

## 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 Associate Professor*, University of Pennsylvania (July 2018—Present)

*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

Zhao, Q., **Keele, L.**, and Small, D. (in press). Will Competition-Winning Methods for Causal Inference Also Succeed in Practice? *Statistical Science*.

**Keele, L.**, Harris, S., and Grieve, R. (in press). "Does transfer to intensive care units reduce mortality? A comparison of an instrumental variables design to risk adjustment." *Medical Care*.

**Keele, L.** and Small, D. (in press). "Instrumental Variables: Don't Throw the Baby Out With the Bathwater." *Health Services Research*.

**Keele, L.**, Harris, S., Pimentel, S., and Grieve, R. (in press). "Stronger Instruments and Refined Covariate Balance in an Observational Study of the Effectiveness of Prompt Admission to the ICU in the UK." *Journal of the Royal Statistical Society, Series A*.

Kennedy, E., Harris, S., **Keele, L.** (in press). Survivor-complier causal effects in the presence of selection on treatment, with an application studying prompt ICU admission. *Journal of the American*

*Statistics Association.*

**Keele, L.** and White, I. (in press). "African-American Turnout in Majority-Minority Districts." *Political Science Research and Methods*.

**Keele, L.**, Elwert, F. and Stevenson, R. (in press). "The Causal Interpretation of Estimated Associations in Regression Models." *Political Science Research and Methods*.

**Keele, L.**, Sharoky, C., Sellers, M., Wirtalla, C., Kelz, R. (in press). "An Instrumental Variables Design for the Effect of Emergency General Surgery." *Epidemiologic Methods*.

Pimentel, S., Page, L., Lenard, M., **Keele, L.** (in press). "Optimal Multilevel Matching Using Network Flows: An Application to a Summer Reading Intervention." *The Annals of Applied Statistics*.

**Keele, L.** and Miratrix, L. (in press). "Randomization Inference for Outcomes with Clumping at Zero." *The American Statistician*.

**Keele, L.**, Zhao, Q., Kelz, R., and Small, D. (2019). "Falsification Tests for Instrumental Variable Designs with an Application to Tendency to Operate." *Medical Care*. 57:2, 167–171.

Ding, P. and **Keele, L.** (2018). "Robust Randomization-Based Inference in Unmatched Clustered Randomized Trials, With Application to the Teacher and Leader Evaluation Systems Intervention." *The Annals of Applied Statistics* 12(4):2151–2174.

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.

**Keele, L.** and Titiunik, R. (2018). "Bounding Treatment Effects Under Interference in Geographic Natural Experiments: An Application to All-Mail Voting in Colorado." *CESifo Economic Studies* 64:2, 127-149.

Sellers, M., **Keele, L.**, Sharoky, C., Wirtalla, C., Bailey, E., Kelz, R. (2018). "Association of Surgical Practice Patterns and Clinical Outcomes with Surgeon Training in University or Non-university-based Residency Program." *JAMA Surgery*. 153:5, 418–425.

Sharoky, C., Sellers, M., **Keele, L.**, Wirtalla, C., Morris, J., Kelz, R. (2018). "Does Surgeon Gender Matter? Practice Patterns and Outcomes of Female and Male Surgeons." *Annals of Surgery*. 267:6, 1069–1076.

Ross, R., **Keele, L.**, Kubis, S., Lautz, A., Dziorny, A., Denson, A., O'Connor, K., Chilutti, M., Weiss, S., Gerber, J. (2018). "Impact of Procalcitonin Availability on Antibiotic Utilization in Critically Ill Children." *Journal of the Pediatric Infectious Diseases Society*. 7:2, e43–e46.

**Keele, L.**, Small D., and Grieve R. (2017). "Randomization Based Instrumental Variables Methods with an Application to the IMPROVE Trial." *Journal of the Royal Statistical Society, Series A*. 1870:2, 569–586.

**Keele, L.** and Quinn, M. (2017). "Bayesian Sensitivity Analysis for Causal Effects from  $2 \times 2$  Tables in the Presence of Unmeasured Confounding with Application to Presidential Campaign Visits." *The*

*Annals of Applied Statistics*. 11:4, 1974–1997.

Zubizarreta, J. and **Keele, L.**, (2017). “Optimal Multilevel Matching in Clustered Observational Studies: A Case Study of the School Voucher System in Chile.” *Journal of the American Statistical Association*. 112:518, 547–560.

Han, M., Fitzgerald, J., Balamuth, F., **Keele, L.**, Alpern, E., Lavelle, J., Chilutti, M., Grundmeier, R., Nadkarni, V., Thomas, N., Weiss, S. (2017). “Association of Delayed Antimicrobial Therapy with One-year Mortality in Pediatric Sepsis.” *Shock*. 48:1, 29–35.

Weiss, S., **Keele, L.**, Balamuth, F., Vendetti, N., Fitzgerald, J., Gerber, J. (2017). “Crystalloid Fluid Choice and Clinical Outcomes in Pediatric Sepsis: A Matched Retrospective Cohort Study.” *The Journal of Pediatrics*.” 182, 304–310.

**Keele, L.**, Shah, P., White, I., and Kay, K. (2017). “Black Candidates and Black Turnout: A Study of Mayoral Elections in the New South.” *Journal of Politics*. 79:3, 780–791.

**Keele, L.**, Lorch, S., Passarella, M., Small, D., Titiunik, R. (2017). “An Overview of Geographically Discontinuous Treatment Assignments With an Application to Children’s Health Insurance.” *Regression Discontinuity Designs: Theory and Applications Advances in Econometrics*. 38, 147–194.

**Keele, L.**, Cattaneo, M., Titiunik R. and Vazquez-Bare, G. (2016 ). “Identification in Regression Discontinuity Designs with Multiple Cutoffs.” *Journal of Politics*. 78:4, 1229–1248.

**Keele, L.**, and Morgan, J. (2016). “How Strong is Strong Enough? Strengthening Instruments Through Matching and Weak Instrument Tests.” *Annals of Applied Statistics*. 10:2, 1086–1106

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*. 2:4, 87–93.

Giuliano, J., Markovitz, B., Brierley, J., Levin, R., Williams, G., **Keele, L.**, Chai See Lum, L., Dorofaeff, T., Cruces, P., Bush, J., Nadkarni, V., Thomas, N., Fitzgerald J., Weiss, S. (2016). “Variability in Pediatric Severe Sepsis Managed in USA and European Intensive Care Units.” *Pediatric Critical Care Medicine*. 17:6, 522–530.

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

**Keele, L.**, Linn, S., and Webb, C. (2016). “Treating Time With All Due Seriousness.” *Political Analysis*. 24:1, 31–41.

**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.**, and Titiunik, R. (2015). “Natural Experiments Based on Geography.” *Political Science Research Methods*. 4:1, 65–95.

- 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.
- Keele, L.**, and Titiunik, R. (2015). "Geographic Boundaries as Regression Discontinuities." *Political Analysis*. 23:1, 127–155.
- Keele, L.**, Titiunik R. and Zubizarreta, J. (2015). "Enhancing a Geographic Regression Discontinuity Design Through Matching to Estimate the Effect of Ballot Initiatives on Voter Turnout." *Journal of the Royal Statistical Society, Series A*. 178:1, 223–239
- Imai, K., **Keele, L.**, Tingley, D., and Yamamoto, T. (2014) "Commentary: Practical Implications of Theoretical Results for Causal Mediation Analysis." *Psychological Methods*. 19:4, 482–487.
- 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.
- Keele, L.**, McConaughy, C., and White, I. (2012). "Strengthening the Experimenter's Toolbox: Statistical Estimation of Internal Validity." *American Journal of Political Science*. 56:2, 484–499.
- Imai, K., **Keele, L.**, Tingley, D., and Yamamoto, T. (2011). "Unpacking the Black Box of Causality: Learning about Causal Mechanisms from Experimental and Observational Studies." *American Political Science Review*. 105:4, 765–789.
- Imai, K., **Keele, L.**, and Tingley, D. (2011). "A General Approach to Causal Mediation Analysis." *Psychological Methods*. 15:4, 309–334.
- Imai, K., **Keele, L.**, and Yamamoto, T. (2010). "Identification, Inference and Sensitivity Analysis for Causal Mediation Effects." *Statistical Science*. 25:1, 51–71.
- Keele, L.** "Proportionally Difficult: Testing for Nonproportional Hazards In Cox Models." (2010). *Political Analysis*. 18:2, 189–205.
- MacKuen, M., Wolak, J., **Keele, L.**, and Marcus, G. (2010). "Reflective or Resolute: How Emotion Guides the Deliberative and Partisan Citizen." *American Journal of Political Science*. 54:2, 440–458.
- 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.** "3-D Graphics in R." *Political Methodologist*. 13:2, 2-7. 2005.

**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.

### **Books and Book Chapters**

**Keele, L.** (2008). *Semiparametric Regression for the Social Sciences*. London: Wiley and Sons. 2008.

Imai, K., **Keele, L.**, Tingley, D., and Yamamoto, T. "Causal Mediation Analysis Using R." In *Advances in Social Science Research Using R*, H. D. Vinod ed. New York: Springer, 129–154. 2010.

MacKuen, M., Wolak, J., **Keele, L.**, Marcus, G., and Nueman, R. "The Third Way: Affective Intelligence and the Depiction of American Democracy." In *The Affect Effect Dynamics of Emotion In Political Thinking and Behavior*. Ann Crigler, George E. Marcus, Michael MacKuen and W. Russell Neuman eds. Chicago: University of Chicago Press. 2007.

MacKuen, M., Wolak, J., **Keele, L.**, and Marcus, G. "The Measure and Mismeasure of Emotion." In *Feeling Politics: Emotion In Political Information Processing* David P. Redlawsk, ed. New York, NY: Palgrave Macmillan. 2006.

### **Manuscripts In Progress**

**Keele, L.**, Fogarty, C., Small, D., and Hsu, J. "Patterns of Effects and Sensitivity Analysis for Differences-in-Differences."

**Keele, L.** and Small, D. "Comparing Covariate Prioritization via Matching to Machine Learning Methods for Causal Inference using Five Empirical Applications."

Kang, H. and **Keele, L.** "Estimation Methods for Cluster Randomized Trials with Noncompliance: A Study of A Biometric Smartcard Payment System in India."

Kang, H. and **Keele, L.** "Spillover Effects in Cluster Randomized Trials with Noncompliance."

**Keele, L.** , Williams, A., and Tchou J. "Does chemotherapy reduce breast cancer recurrence? A regression-discontinuity design."

**Keele, L.**, Kelz, R., and Lorch, S. "Beyond Propensity Score Matching: Innovations in Matching Methods for Outcomes Research."

Basu, B., O'Neill, S., Harris, S., **Keele, L.**, and Grieve, R. Which deteriorating ward patients benefit from ICU transfer? A patient-centered approach to clinical evaluation

Pimentel, S., Page, L., **Keele, L.** "Common Support Violations in Observational Studies of Educational Interventions."

**Keele, L.** "Conditioning on Post-treatment Quantities with Structural Mean Models."

**Keele, L.** Harrison, D., and Grieve, R. "A Principled Approach for Designing Observational Studies from Within RCTs."

## **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."

## **Grants, Honors, and Awards**

2019 Spencer Foundation Grant. Matching in Multilevel Contexts. Co-PI. \$385,733.

2015 Abt Associates and Department of Labor Subcontract NO. 45200.

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

2015 Picwell Corp Grant for Research on Program Evaluation.

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.

2012 National Institutes of Mental Health Grant RC4-MH-092722-01 Subcontractor.

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.

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

### **Conference Presentations**

International Conference on Econometrics and Statistics. (2018).

9th International Conference on Computational and Methodological Statistics. (2016).

European Causal Inference Conference. (2016-2019).

Joint Statistical Meetings. (2015-2018).

Atlantic Causal Inference Meeting. (2011-2012, 2015-2018)

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, 2008-2017)

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

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

### **Professional Activities**

Associate Editor, *Journal of Causal Inference*

Associate Editor, *Observational Studies*

Editorial Board, *Journal of Politics*

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 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**

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**

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).