

# JAMES E. PUSTEJOVSKY

Department of Educational Psychology  
University of Texas at Austin  
1912 Speedway, M/S D5800  
Austin, TX 78712

[pusto@austin.utexas.edu](mailto:pusto@austin.utexas.edu)

## EDUCATION

- 2013            Ph.D., Northwestern University, Department of Statistics
- 2003            B.A., Boston College. Major in Economics, minor in German.

## PROFESSIONAL EXPERIENCE

- 2013-present   Assistant Professor, Department of Educational Psychology  
Quantitative Methods program  
University of Texas at Austin, Austin, TX.
- 2006-2008      Research Analyst, Distributed Leadership Studies  
Northwestern University, Evanston, IL.
- 2003-2006      Analyst/Senior Analyst  
Analysis Group, Boston, MA.

## HONORS AND AWARDS

- 2016-present   *Member*, Society for Research Synthesis Methodology
- 2014            Outstanding Quantitative Dissertation  
Division D (Measurement and Research Methodology) of the American Educational  
Research Association
- 2009-2012      Multidisciplinary Program in Educational Sciences Fellowship,  
Northwestern University

## FUNDING

Greater Texas Foundation, Greater Texas Foundation Faculty Fellows program. *Evaluating the Transition to College Mathematics Course in Texas High Schools*. Aug. 1, 2017-Jul. 31, 2020. \$87,337.

Institute of Education Sciences, *Response Ratio Effect Sizes for Single-Case Designs with Behavioral Outcome Measures* (R305D160002). Aug. 1, 2016—Jul. 31, 2018. \$199,690.

## ARTICLES

Swan, Daniel M., & **Pustejovsky, James E.** (2018). A gradual effects model for single-case designs. *Multivariate Behavioral Research*, forthcoming.

**Pustejovsky, James E.** (2018). Using response ratios for meta-analyzing single-case designs with behavioral outcomes. *Journal of School Psychology*, 68, 99-112.  
<https://doi.org/10.1016/j.jsp.2018.02.003>

**Pustejovsky, James E.** (2018). Procedural sensitivities of effect sizes for single-case designs with directly observed behavioral outcomes. *Psychological Methods*, forthcoming.  
<https://doi.org/10.1037/met0000179>

Zimmerman, Kathleen N., Ledford, Jennifer R., Severini, Katherine E., **Pustejovsky, James E.**, Barton, Erin E., & Lloyd, Blair P. (2018). Single-case synthesis tools I: Evaluating the quality and rigor of research on antecedent sensory-based interventions. *Research in Developmental Disabilities*, forthcoming. <https://doi.org/10.1016/j.ridd.2018.02.003>

Zimmerman, Kathleen N., **Pustejovsky, James E.**, Ledford, Jennifer R., Barton, Erin E., Severini, Katherine E., & Lloyd, Blair P. (2018). Single-case synthesis tools II: Comparing overlap measures and parametric effect sizes for synthesizing antecedent sensory-based interventions. *Research in Developmental Disabilities*, forthcoming.  
<https://doi.org/10.1016/j.ridd.2018.02.001>

Maggin, Daniel M., Lane, Kathleen L., & **Pustejovsky, James E.** (2017). Introduction to the special issue on single-case systematic reviews and meta-analysis. *Remedial and Special Education*, 38(6), 323-330. DOI: [10.1177/0741932517717043](https://doi.org/10.1177/0741932517717043)

Barton, Erin E., **Pustejovsky, James E.**, Maggin, Daniel M., & Reichow, Brian (2017). A meta-analysis of technology-aided instruction and intervention for students with ASD. *Remedial and Special Education*, 38(6), 371-386. DOI: [10.1177/0741932517729508](https://doi.org/10.1177/0741932517729508)

Maggin, Daniel M., **Pustejovsky, James E.**, & Johnson, Austin H. (2017). A meta-analysis of school-based group contingency interventions for students with challenging behavior: An update. *Remedial and Special Education*, 38(6), 353-370. DOI: [10.1177/0741932517716900](https://doi.org/10.1177/0741932517716900)

Common, Eric A., Lane, Kathleen L., **Pustejovsky, James E.**, Johnson, Austin H., & Johl, Liane E. (2017). Functional assessment-based interventions for students with or at-risk for high incidence disabilities: Field-testing single-case synthesis methods. *Remedial and Special Education*, 38(6), 331-352. DOI: [10.1177/0741932517693320](https://doi.org/10.1177/0741932517693320)

**Pustejovsky, James E.** & Elizabeth Tipton (2016). Small sample methods for cluster-robust variance estimation and hypothesis testing in fixed effects models. *Journal of Business and Economic Statistics*. In Press. DOI: [10.1080/07350015.2016.1247004](https://doi.org/10.1080/07350015.2016.1247004)

**Pustejovsky, James E.** & Daniel M. Swan (2015). Four methods of analyzing partial interval recording data, with application to single-case research. *Multivariate Behavioral Research*, 50 (3), 365-380. DOI: [10.1080/00273171.2015.1014879](https://doi.org/10.1080/00273171.2015.1014879)

Tipton, Elizabeth & **James E. Pustejovsky** (2015). Small-sample adjustments for tests of moderators and model fit using robust variance estimation in meta-regression. *Journal of Educational and Behavioral Statistics*, 40(6), 604-634. DOI: [10.3102/1076998615606099](https://doi.org/10.3102/1076998615606099)

Jim, Heather S., **James E. Pustejovsky**, Crystal L. Park, Suzanne C. Danhauer, Allen C. Sherman, George Fitchett, Thomas V Merluzzi, Alexis R. Munoz, Login George, Mallory A. Snyder, & John M. Salsman (2015). Religion, spirituality, and physical health in cancer patients: A meta-analysis. *Cancer*, 121 (21), 3760-3768. DOI: [10.1002/cncr.29353](https://doi.org/10.1002/cncr.29353)

Salsman, John M., **James E. Pustejovsky**, Heather S. Jim, Alexis R. Munoz, Thomas V. Merluzzi, Login George, Crystal L. Park, Suzanne C. Danhauer, Allen C. Sherman, Mallory A. Snyder, & George Fitchett (2015). A meta-analytic approach to examine the relationship between religion/spirituality and mental health in cancer. *Cancer*, 121 (21), 3769-3778. DOI: [10.1002/cncr.29350](https://doi.org/10.1002/cncr.29350)

Sherman, Allen C., Thomas V. Merluzzi, **James E. Pustejovsky**, Crystal L. Park, Login George, George Fitchett, Heather S. Jim, Alexis R. Munoz, Suzanne C. Danhauer, Mallory A. Snyder, & John M. Salsman (2015). A meta-analytic review of religious or spiritual involvement and social health among cancer patients. *Cancer*, 121 (21), 3779-3788. DOI: [10.1002/cncr.29352](https://doi.org/10.1002/cncr.29352)

**Pustejovsky, James E.** (2015). Measurement-comparable effect sizes for single-case studies of free-operant behavior. *Psychological Methods*, 20 (3), 342-359. DOI: [10.1037/met0000019](https://doi.org/10.1037/met0000019)

**Pustejovsky, James E.** & Christopher Runyon (2014). Alternating renewal process models for behavioral observation: Simulation methods and validity implications. *Behavioral Disorders*, 39 (4), 211-227.

**Pustejovsky, James E.**, Larry V. Hedges, and William R. Shadish (2014). Design-comparable effect sizes in multiple baseline designs: A general modeling framework. *Journal of Educational and Behavioral Statistics*, 39 (5), 368-393. DOI: [10.3102/1076998614547577](https://doi.org/10.3102/1076998614547577)

Shadish, William R., Larry V. Hedges, & **James E. Pustejovsky** (2014). Analysis and meta-analysis of single-case designs with a standardized mean difference statistic: A primer and applications. *Journal of School Psychology*, 52, 123-147. DOI: [10.1016/j.jsp.2013.11.005](https://doi.org/10.1016/j.jsp.2013.11.005)

**Pustejovsky, James E.** (2014). Converting from  $d$  to  $r$  to  $z$  when the design uses extreme groups, dichotomization, or experimental control. *Psychological Methods*, 19 (1), 92-112. DOI: [10.1037/a0033788](https://doi.org/10.1037/a0033788)

Hedges, Larry V., **James E. Pustejovsky**, & William R. Shadish (2013). A standardized mean difference effect size for multiple baseline designs across individuals. *Research Synthesis Methods*, 4(4), 324-341. DOI: [10.1002/jrsm.1086](https://doi.org/10.1002/jrsm.1086)

Shadish, William R., Larry V. Hedges, **James E. Pustejovsky**, Jonathan G. Boyajian, Kristynnn J. Sullivan, Alma Andrade, & Jeannette Barrientos (2013). A *d*-statistic for single-case designs that is equivalent to the usual between-groups *d*-statistic. *Neuropsychological Rehabilitation: An International Journal*, 24 (3-4), 528-553. DOI: [10.1080/09602011.2013.819021](https://doi.org/10.1080/09602011.2013.819021)

Hedges, Larry V., **James E. Pustejovsky**, & William R. Shadish (2012). A standardized mean difference effect size for single case designs. *Research Synthesis Methods*, 3, 224-239. DOI: [10.1002/jrsm.1052](https://doi.org/10.1002/jrsm.1052)

Dorner, Lisa M., James P. Spillane, **James E. Pustejovsky** (2011). Organizing for instruction: A comparative study of public, charter, & Catholic schools. *Journal of Educational Change*, 12, 71-98. DOI: [10.1007/s10833-010-9147-5](https://doi.org/10.1007/s10833-010-9147-5)

**Pustejovsky, James E.**, James P. Spillane, Ruth Heaton, & W. James Lewis (2009). Understanding teacher leadership in middle school mathematics: A collaborative research effort. *Journal of Mathematics and Science: Collaborative Explorations*, 11, 19-40. Available at <http://www.math.vcu.edu/g1/journal/IssuesOnline.html#11>

**Pustejovsky, James E.** & James P. Spillane (2009). Question-order effects in social network name generators. *Social Networks*, 31(4), 221-229. DOI: [10.1016/j.socnet.2009.06.001](https://doi.org/10.1016/j.socnet.2009.06.001)

Spillane, James P., Eric M. Camburn, **James E. Pustejovsky**, Amber Stitzel Pareja, & Geoff Lewis (2008). Taking a distributed perspective: epistemological and methodological tradeoffs in operationalizing the leader-plus aspect. *Journal of Educational Administration*, 46(2), 189-213. DOI: [10.1108/09578230810863262](https://doi.org/10.1108/09578230810863262)

## BOOK CHAPTERS

**Pustejovsky, James E.**, & John M. Ferron (2017). Research synthesis and meta-analysis of single-case designs. In J. M. Kauffman, D. P. Hallahan, & P. C. Pullen (Eds.), *Handbook of Special Education, 2nd Edition*. New York, NY: Routledge.

Shadish, William R., Larry V. Hedges, **James E. Pustejovsky**, David M. Rindskopf, Jonathan G. Boyajian, & Kristynnn J. Sullivan (2014). Analyzing Single-Case Designs: d, G, Hierarchical Models, Bayesian Estimators, Generalized Additive Models, and the Hopes and Fears of Researchers about Analyses. In T. R. Kratochwill & J. R. Levin (Eds.), *Single-Case Intervention Research: Methodological and Data-Analysis Advances*. Washington, D.C.: American Psychological Association.

Spillane, James P., Eric M. Camburn, **James E. Pustejovsky**, Amber Stitzel Pareja, & Geoff Lewis (2008). Taking a distributed perspective in studying school leadership and management: The challenge of study operations. Chp. 3 in A. Harris (ed.), *Distributed Leadership: Different Perspectives*. Dordrecht, DE: Springer, 47-80.

## DISCUSSION PAPERS, LETTERS, AND OTHER PUBLISHED WORK

Valentine, Jeffrey C., Emily E. Tanner-Smith, **James E. Pustejovsky**, and Timothy S. Lau (2016). Between-case standardized mean difference effect sizes for single-case designs: A primer and tutorial using the scdhlms web application. Oslo, Norway: The Campbell Collaboration. Retrieved from <https://campbellcollaboration.org/library/effect-sizes-single-case-designs-campbell-discussion-paper-1.html>

Salsman, John M., **James E. Pustejovsky**, Crystal L. Park, Allen C. Sherman, Thomas V. Merluzzi, Suzanne C. Danhauer, Heather S. Jim, & George Fitchett (2016). Reply to the association between religion/spirituality and mental health in cancer. *Cancer*, 122, 2441-2442. DOI: [10.1002/cncr.30019](https://doi.org/10.1002/cncr.30019)

## UNDER SUBMISSION

Salsman, J.M., **Pustejovsky, J.E.**, Schueller, S.M., Hernandez, R., Berendsen, M., Steffen, L.E. & Moskowitz, J.T. (2017). Psychosocial interventions for cancer patients and survivors: A meta-analysis of effects on positive affect

Tipton, E., **Pustejovsky, J.E.**, & Ahmadi, H. (2018). Too much or too little: A divergent history of meta-regression and review of current practice.

Park, C.L., **Pustejovsky, J.E.**, Trevino, K., Sherman, A., Esposito, C., Berendsen, M., & Salsman, J.M. (2018). Effects of psychosocial interventions on meaning and purpose in adults with cancer: A systematic review and meta-analysis.

Merluzzi, T.V., **Pustejovsky, J.E.**, Philip, E.J., Sohl, S. J., Berendsen, M., & Salsman, J.M. (2018). A meta-analytic review of interventions to enhance self-efficacy in cancer patients and survivors.

## SOFTWARE

**Pustejovsky, James E.** (2016). *scdhlms: Estimating hierarchical linear models for single-case designs* (R package version 0.3). URL: <https://CRAN.R-project.org/package=scdhlms>

**Pustejovsky, James E.** (2016). *clubSandwich: Cluster-robust (sandwich) variance estimators with small-sample corrections* (R package version 0.2.1). URL: <https://CRAN.R-project.org/package=clubSandwich>

**Pustejovsky, James E.** (2015). *ARPobservation: Simulating recording procedures for direct observation of behavior* (R package version 1.1). URL: <https://CRAN.R-project.org/package=ARPobservation>

Tyszler, Marcelo, **Pustejovsky, James E.**, & Tipton, Elizabeth (2017). REG\_SANDWICH: Stata module to compute cluster-robust (sandwich) variance estimators with small-sample corrections for linear regression, Statistical Software Components S458352, Boston College Department of Economics. URL: <https://ideas.repec.org/c/boc/bocode/s458352.html>

## CONFERENCE PRESENTATIONS

**Pustejovsky, J.E.**, Tipton, E., & Aloe, A. (2018). Meta-analysis of dependent effect sizes: A review and consolidation of methods. Presentation at the American Educational Research Association annual convention, April 15, 2018 in New York, NY.

Rodgers, M.A. & **Pustejovsky, J.E.** (2018). Testing for funnel plot asymmetry of standardized mean differences. Presentation at the American Educational Research Association annual convention, April 15, 2018 in New York, NY.

Tipton, E., **Pustejovsky, J.E.**, & Ahmadi, H. (2018). Meta-analysis in Education: Past, Present, & Future. Presentation at the American Educational Research Association annual convention, April 15, 2018 in New York, NY.

Swan, D.M., & **Pustejovsky, J.E.** (2018). A gradual effects model for single-case designs. Poster presented at the Institute of Education Sciences 2018 Principal Investigators Meeting, January 10, 2018 in Washington, DC.

**Pustejovsky, J.E.**, & Furman, G. (2017). Heteroskedasticity-robust tests in linear regression: A review and evaluation of small-sample corrections. Presentation at the American Educational Research Association annual convention, April 30, 2017 in San Antonio, TX.

**Pustejovsky, J.E.** (2017). Using response ratios for meta-analyzing single-case designs with behavioral outcomes. Poster presented at the American Educational Research Association annual convention, April 28, 2017 in San Antonio, TX.

Swan, D.M., & **Pustejovsky, J.E.** (2017). A nonlinear intervention analysis model for treatment reversal single-case designs. Poster presented at the American Educational Research Association annual convention, April 28, 2017 in San Antonio, TX.

Moskowitz, J.T., **Pustejovsky, J.E.**, Hernandez, R., Schueller, S.M., Berendsen, M. & Salsman, J.M. (2017). Don't worry, be happy? Meta-analysis of intervention trials on positive affect in cancer patients and survivors. In J.M. Salsman (Chair), Promoting psychological well-being in cancer patients and survivors: Meta-analyses of randomized clinical trials. *Annals of Behavioral Medicine*, 51 (Suppl.), S1624.

Park, C.L., **Pustejovsky, J.E.**, Trevino, K., Sherman, A., Esposito, C., Berendsen, M., & Salsman, J.M. (2017). Do psychosocial interventions with cancer patients and survivors increase meaning and purpose? A meta-analytic approach. In J. M. Salsman (Chair), Promoting psychological well-being in cancer patients and survivors: Meta-analyses of randomized clinical trials. *Annals of Behavioral Medicine*, 51 (Suppl.), S1625.

Merluzzi, T.V., **Pustejovsky, J.E.**, Philip, E.J., Berendsen, M., Heitzmann Ruhl, C.A., & Salsman, J.M. (2017). A meta-analytic review of interventions to enhance self-efficacy behaviors in cancer patients and survivors. In J. M. Salsman (Chair), Promoting psychological well-being in cancer patients and survivors: Meta-analyses of randomized clinical trials. *Annals of Behavioral Medicine*, 51 (Suppl.), S1626.

**Pustejovsky, James E.** & Elizabeth Tipton. Small sample corrections for use of cluster-robust standard errors in the analysis of school-based experiments. Presentation at the Society for Research on Educational Effectiveness Conference, March 2, 2017 in Washington, D.C.

**Pustejovsky, James E.** & Elizabeth Tipton. Small-sample methods for cluster-robust variance estimation and hypothesis testing in fixed effects models. Presentation at the Joint Statistical Meetings, July 31, 2016 in Chicago, IL.

**Pustejovsky, James E.** & Elizabeth Tipton. Small-sample adjustments for multiple-contrast hypothesis tests of meta-regressions using robust variance estimation. Presentation at the annual meeting of the Society for Research Synthesis Methods, July 8, 2015 in Nashville, TN.

**Pustejovsky, James E.** Operational sensitivities of non-overlap effect sizes for single-case experimental designs. Poster presented at the American Educational Research Association annual convention, April 19, 2015 in Chicago, IL.

**Pustejovsky, James E.** & Elizabeth Tipton. Small-sample adjustments for F-tests using robust variance estimation in meta-regression. Presentation at the American Educational Research Association annual convention, April 18, 2015 in Chicago, IL.

**Pustejovsky, James E.** Observation procedures and Markov Chain models for estimating the prevalence and incidence of a state behavior. Presentation at the American Educational Research Association annual convention, April 16, 2015 in Chicago, IL.

Tipton, Elizabeth & **James E. Pustejovsky.** Small-sample adjustments for tests of moderators and model fit using robust variance estimation in meta-regression. Presentation at the Society for Research on Educational Effectiveness Conference, March 6, 2015 in Washington, D.C.

Salsman, John M., Alexis R. Munoz, **James E. Pustejovsky,** Heather S. Jim, Crystal L. Park, Suzanne C. Danhauer, Allen C. Sherman, Login George, Thomas V. Merluzzi, & George Fitchett. A meta-analytic approach to examine the relationship between religion/spirituality and mental health in cancer. Presentation at the Annual Conference of the Society for Behavioral Medicine, April 24, 2014 in Philadelphia, PA.

Jim, Heather S., Thomas V Merluzzi, Suzanne C. Danhauer, **James E. Pustejovsky,** Alexis R. Munoz, George Fitchett, Crystal L. Park, Allen C. Sherman, Login George, & John M. Salsman. A meta-analysis of the relationship between religion/spirituality and physical health in cancer survivors. Presentation at the Annual Conference of the Society for Behavioral Medicine, April 24, 2014 in Philadelphia, PA.

Merluzzi, Thomas V., Allen C. Sherman, Crystal L. Park, Login George, George Fitchett, Heather S. Jim, Alexis R. Munoz, **James E. Pustejovsky,** Suzanne C. Danhauer, & John M. Salsman. A meta-analytic review of religion/spirituality and social QOL among cancer patients. Presentation at the Annual Conference of the Society for Behavioral Medicine, April 24, 2014 in Philadelphia, PA.



**Pustejovsky, James E.** & Daniel M. Swan. Four methods of analyzing partial interval recording data, with application to single-case research. Poster presented at the American Educational Research Association annual convention, April 4, 2014 in Philadelphia, PA.

**Pustejovsky, James E.** Addressing construct invalidity in partial interval recording data. Presentation at the Texas Universities Educational Statistics and Psychometrics Meeting, March 21, 2014, at Texas A&M University, College Station, TX.

**Pustejovsky, James E.** On internal validity in multiple baseline designs. Presentation at the Society for Research on Educational Effectiveness Conference, March 6, 2014 in Washington, D.C.

**Pustejovsky, James E.** Effect sizes and measurement comparability for meta-analysis of single-case research. Presentation at the annual convention of the Association for Behavior Analysis International, May 28, 2013 in Minneapolis, MN.

**Pustejovsky, James E.** Observation procedures and Markov chain models for estimating the prevalence and incidence of a behavior. Poster presented at the American Educational Research Association annual convention, April 30, 2013 in San Francisco, CA. *Awarded first place in the Division-D In-Progress Research Poster Competition.*

**Pustejovsky, James E.** Operationally comparable effect sizes for meta-analysis of single-case research. Presentation at the Society for Research on Educational Effectiveness Conference, March 7, 2013 in Washington, D.C.

Hedges, Larry V., William R. Shadish, & **James E. Pustejovsky.** A d-estimator for single case designs. Presentation at the Society for Research Synthesis Methods conference, July 13, 2011 in Ottawa, Canada.

**Pustejovsky, James E.** Power analysis for anticipated non-response in randomized block experimental designs. Poster presented at the Society for Research on Educational Effectiveness Conference, March 3-5, 2011 in Washington, D.C.

**Pustejovsky, James E.** Power analysis for anticipated non-response in simple experimental designs. Poster presented at the Institute for Education Sciences Conference, June 28-30, 2010 in Washington, D.C.

**Pustejovsky, James E.** & James P. Spillane. Question-order effects in social network name generators. Poster presented at the 28th annual International Sunbelt Social Network Conference, January 22-28, 2008, in St. Petersburg Beach, Florida.

## INVITED PRESENTATIONS

**Pustejovsky, James E.** (2018). Meta-analysis of single-case research: A brief and breezy tour. Presentation at the Systematic Reviews and Meta-Analysis Special Interest Group, American Educational Research Association annual convention, April 15, 2018 in New York, NY.



**Pustejovsky, James E.** Randomization inference for single case experimental designs. Presentation at the Institute of Education Sciences 2018 Principal Investigators Meeting, January 10, 2018 in Washington, DC.

**Pustejovsky, James E.** Effect sizes for single case research. Presentation at Institute of Education Sciences 2016 Principal Investigators Meeting, December 19, 2016 in Washington, DC.

**Pustejovsky, James E.** When large samples act small: The importance of small-sample adjustments for cluster-robust inference in impact evaluations. Presentation at the American Institutes for Research Impact Working Group Lecture Series, July 18, 2016.

**Pustejovsky, James E.** Some Markov models for direct observation of behavior. Presentation at the Department of Statistics, Northwestern University, May 29, 2013.

**Pustejovsky, James E.** Some implications of behavioral observation procedures for meta-analysis of single-case research. Presentation at the Department of Educational Psychology, College of Education, University of Texas at Austin, November 14, 2012.

## SERVICE

### *Teaching:*

- Instructor, American Psychological Association Advanced Training Institute on Single-Case Intervention Research. Madison, WI, June 27-July 1, 2016.

### *Editorial board:*

- Psychological Bulletin (2015 – present)
- Topics in Early Childhood Special Education (2016 – present)

### *Referee service:*

- Methodological referee, Campbell Collaboration (2011 – present)
- Proposal reviewer, Society for Research on Educational Effectiveness (2012, 2015)
- Ad-hoc reviews for:
  - Behavior Research Methods
  - Computational Statistics and Data Analysis
  - Developmental Neurorehabilitation
  - Education and Treatment of Children
  - Evaluation Review
  - Field Methods
  - International Journal of Research & Method in Education
  - Journal for Specialists in Group Work
  - Journal of Educational and Behavioral Statistics
  - Journal of Educational Psychology

- Journal of Research on Educational Effectiveness
- Journal of School Psychology
- Methodology: European Journal of Research Methods for the Behavioral and Social Sciences
- Multivariate Behavioral Research
- Psychological Methods
- Psychological Bulletin
- Remedial and Special Education
- Research in Developmental Disabilities
- Research Synthesis Methods
- Review of General Psychology
- Social Networks
- Structural Equation Modeling

## **MEMBERSHIP**

American Statistical Association

American Educational Research Association

Society for Research on Educational Effectiveness