

Adam Sales

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Education

Ph.D., University of Michigan, Ann Arbor. Statistics. August 2013
B.S., Johns Hopkins University, general and departmental honors, Mathematics and Physics. May 2005

Professional Experience

Research Associate University of Texas, Austin Director of Statistics, Measurement, and Research design Techniques in Education Research (SMARTER) consulting office, College of Education, and Biostatistician, School of Nursing	2015–Present
Postdoctoral Fellow Carnegie Mellon University Carnegie Mellon and RAND Traineeships in Interdisciplinary Education Research	2013–2015
Associate Editor Today's Science, New York, NY	2006–2007
Mathematics Teacher University High School, Newark, NJ	2005–2006

Grants

Funded

Analyzing Student Usage and Outcome Data from a Randomized Experiment of Cognitive Tutor Algebra I. Co-PI. NSF #DRL-1420374. 2014–2017

National Center on Postsecondary Outcomes–Deaf and Hard of Hearing. Statistical Consultant. Office of Special Education Programs Grant #H326D160001. 2016–2021

Understanding Disparities in Alcohol Treatment Services Utilization. Statistical Consultant. NIH #R01 AA027767-01. 2019–2022

Improving Health Outcomes in African Americans with Type 2 Diabetes: A Culturally-Tailored, Resilience-Based Diabetes Self-Management Education (RB-DSME) Intervention. Statistical Consultant. NIH #R01 DK123146-01. 2019–2022

Suicidal Trajectories from Early Adolescence into Young Adulthood in a National Sample. Statistical Consultant. NIMH. #R03 MH112015-01A1. 2017–2019

The Efficacy of From Here to There: A Dynamic Technology for Improving Algebraic Understanding. Statistical Consultant. IES #R305A180401 2018–2021.

Pending

Rural Hospital Utilization of Regionalized Critical Care to Address Disparities by Leveraging a Delivery Network in Inter-Hospital Transfers (RURAL-IHT). Co-I. NIH/NINR 2020–2025.

Cognitive Training for Diabetes Self-Management. Statistical Consultant. NIH 2020–2022.

Influence of Intermittent Hypoxia on Cardiovascular Health in Type 2 Diabetes. Statistical Consultant. NIH #R01 HL153590-01 2020–2023.

Peer-Reviewed Publications

Methodological Research

Sales, A.C., and Pane, J.F. (Conditionally Accepted). “Student Log-Data from a Randomized Evaluation of Educational Technology: A Causal Case Study.” *Journal of Research on Educational Effectiveness*. <http://arxiv.org/abs/1808.02528>.

Sales, A.C., and Hansen, B.B. (2020). “Limitless Regression Discontinuity.” *Journal of Educational and Behavioral Statistics*, 45(2), 143–174. <https://doi.org/10.3102/1076998619884904>.

Sales, A.C. and Pane, J.F. (2019) “The Role of Mastery Learning in Intelligent Tutoring Systems: Principal Stratification on a Latent Variable.” *Annals of Applied Statistics*. 13(1), 420–443. <http://doi.org/10.1214/18-AOAS1196>.

Sales, A.C., Botelho, A, Patikorn, T & Heffernan, N.T. (2018) “Using Big Data to Sharpen Design-Based Inference in A/B Tests.” *Proceedings of the 11th International Conference on Educational Data Mining*. http://educationaldatamining.org/files/conferences/EDM2018/papers/EDM2018_paper_220.pdf.

Sales, A.C., Patikorn, T & Heffernan, N.T. (2018) “Bayesian Partial Pooling to Improve Inference Across A/B Tests in EDM.” *Proceedings of the 11th International Conference on Educational Data Mining*. <https://github.com/adamSales/EDMpartialPooling>.

Sales, A.C., Hansen, B.B., and Rowan, B. (2018) Rebar: Reinforcing a Matching Estimator with Predictions from High-Dimensional Covariates. *Journal of Educational and Behavioral Statistics*. 43(1), 3–31. <https://doi.org/10.3102/1076998617731518>.

Williams, JJ, Botelho, A, Sales, A.C., Heffernan, N.T., and Lang, C. (2016) “Discovering ‘Tough Love’ Interventions Despite Dropout.” *Proceedings of the 9th International Conference on Educational Data Mining*. http://www.educationaldatamining.org/EDM2016/proceedings/paper_130.pdf.

Sales, A.C. (2016) “Review: mediation Package in R” *Journal of Educational and Behavioral Statistics*. 42(1), 69–84. <https://doi.org/10.3102/1076998616670371>.

Hansen, B.B., and Sales, A.C. (2015) “Comment on Cochran’s ‘Observational Studies’.” *Introduction to Observational Studies and the Reprint of Cochran’s paper “Observational Studies” and Comments*:184. https://obsstudies.org/wp-content/uploads/2017/06/cochran_and_comments.pdf#page=61.

Sales, A.C. and Pane, J. (2015) Exploring Causal Mechanisms in a Randomized Effectiveness Trial of the Cognitive Tutor. *Proceedings of the 8th International Conference on Educational Data Mining*. <http://www.educationaldatamining.org/EDM2015/proceedings/short504-507.pdf>.

Applied Research

Garberoglio, C.L., Johnson, P., Sales, A.C., and Cawthon, S. (Forthcoming). “Educational Attainment Trends and Gaps Between Deaf and Hearing People Over Time: 2008–2018.” *Journal of Postsecondary Education and Disability*.

Hendrickson, S.G., Roche, M.E., Holland, A., and Sales, A.C. (2020). “Valuing Joyful Teaching Moments: Nursing Faculty Experiences in Texas.” *Journal of Holistic Nursing*. <https://doi.org/10.1177/0898010120937849>.

Henneghan, A., Wright, M., Bourne, G. and Sales, A.C. (2020). “A cross sectional exploration of cytokine-symptom networks in breast cancer survivors using network analysis.” *Canadian Journal of Nursing Research*. <https://doi.org/10.1177/0844562120927535>.

Sales, A.C. and Pane, J.F. (2020) “The effect of teachers reassigning students to new Cognitive Tutor sections.” *Proceedings of the 13th International Conference on Educational Data Mining*. <https://github.com/adamSales/cpEffect>.

Peng, P., Lin, X., Ünal, A. E., Lee, K. J., Namkung, J., Chow, J., & Sales, A.C. (2020). “Examining the mutual relations between language and mathematics: A meta-analysis.” *Psychological Bulletin*. advance online publication. <https://doi.org/10.1037/bul0000231>.

Becker, H., Zhang, Vivian, and Sales, A.C. (2020). “Moderator Effects in Nursing Intervention Studies.” *Nursing Research*. 69(1), 62–68 <https://doi.org/10.1097/NNR.0000000000000398>.

Berger, W. and Sales, A.C. (2019). “The Plausibility of Epistemic Democracy’s Majority Rule Result.” *Politics, Philosophy & Economics*. <https://doi.org/10.1177/1470594X19870260>.

Johnson, K., Sales, A.C., Rew, L., Garing, J.H., and Crosnoe, R. (2019) “Using polytomous latent class analysis to compare patterns of substance use and co-occurring health-risk behaviors between students in alternative and mainstream high schools.” *Journal of Adolescence* 75, 151–162. <https://doi.org/10.1016/j.adolescence.2019.07.010>.

Calzada, E., Sales, A.C., and O’Gara, J. (2019). “Maternal depression and acculturative stress impacts on Mexican-origin children through authoritarian parenting.” *Journal of Applied Developmental Psychology* 63, 65–75. <https://doi.org/10.1016/j.appdev.2019.05.001>.

Calzada, E. and Sales, A.C. (2018). “Depression Among Mexican-Origin Mothers: Exploring the Immigrant Paradox.” *Cultural Diversity and Ethnic Minority Psychology* 25(2), 288–298. <http://dx.doi.org/10.1037/cdp0000214>.

Thurman, W, Johnson, K, Gonzalez, D, & Sales, A.C. (2018). “Teacher support as a protective factor against sadness and hopelessness for adolescents experiencing parental incarceration: Findings from the 2015 Texas Alternative School Survey.” *Children and Youth Services Review*. Vol 88. 558–566. <https://doi.org/10.1016/j.childyouth.2018.04.004>.

Sales, A.C., Wilks, A, and Pane, J.F. (2016) “Student Usage Predicts Treatment Effect Heterogeneity in the Cognitive Tutor Algebra I Program.” *Proceedings of the 9th International Conference on Educational Data Mining*. http://www.educationaldatamining.org/EDM2016/proceedings/paper_75.pdf.

Maass M, Sales A.C., Chung B, Sunshine J. (2016) “A systematic analysis of the science of sand-boxing.” *PeerJ Computer Science* 2:e43. <https://doi.org/10.7717/peerj-cs.43>.

Knowlton, S, Sales, A.C. and Merriman, K. (2014) “A Comparison Of Faculty And Bibliometric Valuation Of Serials Subscriptions At An Academic Research Library.” *Serials Review*, 40(1), 28–39. <https://doi.org/10.1080/00987913.2014.897174>.

Grim, P, Singer, DJ, Fisher, S, Bramson, A, Berger, WJ, Reade, C, Flocken, C, and Sales, Adam. (2013). Scientific Networks on Data Landscapes: Question Difficulty, Epistemic Success, and Convergence. *Episteme*, v10, n4, 441–464. <https://doi.org/10.1017/epi.2013.36>.

Submissions and Working Papers

Israni, A., Sales, A.C., and Pane, J. (In Revision) Mastery Learning in Practice: A (Mostly) Descriptive Analysis Based on the Cognitive Tutor Algebra I Effectiveness Trial. <https://github.com/adamSales/cpPaper/blob/master/paper.pdf>.

Young, C., Danesh, V., Sales, A.C. and Sagna, A. (In Submission). Teaching Evidence-Based Practice in Graduate Nursing Education: Knowledge Retention Trends among Nurse Practitioner Students.

Botelho, A., Sales, A.C., Heffernan, N.T., and Patikorn, T.M. (2018) The ASSISTments TestBed: Opportunities and Challenges of Experimentation in Online Learning Platforms. <http://tiny.cc/jreeASSISTments>.

Sales, A.C., Gagnon-Bartsch, J., Wu, E., Botelho, A., Heffernan, N.T., Patikorn, T.M. and Miratrix, L. (2019) ReLOOP: Precise Unbiased Estimation in Randomized Experiments using Observational Auxilliary Data. <http://tiny.cc/reloop>

Technical Reports

Garberoglio, C. L., Stapleton, L. D., Palmer, J. L., Simms, L., Cawthon, S., and Sales, A.C. (2019). *Postsecondary Achievement of Black Deaf People in the United States*. Washington, DC: U.S. Department of Education, Office of Special Education Programs, National Deaf Center on Postsecondary Outcomes. <https://www.nationaldeafcenter.org/blackdeaf>.

Garberoglio, C.L., Palmer, J.L., Cawthon, S., and Sales, A.C. (2019). *Deaf People and Educational Attainment in the United States: 2019*. Washington, DC: U.S. Department of Education, Office of Special Education Programs, National Deaf Center on Postsecondary Outcomes. <https://www.nationaldeafcenter.org/resource/deaf-people-and-educational-attainment-united-states>.

Garberoglio, C.L., Palmer, J.L., Cawthon, S., and Sales, A.C. (2019). *Deaf People and Employment in the United States: 2019*. Washington, DC: U.S. Department of Education, Office of Special Education Programs, National Deaf Center on Postsecondary Outcomes. <https://www.nationaldeafcenter.org/resource/deaf-people-and-employment-united-states>.

Sales, A.C. and Pane, J.F. (2018) Principal Stratification for Intelligent Tutors: A Tutorial. <https://github.com/adamSales/tutorial/blob/master/paper.pdf>.

Garberoglio, C. L., Palmer, J. L., Cawthon, S., and Sales, A.C. (2018). *State Rankings of Postsecondary Achievement for Deaf People: 2012-2016*. Washington, DC: U.S. Department of Education, Office of Special Education Programs, National Deaf Center on Postsecondary Outcomes. <https://www.nationaldeafcenter.org/resource/state-rankings-postsecondary-achievement-deaf-people-2012-2016>.

Garberoglio, C. L., Cawthon, S., and Sales, A.C. (2017). *Deaf People and Educational Attainment in the United States: 2017*. Washington, DC: U.S. Department of Education, Office of Special Education Programs, National Deaf Center on Postsecondary Outcomes. <https://www.nationaldeafcenter.org/resource/deaf-people-and-educational-attainment-united-states-2017>.

Fifty-one part series of state reports, e.g.:

Garberoglio, C. L., Cawthon, S., and Sales, A.C. (2017). *Postsecondary Achievement of Deaf People in Alabama: 2017*. Washington, DC: U.S. Department of Education, Office of Special Education Programs, National Deaf Center on Postsecondary Outcomes. <https://www.nationaldeafcenter.org/resource/state-reports-postsecondary-achievement-deaf-people>.

Sales, A.C., Bryant, DP, Bryant, BR. (2016) *An Analysis of a "Closing the Gap" Intervention via Regression Discontinuity and Matching*.

Rowan, B, Perrault, P, White, M, Beuche, B, Sales, A.C., and Hansen, B.B. (2014) *Final Report: Year Two Research on the Excellence for All Initiative*. Education and Well Being Program, Survey Research Center, Institute for Social Research, University of Michigan.

Sales A.C. (2018) Sequential Specification Tests to Choose a Model: A Change Point Approach. <https://arxiv.org/abs/1708.00907>

Invited Presentations

Sales, A.C., Gagnon-Bartsch, J.A., Botelho, A., Heffernan, N.T., Wu, E., and Miratrix, L. *ReLOOP: Precise Unbiased Estimation in Randomized Experiments Using Observational Auxiliary Data*. Invited paper at the Joint Statistical Meetings, Denver, CO, July 2019.

Sales, A.C. *Uses and Misuses of Statistical Inference in Replicable Research*. Keynote address, replicate.education: A Workshop on Large Scale Education Replication, International Conference on Educational Data Mining, July, 2018.

Sales, A.C. and Hansen, BB *Rebar: Salvaging Unused Data to Strengthen Causal Inference*. Invited seminar, Departments of Computer Science Mathematics, Worcester Polytechnic Institute, October, 2016.

Sales, A.C. and Hansen, BB *Counting successes as a way to aggregate results across experiments*. Invited seminar, Statistics Education Research Group, Dept of Statistics, Carnegie Mellon University, June, 2015.

Sales, A.C. Invited participant, *CMART Conversations: A Workshop on on Postdoctoral Training*, Pittsburgh PA. June 22-23, 2015.

Sales, A.C. and Pane, J. *Causal Mechanisms and Student Usage Data from a Randomized Exper-*

iment of Cognitive Tutor Algebra: Preliminary Results. Causal Inference in Education Seminar, University of Michigan, March 2015.

Sales, A.C. and Hansen, B.B. *Rebar: Reinforcing a Matching Estimator with Predictions from High-Dimensional Covariates* Invited Seminar: Department of Statistics and Operations Research, Tel Aviv University, Tel Aviv, Israel, December 2014; Department of Statistics, Hebrew University, Jerusalem, Israel, December 2014; Department of Statistics, University of Haifa, Haifa, Israel, December 2014; Statistics Department, University of Nevada, Reno, November 2014

Sales, A.C. and Hansen, B.B. *Adjusting a Propensity Score Analysis for Many Covariates in an Educational Evaluation.* Invited Presentation at the Quantitative Research Methodology for the Social and Behavioral Sciences Workshop at the University of Chicago. October 2014.

Sales, A.C. *Propensity-Score Matching: Background and Recent Developments, Told Through One* Case Study.* Invited Seminar at George Mason University, January 2014.

Sales, A.C. and Hansen, B.B. *Using Local Randomization to Analyze Regression Discontinuity Designs.* Invited Paper at the Joint Statistical Meetings, Montreal, Canada, August 2013.

Contributed Presentations

Quinto-Pozos, David, et al. *Vocabulary and reading for ASL-English bilinguals.* Vanderbilt University, October, 2019.

Garberoglio, C.L., Cawthon, S., Palmer J.L., & Sales A.C. *Understanding deaf individuals who are not in the labor force: A cluster analysis.* American Educational Research Association Annual Meeting, April, 2019.

Sales, A.C., Botelho, A.F., Gagnon-Bartsch, J., Heffernan, N.T., Miratrix, L., Patikorn, T., & Wu, E. *Using Machine Learning and Auxiliary Data for Precise, Unbiased, Causal Inference.*, Contributed Presentation at: The Society for Research in Educational Effectiveness Spring Conference, Washington, DC, March 2019; The Atlantic Causal Inference Conference, Montreal, Canada, May, 2019.

Botelho, A.F., Gagnon-Bartsch, J., Heffernan, N.T., Miratrix, L., Patikorn, T., Sales, A.C., & Wu, E. *Combining Residualization Methods to Better Estimate Treatment Effects in Randomized Controlled Trials.* Contributed Presentation at the Conference on Digital Experimentation, Cambridge, MA, October 2018.

Sales, A.C., Botelho, A., Patikorn, T. & Heffernan, N.T. *Using Big Data to Sharpen Design-Based Inference in A/B Tests.* Contributed Presentation at the 11th International Conference on Educational Data Mining, Buffalo, NY, July 2018.

Garberoglio C.L., Cawthon, S. & Sales, A.C. *Change Over Time in Educational Attainment for Deaf Individuals From 2008 to 2015.* American Educational Research Association Annual Meeting, New York, NY, April 2018.

Sales, A.C. and Pane, J. *Theory vs Practice of Mastery Learning in the Cognitive Tutor: Principal Stratification on a Latent Variable.* Contributed Presentation at the Society for Research in Educational Effectiveness Spring Conference, Washington, DC, March 2018.

Johnson, K. E., Sales, A.C., Rew, L., & Crosnoe, R. *Patterns of Substance Use and Associated Health-Risk Behaviors in Texas Alternative High School Students.*, Society for Adolescent Health and Medicine Annual Meeting, Seattle, WA, March 2018.

Sales, A.C., Heffernan, N, and Hansen, B.B. *Rebar: Predicting Outcomes to Reinforce Online Experiments.* Contributed Presentation at the MIT Conference on Digital Experimentation, Cambridge, MA, October 2016.

Sales, A.C., Sweet, T and Junker, B. *Causal Mediation Analysis of Social Networks* Contributed Presentation at the Joint Statistical Meetings, Chicago, IL, August 2016.

Sales, A.C., Wilks, A and Pane, J.F. *Student Usage Predicts Treatment Effect Heterogeneity in the Cognitive Tutor Algebra I Program.* Contributed Presentation at the 9th International Conference on Educational Data Mining, Raleigh, NC, July, 2016.

Sales, A.C., and Pane, J.F. *Modeling Log Data from an Intelligent Tutor Experiment*. Contributed Presentation at the Atlantic Causal Inference Conference, New York, NY, May 2016.

Sales, A.C. and Pane, J.F. *Causal Mechanisms and Student Usage Data from a Randomized Experiment of Cognitive Tutor Algebra I: Preliminary Results*. Contributed Presentation at the Association for Education Finance and Policy 41st Annual Conference, Denver, CO, 2016.

Sales, A.C. and Pane, J. *Exploring Causal Mechanisms in a Randomized Effectiveness Trial of the Cognitive Tutor*. Contributed Presentation at the 8th International Conference on Educational Data Mining, Madrid, Spain, June 2015.

Sales, A.C. and Hansen, B.B. *Adjusting a Propensity Score Analysis for Many Covariates in an Educational Evaluation*. Contributed Presentation at the Psychometric Society Annual Meeting, Madison, WI, July 2014; Contributed Presentation at the Society for Research in Educational Effectiveness Spring Conference, Washington, DC, March 2014; Poster at the Atlantic Causal Inference Conference, Providence, RI, May 2014; Presented at the Statistics in Education Research Group, Carnegie Mellon University, Pittsburgh, PA, November 2013.

Sales, A.C. *A Useful Model? Using Covariates to Test the Usefulness of the Randomization Assumption*. Presented at the Statistics in Education Research Group, Carnegie Mellon University, Pittsburgh, PA, September 2014.

Sales, A.C. *Using Covariate Balance to Choose a Regression Discontinuity Bandwidth*. Presented at the Statistics in Education Research Group, Carnegie Mellon University, Pittsburgh, PA, June 2014.

Sales, A.C. and Hansen, BB *A Propensity Score Match with Many More Adjustment Variables than Observations: Evaluation of a Math Enrichment Program Via School-Level Matching*. Presented at the Causal Inference in Education Research Seminar, Ann Arbor, MI, January 2013.

Sales, A.C. and Hansen, BB *Analyzing Regression Discontinuity Designs as Randomized Experiments*. Poster at the Atlantic Causal Inference Conference, Baltimore, MD, May 2012.

Sales, A.C. *Choosing a Bandwidth for Regression-Discontinuity Designs: The Case of Academic Probation*. Presented at the Causal Inference in Education Research Seminar, Ann Arbor, MI, February 2012.

Sales, A.C. *Using Displacement Effects to Study Returns to Education*. Poster at the Michigan Student Symposium for Inter-disciplinary Statistical Sciences, April 2011.

Methodology Workshops and Guest Lectures

Statistical Computing with R. University of Texas College of Education, September 2018, February, 2019, October 2019.

Proposal Writing: A Statistician's View. University of Texas College of Education, September 2019.

Power and Sample Size. University of Texas College of Education, July 2019.

Reproducible Research. University of Texas College of Education, November 2018.

Mediation Analysis: Beyond Baron and Kenny. University of Texas College of Education, February 2016, April 2018

Social Network Data Analysis. University of Texas College of Education, March 2017. February 2018.

Meta Analysis. University of Texas College of Education, April 2017, March 2018.

Tutorial: Principal Stratification for EDM Experiments. 10th International Conference on Educational Data Mining, Wuhan, China, June 2017.

Causality in Ed Research: How to think and write about cause and effect in your research. University of Texas College of Education, April 2017.

Effect Sizes in Education Research. University of Texas College of Education, March, 2017.

Propensity Score Matching. University of Texas College of Education, November, 2016, April 2018, George Mason University, January 2014.

Teaching Experience

Instructor, *Observational Causal Inference*. Statistics Department, Carnegie Mellon University.

Fall 2014.

Guest Lecturer, *Statistical Practice*. Statistics Department, Carnegie Mellon University. Spring 2014.

Teaching Assistant, *Causal Inference*. Inter-University Consortium for Political and Social Research (ICPSR). Summer, 2012.

Graduate Student Instructor, *Applied Statistical Methods*. Statistics Department, University of Michigan. Winter 2012.

Graduate Student Instructor, *Introduction to Quantitative Research Methods*. Statistics Department, University of Michigan. Fall 2010, Fall 2011.

Graduate Student Instructor, *Survey Sampling Techniques*. Statistics Department, University of Michigan. Winter 2011.

Graduate Student Instructor, *Introduction to Statistics and Data Analysis*. Statistics Department, University of Michigan. Fall 2009.

Mathematics Teacher, University High School, Newark, NJ. Fall 2005-spring 2006.

Awards and Fellowships

Outstanding Graduate Student Instructor Award (2013)

Biostatistics Training Grant (2007-2009)

Sigma Phi Sigma Physics Honor Society (2005)

Professional Service

Dissertation committees: Siyuan Zhao (Worcester Polytechnic Institute), Thanaporn March Patikorn (Worcester Polytechnic Institute), Yasmine Jassal (University of Texas), Christopher Runyon (University of Texas).

Journal Reviewer: *Science*. *Educational Evaluation and Policy Analysis*, *Health Services Research*, *Operations Research*. *Statistics in Medicine*. *Journal of the American Statistical Association*. *Operations Research*. *Annals of Applied Statistics*. *Journal of Educational Data Mining*. *Journal of Educational and Behavioral Statistics*. *Journal of Research in Educational Effectiveness*.

Co-Organized CMART Speaker Series, 2014–2015.

Co-Organized Statistics in Education Research Group Seminar Series, 2013–2015.