920.

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Small, D., Firth, D., **Keele, L.**, Huber, M., Passarella, M., Lorch, S., and Burris, H. (2021). "Surface mining and low birth weight in central Appalachia." *Environmental Research*. 196, 110340.

Shannon, A., Roberson, J., **Keele, L.**, Bharani, T., Song, Y., Miura, J., Kelz, R., Dempsey, D., Fleisher, L., DeMatteo, R., and Karakousis, G. (2021). "Impact of COVID-19 restrictions on demographics and outcomes of patients undergoing medically necessary non-emergent surgeries during the pandemic." *World Journal of Surgery*. 45:4, 946–954.

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Books and Book Chapters

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Statistical Software

Keele, L., and Pimentel, S. `matchMulti`: Optimal Multilevel Matching using a Network Algorithm in `R`.

Keele, L. `rbounds`: An `R` package for calculating Rosenbaum's bounds with matched data.

Yamamoto, T., Tingley, D., **Keele, L.**, and Imai, K. `mediation`: An `R` package for causal mediation analysis.

Working Papers and Preprints

Ben-Michael, E., Feller, A., and **Keele, L.** (2026). "A weighting framework for clusters as confounders in observational studies." arXiv:2602.05041.

Zeng, Z., Levis, A., Lee, J., Kennedy, E., and **Keele, L.** (2025). "Nonparametric estimation of local treatment effects with continuous instruments." arXiv:2504.03063.

Rakshit, P., Levis, A., and **Keele, L.** (2024). "Local effects of continuous instruments without positivity." arXiv:2409.07350.

Levis, A., Kennedy, E., and **Keele, L.** (2024). "Nonparametric identification and efficient estimation of causal effects with instrumental variables." arXiv:2402.09332.

Bonvini, M., Zeng, Z., Yu, M., Kennedy, E., and **Keele, L.** (2023). "Flexibly estimating and interpreting heterogeneous treatment effects of laparoscopic surgery for cholecystitis patients." arXiv:2311.04359.

Bonvini, M., Kennedy, E., and **Keele, L.** (2023). "Minimax optimal subgroup identification." arXiv:2306.17464.

Grants

2022 PCORI (21-12555). Improved Statistical Methods for IV Designs in CER. Co-PI.

2021 National Library of Medicine (R01LM013361). Efficient Nonparametric Estimation of Heterogeneous Treatment Effects in Causal Inference. Co-PI.

2021 Institute of Education Sciences (R305D210014). Statistical Innovations for Clustered Observational Studies. Co-PI.

2019 Spencer Foundation Grant. Matching in Multilevel Contexts. Co-PI.

2015 Picwell Corp Grant for Research on Program Evaluation.

2001 National Science Foundation Dissertation Improvement Grant (SES-0112198).

Honors and Awards

2015 Best Software Award for the `mediation` package in `R`.

2013 Recipient of the Emerging Scholar Award for a young scholar making exceptional contributions to political methodology who is within ten years of their terminal degree, awarded by the Society of Political Methodology.

2011 Thomas R. Ten Have Citation for "exceptionally creative or skillful research on causal inference."

2002 Royster Society of Fellows Dissertation Fellowship. University of North Carolina-Chapel Hill.

2002 UNC-Chapel Hill Royster Society of Fellows Dissertation Completion Fellowship.

Conference Presentations

International Conference on Econometrics and Statistics. (2018-2023).

9th International Conference on Computational and Methodological Statistics. (2016, 2019-2023).

European Causal Inference Conference. (2016-2019,2023).

Joint Statistical Meetings. (2015-2021).

Atlantic Causal Inference Meeting. (2011-2012, 2015-2019, 2022-2023.)

Association for Public Policy Analysis & Management, Fall Research Conference. (2012-2013, 2015-2016)

West Coast Experiments Conference. (2013)

The Annual Meeting of the American Political Science Association (2001-2006, 2008-2021)

The Annual Meeting of the Midwest Political Science Association (2001-2016)

The Annual Summer Political Methodology Meetings (2001-2005, 2008-2016, 2018-2020, 2023)

Professional Activities

Secretary, American Statistical Association, Council of Sections

President, *Society for Causal Inference*

Steering Committee, *Society for Causal Inference*

Associate Editor, *Journal of the Royal Statistical Society, Series A*

Associate Editor, *Journal of Causal Inference*

Associate Editor, *Observational Studies*

Editorial Board, *Journal of Politics*

Editorial Board, *Journal of the Royal Statistical Society, Series A*

Editorial Board, *American Political Science Review*

Referee for *American Political Science Review*, *American Journal of Political Science*, *American Journal of Sociology*, *American Sociological Review*, *Biometrical Journal*, *Biometrics*, *Biostatistics*, *British Journal of Mathematical and Statistical Psychology*, Cambridge University Press, *Economic & Politics*, *Economics and Human Biology*, *Electoral Studies*, *Journal of the American Statistical Association*, *Journal of Business and Economic Statistics*, *Journal of Educational and Behavioral Statistics*, *Journal of Experimental Political Science*, *Journal of Politics*, *Journal of the Royal Statistical Society, Series A, B, C*, *Medical Decision Making*, National Science Foundation, Oxford University Press, *PLoS One*, *Political Science Research and Methods*, *Prevention Science*, *Psychological Methods*, *Political Analysis*, *Political Behavior*, *Political Psychology*, *Public Opinion Quarterly*, *State Politics and Policy Quarterly*, *Statistics in Medicine*, *Statistical Methodology*, *Statistical Methods in Medical Research*, *Structural Equation Modeling*, Wiley & Sons.

Member of American Political Science Association, Methodology Section; Midwest Political Science Association; American Statistical Association; American Economic Association.

Consulting Experience

Program Evaluation. Department of Labor. (2020)

Educational Program Evaluation. American Institutes for Research. (2013-2017)

Educational Program Evaluation. Villanova University. (2011-2012)

Statistical Consultant. Booz Allen Hamilton. (2010-2012)

Statistical Consultant. Science Applications Corp. (2010-2012)

Invited Presentations

Northwestern University (2022); Princeton University (2022); UCLA (2020); Duke University (2020); Duke University (2019); Brown University (2019); University of Florida Statistics Workshop (2019); New York University (2019); University of Rochester (2017); American University (2017); University of Sydney (2017); Harvard Graduate School of Education (2017); European Union Institute (2017); White House Social and Behavioral Sciences Team (2016); Center for Surgery and Health Economics, University of Pennsylvania School of Medicine (2016); WZB - Berlin Social Science Center (2016); University of Florence (2016); University of Michigan (2016); Georgetown University (2015); Washington University, St. Louis (2015); Yale University (2015); University of Michigan (2015); University of California, Berkeley (2015); University of California, Davis (2015); University of Pennsylvania, Graduate School of Education (2015); Georgetown University (2014); NYU (2014); Columbia University (2014);

Bloomberg School of Public Health, Johns Hopkins University; Oxford University (2014); American University (2013); West Coast Experiments Conference, Stanford University (2013); University of Illinois, Champagne-Urbana (2013); Abt Associates, Evaluation Methods Center Speaker Series (2013); Texas A&M (2013); American Institutes for Research (2013); Stanford Political Science Dept (2012); Stanford Graduate School of Business (2012); Columbia University (2012); Yale University (2011); University of Wisconsin, Madison (2011); University of Pennsylvania (2011); New York University (2011); Temple University (2011); Texas A&M (2010); Penn State University (2010); University of Michigan (2010); Columbia University (2010); University of Rochester (2009); New York University (2009); Columbia University (2008); Princeton University (2008); New York University (2006); Nuffield College, Oxford University (2004); Washington University in St. Louis (2004); University of South Carolina (2004); University of California-Berkeley (2004); Pennsylvania State University (2004); University of Rochester (2004); Ohio State University (2004); University of California, Davis (2003); University of Texas at Dallas (2003).