

# Matthew J. Madison

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Clemson University  
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## Education

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| <i>Degree</i> | <i>Program</i>           | <i>Institution</i>           | <i>Year</i> |
|---------------|--------------------------|------------------------------|-------------|
| Ph.D.         | Quantitative Methodology | University of Georgia        | 2016        |
| M.S.          | Statistics               | University of Georgia        | 2014        |
| M.A.          | Mathematics              | Central Michigan University  | 2011        |
| B.S.          | Mathematics              | University of South Carolina | 2009        |

## Academic Positions

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**Clemson University** July 2018 – Present  
College of Education  
Department of Education and Human Development  
*Assistant Professor, Learning Sciences*

**University of California – Los Angeles** June 2016 – June 2018  
Graduate School of Education and Information Studies  
Social Research Methodology Division  
*Assistant Professor, Advanced Quantitative Methods*

## Research Interests

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Psychometrics; diagnostic classification models; item response models; growth modeling; K-16 formative assessment; STEM education assessment

## Publications

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\*Indicates collaboration with a graduate student.

**Madison, M. J.** (2019). Reliably assessing growth with longitudinal diagnostic classification models. *Educational Measurement: Issues and Practice*, 38(2), 68-78.

**Madison, M. J., & Bradshaw, L.** (2018). Assessing growth in a diagnostic classification model framework. *Psychometrika*, 83(4), 963-990.

**Madison, M. J., & Bradshaw, L.** (2018). Evaluating intervention effects in a diagnostic classification model framework. *Journal of Educational Measurement*, 55(1), 32-51.

Bradshaw, L., & **Madison, M. J.** (2016). Invariance properties for general diagnostic classification models. *International Journal of Testing*, 16(2), 99-118.

**Madison, M. J., & Bradshaw, L.** (2015). The effects of Q-matrix design on classification accuracy in the LCDM. *Educational and Psychological Measurement*, 75(3), 491-511.

Piatek-Jimenez, K., **Madison, M. J., & Przybyla-Kuchek, J.** (2014). Equity in mathematics textbooks: A new look at an old issue. *Journal of Women and Minorities in Science and Engineering*, 20(1), 55-74.

Piatek-Jimenez, K., & **Madison, M. J.** (2012). Equity in mathematics textbooks: A report on progress. *Proceedings of the 34th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Kalamazoo, MI: Western Michigan University.

### **Manuscripts Under Review**

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\*Indicates collaboration with a graduate student.

**Madison, M. J., & Fager, M.** Revisiting diagnostic classification model invariance properties. Manuscript under review.

Jurich, D., & **Madison, M. J.** Item influence indices for diagnostic classification models. Manuscript under review.

### **Current Grant Support**

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**Principal Investigator:** *A Family of Diagnostic Models for Evaluating Learning Progressions* (2019 – 2022). National Science Foundation ~ \$229,430.

**Advisory Board:** *Next Generation STEM Teachers for Urban Schools: Recruiting, Preparing, and Mentoring Undergraduates for Innovative STEM Teaching* (2018 – 2023). National Science Foundation: Robert Noyce Scholarship Program ~ \$949,721.

### **Grant Proposals Under Review**

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**Principal Investigator:** *Generalized, Multilevel, and Longitudinal Psychometric Models for Evaluating Educational Interventions* (2020 – 2023). Institute of Educational Sciences ~ \$854,997.

**Senior Personnel:** *Personalized, Impactful Professional Development: Uniting Machine Learning and Teacher Developmental Needs* (2019 – 2020). National Science Foundation ~ \$99,889. PI: Jeff Marshall.

### **Previously Funded Grants**

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**Principal Investigator:** *Assessing Nested Effects in a Diagnostic Classification Model Framework* (2017 – 2018). UCLA Faculty Research Grant ~ \$6,305.

### **Unfunded Grant Proposals**

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**Principal Investigator:** CAREER: *Multilevel Diagnostic Classification Models for Evaluating Intervention Effects* (2019 – 2024). National Science Foundation ~ \$559,363.

**Co-Principal Investigator:** *Know Your Nearest Neighbors* (2018 – 2023). National Science Foundation: Discovery Research PreK – 12 ~ \$2,999,569. PI: David Weintrop.

**Co-Principal Investigator:** *Talent for Teaching* (2018 – 2023). National Science Foundation: Robert Noyce Scholarship Program ~ \$1,447,285. PI: Christopher Anderson.

**Co-Principal Investigator:** *Principles of Data Science (PODS)* (2017 – 2020). National Science Foundation: STEM + Computing ~ \$2,500,000. PI: Rob Gould.

**Principal Investigator:** *Diagnosing Teachers' Statistical Preparation* (2017 – 2018). UCLA Transdisciplinary Seed Grant ~ \$32,337.

### **Honors and Awards**

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| Paul L. Beasley TRiO Trailblazer McNair Alumni Award<br>University of South Carolina TRIO Programs                               | 2019 |
| Outstanding Dissertation Award<br>American Educational Research Association<br>Cognition and Assessment Special Interest Group   | 2019 |
| Owen W. Scott Award for Academic Merit and Professional Promise<br>University of Georgia<br>Department of Educational Psychology | 2015 |
| UGA Amazing Student<br>University of Georgia College of Education  | 2014 |

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| 2 <sup>nd</sup> Place: Quantitative Division Poster  | 2013 |
| <i>Group-mean centering in hierarchical linear models: A weighting approach.</i> Poster presented at the 2013 College of Education Graduate Student Research Conference in Athens, GA. |      |
| Outstanding Tutor Honorable Mention  | 2012 |
| Central Michigan University<br>Department of Mathematics   |      |
| Outstanding Teaching Assistant   | 2011 |
| Central Michigan University<br>Department of Mathematics   |      |
| Emerging Scholar Award   | 2008 |
| University of South Carolina<br>Ronald E. McNair Scholars Program  |      |

## Research Presentations

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\*Indicates collaboration with a graduate student.

### 2019

**Madison, M. J.**, Fager, M. (2019, October). *Revisiting diagnostic classification model invariance properties*. Paper to be presented at the annual meeting of the Northeastern Educational Research Association in Trumbull, CT.

**Madison, M. J.** (2019, April). *Effects of Item Parameter Drift on Longitudinal Diagnostic Classification Models*. Paper presented at the annual meeting of the National Council on Measurement in Education in Toronto, Ontario, CA.

\*Kim, J., **Madison, M. J.**, Chung, S., & Bradshaw, L. (2019, April). *Approaches to estimating longitudinal diagnostic classification models*. Paper presented at the annual meeting of the National Council on Measurement in Education in Toronto, Ontario, CA.

\*Soo, Y. S., **Madison, M. J.** (2019, April). *Effects of Local Dependence on Longitudinal Diagnostic Classification Models*. Paper presented at the annual meeting of the National Council on Measurement in Education in Toronto, Ontario, CA.

### 2018

**Madison, M. J.**, & Bao, Y. (2018, July). *A longitudinal and polytomous diagnostic classification model*. Paper presented at the International Meeting of the Psychometric Society in New York, NY.

\*Keenan, E. G., **Madison, M. J.**, Wood, J. J., & Lerner, M. D. (2018, May). *Psychometric analysis of the autism spectrum quotient using diagnostic classification modeling*. Poster presented at the Annual Meeting of the International Society for Autism Research, Rotterdam, Netherlands.

**Madison, M. J.** (2018, April). *Item influence measures for diagnostic classification models*. Paper presented at the annual meeting of the National Council on Measurement in Education in New York, NY.

\*Cho, A. C. B., Wood, J., & **Madison, M. J.** (2018, January). *Personality matters: A latent profile analysis of personality subgroups in children with autism spectrum disorder*. Poster presented at the Annual Conference for the University of California Center for Research on Special Education, Disabilities, and Developmental Risk in Davis, CA.

## **2017**

**Madison, M. J.**, (2017, October). *A diagnostic approach to reliably assessing growth*. Paper presented at the annual meeting of the Northeastern Education Research Association in Trumbull, CT.

\*Cruz, E., & **Madison, M. J.** (2017, October). *Diagnosing teachers' statistical preparation: A Pilot Study*. Paper presented at the Annual Meeting of the Society for Advancement of Chicanos/Hispanics and Native Americans in Science in Salt Lake City, UT.

**Madison, M. J.**, & Bradshaw, L. (2017, April). *Evaluating intervention effects in a diagnostic classification model framework*. Paper presented at the annual meeting of the National Council on Measurement in Education in San Antonio, TX.

## **2016**

\*Grantham, T., **Madison, M. J.**, Collins, K., & Luckey, J. (2016, November). *Single-subject acceleration for gifted Black males using the Math Hall and Ball afterschool program*. Paper presented at the annual meeting of the National Association for Gifted Children in Orlando, FL.

**Madison, M. J.**, & Bradshaw, L. (2016, October). *Evaluating innovative instruction using a longitudinal diagnostic classification model*. Paper presented at the annual meeting of the Northeastern Education Research Association in Trumbull, CT.

**Madison, M. J.**, & Bradshaw, L. (2016, July). *Assessing growth in a general diagnostic classification model*. Paper presented at the International Meeting of the Psychometric Society in Asheville, NC.

Xiong, X., **Madison, M. J.**, & Mattar, J. (2016, April). *Speededness for task based simulations items in a multi-stage licensure examination*. Paper presented at the annual meeting of the National Council on Measurement in Education in Washington, D.C.

**Madison, M. J.**, & Bradshaw, L. (2016, April). *Assessing growth in a diagnostic classification model framework*. Poster presented at the 2016 College of Education Graduate Student and Faculty Research Conference in Athens, GA.

## **2015**

**Madison, M. J., & Bradshaw, L.** (2015, October). *Invariance properties for general diagnostic classification models*. Paper presented at the annual meeting of the Northeastern Education Research Association in Trumbull, CT.

**Madison, M. J., & Bradshaw, L.** (2015, April). *Using Q\*Power to refine diagnostic assessment designs*. Paper presented at the annual meeting of the American Educational Research Association in Chicago, IL.

**Madison, M. J. & Bradshaw, L.** (2015, February). *Developing Diagnostic Formative Assessments in Graduate Statistics Courses*. Poster presented at the 2015 College of Education Graduate Student and Faculty Research Conference in Athens, GA.

## **2014**

**Madison, M. J. & Bradshaw, L.** (2014, April). *The effects of Q-matrix design on classification accuracy in the LCDM*. Poster presented at the 2014 College of Education Graduate Student and Faculty Research Conference in Athens, GA.

**Madison, M. J., Bradshaw, L., & Hollingsworth, B.** (2014, April). *The role of Q-matrix design in diagnostic assessment*. Paper presented at the annual meeting of the National Council on Measurement in Education in Philadelphia, PA.

## **2013**

**Madison, M. J. & Bradshaw, L.** (2013, October). *The effects of Q-matrix design on classification accuracy in the LCDM*. Paper presented at the annual meeting of the Northeastern Education Research Association in Rocky Hill, CT.

**Madison, M. J., & Templin, J.** (2013, April). *Group-mean centering in hierarchical linear models: A weighting approach*. Poster presented at the 2013 College of Education Graduate Student Research Conference in Athens, GA. Awarded 2<sup>nd</sup> place research prize.

## **2012**

Bradshaw, L., Brown, C., Cohen, A., **Madison, M. J., & Templin, J.** (2012, December). *Evaluating the statistical properties of epistemic network analysis*. Poster presented at the 4<sup>th</sup> annual Discovery Research K-12 Meeting in Madison, WI.

Piatek-Jimenez, K., & **Madison, M. J.** (2012, November). *Equity in mathematics textbooks: A report on progress*. Poster presented at the annual conference of the North American Chapter of the International Group for the Psychology of Mathematics Education in Kalamazoo, MI.

Marcinek, T., & **Madison, M. J.** (2012, July). *Learning to interpret the mathematical thinking of others in pre-service mathematics courses: potential and limitations*. Paper presented at the 12th International Congress on Mathematical Education in Seoul, Korea.

Hamed, D., & **Madison, M. J.** (2012, April). *Factors affecting student achievement in business calculus*. Poster presented at the annual Student Research and Creative Endeavors Exhibition in Mount Pleasant, MI.

### **Invited Presentations/Workshops**

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**Madison, M. J.** (2019, March). *Meaningful metrics in mathematics education research*. Invited presentation the UCLA Curtis Center Mathematics and Teaching Conference.

**Madison, M. J.** (2018, October). *Introduction to diagnostic measurement models*. Invited workshop to University of Massachusetts Amherst Research, Educational Measurement, and Psychometrics Program.

**Madison, M. J.** (2018, April). *A diagnostic classification analysis of an MDTP Test*. Invited presentation to the Working Group of the Mathematics Diagnostic Testing Project. Long Beach, CA.

**Madison, M. J.** (2018, March). *Meaningful metrics in educational research*. Invited presentation to the Quantitative Methodology Colloquium, UGA Department of Educational Psychology.

**Madison, M. J.** (2018, February). *Getting more out of educational assessments*. Invited presentation to the Precision Institute at National University in San Diego, CA.

**Madison, M. J.** (2018, January). *Non-arbitrary metrics in educational research*. Invited presentation to the Teaching and Learning Lab (TALL), UCLA Department of Psychology.

**Madison, M. J.** (2017, October). *Evaluating learning (and forgetting) over time via a diagnostic classification model*. Invited presentation to the Cognitive Psychology CogFog Meeting, UCLA Department of Psychology.

**Madison, M. J.** (2017, October). *Psychometric models for the reliable measurement of multiple latent traits*. Invited presentation to the UCLA Department of Statistics Research Seminar.

**Madison, M. J.** (2017, April). *Evaluating an instructional intervention with a longitudinal diagnostic model*. Invited presentation to the Human Development and Psychology Colloquium, UCLA Department of Education.

**Madison, M. J.** (2016, May). *Navigating the academic job market*. Invited presentation to Graduate Researchers in Educational Psychology at the University of Georgia.

**Madison, M. J.** (2016, January). *Getting more out of educational assessments*. Invited presentation at the 2016 University of Georgia College of Education Doctoral Recruitment Weekend in Athens, GA.

## Technical Reports

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**Madison, M. J. (2018).** *A Diagnostic Classification Analysis of an MDTP Test*. Technical Report. Mathematics Diagnostic Testing Project.

**Madison, M. J. (2015).** *Examining the Speediness of the Uniform CPA Examination*. Technical Report. American Institute of Certified Public Accountants.

## Developed Software

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**Madison, M. J., Bradshaw, L. (2015).** Q\*Power (1.0): A tool for prospective diagnostic assessment design. [Computer software]. Athens, GA.

## Teaching Experience

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### Graduate Courses

|   |             |
|---|-------------|
| Instructor: EDF 9870 – Multivariate and Categorical Educational Research<br>Clemson University                          | 2019        |
| Instructor: EDF 9770 – Multiple Regression / General Linear Models in Education<br>Clemson University                   | 2019        |
| Instructor: EDF 9270 – Quantitative Research Design and Statistics in Education<br>Clemson University                   | 2018        |
| Instructor: EDUC 255 – Diagnostic Classification Models<br>University of California – Los Angeles                       | 2017        |
| Instructor: EDUC 231C – Categorical Data Analysis<br>University of California – Los Angeles                             | 2017        |
| Co-instructor: EDUC 288 – Research Apprenticeship Course<br>University of California – Los Angeles                      | 2017        |
| Instructor: EDUC 230B – Linear Models in Social Sciences: Multiple Regression<br>University of California – Los Angeles | 2017, 2018  |
| Instructor: EDUC 230A – Introduction to Research Design and Statistics<br>University of California – Los Angeles        | 2016, 2017  |
| Teaching Assistant: ERSH 8310 – Applied Analysis of Variance in Education<br>University of Georgia                      | 2013 – 2015 |



## Undergraduate Courses

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|---|-------------|
| Instructor: MTH 217 – Business Calculus<br>Central Michigan University                          | 2012        |
| GRE Mathematics Preparatory Instructor<br>Central Michigan University Ronald E. McNair Scholars | 2011 – 2012 |
| Instructor: MTH 105 – Intermediate Algebra<br>Central Michigan University                       | 2009 – 2011 |
| Instructor: MTH 055 – Beginning Algebra<br>Central Michigan University                          | 2010        |
| Supplemental Instruction Leader: MTH 141 – Calculus I<br>University of South Carolina           | 2006 – 2009 |

## Professional Development Training Sessions/Workshops

**Madison, M. J.** (April, 2019). *Diagnostic Classification Models: Advanced Applications*. Half-day training session presented at the annual meeting of the National Council on Measurement in Education in Toronto, Ontario, CA.

Bradshaw, L., & **Madison, M. J.** (April, 2018). *Diagnostic Classification Models Part I: Fundamentals*. Half-day training session presented at the annual meeting of the National Council on Measurement in Education in New York, NY.

**Madison, M. J.**, & Bradshaw, L. (April, 2018). *Diagnostic Classification Models Part II: Advanced Applications*. Half-day training session presented at the annual meeting of the National Council on Measurement in Education in New York, NY.

Bradshaw, L., & **Madison, M. J.** (April, 2017). *Diagnostic Measurement: Theory, Methods and Applications*. Full day training session presented at the annual meeting of the National Council on Measurement in Education in San Antonio, TX.

## Mentorship

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### Ph.D. Dissertation Committee Member

*In Progress*

Karen Franklin, Learning Sciences, Clemson University

### Pre-/Postdoctoral Research Associate Supervisor

*In Progress*

Meghan Fager, UCLA + National University Precision Institute

### Ph.D. Dissertation Co-Chair

*In Progress*

Eric Setoguchi, Social Research Methodology, UCLA

**Ph.D. Dissertation Committee Member***Completed*

Anne Blackstock-Bernstein, Human Development and Psychology, UCLA

**Second Year Project Committee Member***Completed*

An Cho, Human Development and Psychology, UCLA

**Service Activities/Leadership Positions**

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| Academic Technology Council<br>Clemson University  | 2019 – Present |
| Brenda Loyd Outstanding Dissertation Award Committee<br>National Council on Measurement in Education                                   | 2019 – Present |
| Merit Review Committee<br>Clemson College of Education<br>Department of Education and Human Development                                | 2019           |
| Quantitative Methodologist Professor Search Committee<br>Clemson College of Education<br>Department of Education and Human Development | 2018           |
| Program Chair<br>American Educational Research Association<br>Special Interest Group 167: Cognition and Assessment                     | 2018 – 2019    |
| Outstanding Dissertation Committee<br>American Educational Research Association, Division D  | 2018 – Present |
| Membership Chair<br>Northeastern Educational Research Association  | 2017 – 2018    |
| Core Faculty Member<br>UCLA Department of Education<br>Educational Leadership Program  | 2017 – 2018    |
| Academic Personnel Committee<br>UCLA Department of Education   | 2017 – 2018    |
| Faculty Search Committee<br>UCLA Department of Psychology  | 2017 – 2018    |
| California State University Sally Casanova Pre-Doctoral Scholars Program<br>Undergraduate Research Faculty Mentor                      | 2017           |

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| Membership Committee<br>Northeastern Educational Research Association   | 2016 – 2017                |
| DCMNET: Diagnostic Classification Model Network<br>Listserv Owner and Operator  | 2016 – Present             |
| Standards and Test Use Committee<br>National Council for Measurement in Education   | 2015 – 2016                |
| Project U-SPARC: Math Hall and Ball Co-director<br>University of Georgia / Howard B. Stroud Elementary  | 2015                       |
| The 2014 Frasier Equity & Excellence STEM Conference Planning Committee<br>University of Georgia, College of Education  | 2014 – 2015                |
| Graduate Student Liaison<br>American Educational Research Association<br>Special Interest Group 167: Cognition and Assessment   | 2013 – 2016                |
| Mathematics Curriculum Team<br>University of Georgia  | 2013 – 2015                |
| Training and Professional Development Committee<br>National Council for Measurement in Education<br><i>Graduate Student Representative</i>                                  | 2013 – 2014                |
| Graduate Researchers in Educational Psychology<br>University of Georgia<br><i>Executive Committee: Treasurer</i><br><i>Program Representative: Quantitative Methodology</i> | 2013 – 2014<br>2012 – 2013 |

### **Other Professional Activities**

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| <b>Psychometric Collaborator</b><br>Navy Education   | 2018 – Present |
| <b>Graduate Research Assistant</b><br><i>Developing Enhanced Assessment Tools for Capturing Students' Procedural Skills and Conceptual Understandings in Mathematics.</i> United States Department of Education, Institute of Educational Sciences award number R324A150035. | 2015 – 2016    |
| <b>Psychometric Intern</b><br>American Institute of Certified Public Accountants   | Summer 2015    |
| <b>Graduate Assistant</b><br><i>Georgia Center for Assessment</i>  | 2014 – 2015    |

**Graduate Research Assistant**

2012 – 2014

*AutoMentor: Virtual Mentoring and Assessment in Computer Games for STEM Learning.*  
National Science Foundation: Division of Research on Learning.

**Software Skills**

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Fortran, MATLAB, Mplus, Python, R, SAS, SPSS, Visual Studio, Visual Basic, Linux

**Professional Affiliations**

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|---|----------------|
| American Statistical Association              | 2015 – Present |
| Psychometric Society                          | 2015 – Present |
| Northeastern Educational Research Association | 2013 – Present |
| American Educational Research Association     | 2012 – Present |
| National Council on Measurement in Education  | 2012 – Present |