

Josh Medrano, Ph.D.

Postdoctoral Scholar
Berkeley School of Education (BSE)
University of California, Berkeley

Email: joshmedrano@berkeley.edu

Website: www.joshmedrano.com

ACADEMIC APPOINTMENTS

2024- **Postdoctoral Scholar**, University of California, Berkeley
Berkeley School of Education
PI: Dr. Dana Miller-Cotto

2023-2024 **Postdoctoral Scholar**, Kent State University
Department of Psychological Sciences
PI: Dr. Dana Miller-Cotto

EDUCATION

2019-2023 **Ph.D. in Human Development**, University of Maryland, College Park
Advisor: Dr. Richard W. Prather
Dissertation: *Integrating perceptual and cognitive processes in mental arithmetic*

2018-2019 **M.Ed. in Educational Psychology-Applied Developmental Science**,
University of Virginia
Advisor: Dr. Jamie Jirout

2013-2016 **B.A. in Psychology**, The Ohio State University

RESEARCH INTERESTS

(In no particular order) The role of domain-general skills, such as executive functions and spatial/relational-reasoning, in math and science cognition and learning; mechanisms underlying learning; the role of the physical environment on cognitive development

STATISTICAL SKILLS

(In no particular order) Univariate and multivariate statistics; general linear models, including linear, logistic, and quintile regressions; exploratory latent and composite variable methods including cluster analyses; structural equation modeling, including path analyses; causal inference; meta-analysis

PROGRAMMING SKILLS

Statistical analysis and data visualization: R (viz: ggplot), SPSS, and STATA
Traditional experiment tools: PsychoPy, OpenSesame, MATLAB, Python, & EyeLink
Online experiment: Gorilla Experiment Builder and Qualtrics
Web programming: HTML, CSS, Markdown, JavaScript, and Python

HONORS & AWARDS

2024	NSF Modern Meta-Analysis Research Institute, Washington, DC
2023	Charles H. Flatter Fellowship (\$500)
2023	Ann Wylie/Lee Thornton Dissertation Fellowship Nomination
2022	The David and Winifred "Winkle" Fulk Fellowship Nomination
2022	Cognitive Developmental Society Diversity Travel Award (\$700)
2020	APA Conference Poster Selected for Presidential Poster Session
2019-2023	Department Travel Awards (4 years, \$2,300 total)
2019-2021	Dean's Fellowship, stipend and tuition
2017	AmeriCorps Education Award (\$3,011)
2014-2016	Dean's List

GRANT SUPPORT

Role: Principal Investigator

2022	NSF STEM Education Postdoctoral Research Fellowship [Not Funded] Title: <i>Finding a model for supporting foundational STEM skills through technology: Executive functions, spatial reasoning, and mathematical skills</i>
2022	Support Program for Advancing Research and Collaboration (SPARC) Award [Funded, UMD] Amount: \$990 Title: <i>Integrating perceptual and cognitive processes in mental arithmetic</i>

Role: Graduate Student Support

2021	Faculty-Student Research Award [Funded, UMD] Amount: \$10,000 Title: <i>What role does arithmetic history play on adults' math skills?</i>
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PEER-REVIEWED PUBLICATIONS

Medrano, J., & Prather, R.W. (2023). Rethinking executive functions in mathematical cognition. *Journal of Cognition and Development*. <https://doi.org/10.1080/15248372.2023.2172414>

Medrano, J., Crnosija, N., Prather, R. W., & Payne-Sturges, D. (2022). Bridging the environment and neurodevelopment for children's health: Associations between real-time air pollutant exposures and cognitive outcomes. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2022.933327>

Prather, R.W., Benitez, V.L., Kendall Brooks, L., Dancy, C.L., Dilworth-Bart, J., Dutra, N.B., Faison, M.O., Figueroa, M., Holden, L.T.R., Johnson, C., **Medrano, J.**, Miller-Cotto, D. Matthews, P.G., Manly, J.J., Thomas, A.K. (2022). What can cognitive science do for people? *Cognitive Science*. <https://doi.org/10.1111/cogs.13167>

Medrano, J.*, Jaffe, J.*, Lombardi, D., Holzer, M.A., & Roemmele, C. (2020). Students' scientific evaluations of water resources. *Water*. <https://doi.org/10.3390/w12072048>

*Co-first authors

Google Scholar: scholar.google.com/citations?user=IrZrHOQAAAAJ&hl=en

MANUSCRIPTS UNDER REVIEW

Medrano, J., Mohan, S., & Lombardi, D. (under review). The role of inhibitory control and cognitive flexibility in plausibility judgments and scientific evaluations.

Medrano, J. & Prather, R.W. (under review). Testing the contributions of inhibitory control to arithmetic skills. [Pre-registration: https://osf.io/2aq5n?view_only=117319d14f3c4663a7c6043ed67e31f2].

Miller-Cotto, D., Chan, J.Y.-C., & **Medrano, J.** (under review). Identifying challenging topics in mathematics: An analysis of student performance across domains. [Pre-registration: <https://osf.io/xfvjp>].

Miller-Cotto, D. & **Medrano, J.** (under review). The role of working memory in the effectiveness of faded worked examples.

MANUSCRIPTS UNDER REVISION

Medrano, J., Devlin, B., Shingledecker, M., Thompson, C.A., & Miller-Cotto, D., (under revision). Individual differences in fraction understanding and relations to EF and spatial/relational reasoning. [Pre-registration: <https://osf.io/98gzv>].

Medrano, J. & Prather, R.W. (invited revision). Interactions between perceptual cues and working memory during mental arithmetic: A dual-task experiment.

MANUSCRIPTS IN PREPARATION

Miller-Cotto, D., & **Medrano, J.** (in prep). Understanding the mechanistic role of working memory in early math learning: to offload or not to offload? A developmental perspective.

Miller-Cotto, D., **Medrano, J.**, & Zaborowski, S. (in prep). When training is inconclusive: Making a case for supporting instead of training executive functions.

Miller-Cotto, D., & **Medrano, J.**, Thompson, C.A., Devlin, B., & Shingledecker, M. (in prep). Testing theories of working memory with whole number bias: A developmental analysis.

Miller-Cotto, D., Ribner, A.D., & **Medrano, J.** (in prep). The role of assessor racial identity on Black children's executive function task performance: An initial examination.

Miller-Cotto, D., Borriello, G.A. & **Medrano, J.** (in prep). A meta-analysis of the correlations between executive functions and spatial skills.

CONFERENCE PRESENTATIONS

Chaired Symposium

Medrano, J. (Chair). *The role of perception in arithmetic cognition* [Symposium]. 2023 Mathematical Cognition and Learning Society Conference, Loughborough, UK.

Invited Oral Presentations

Medrano, J. & Prather, R.W. (2023, June). Why does inhibitory control only sometimes associate with math? Insights from a review of executive function development research. In Hochman, S. (Chair). *Numerical Cognition Meets Executive Functions Symposium* [Symposium]. University of Surrey, Guildford, UK.

Medrano, J. & Prather, R.W. (2023, June). Integrating perceptual and cognitive processes in mental arithmetic. In Medrano, J. (Chair). *The role of perception in arithmetic cognition* [Symposium]. 2023 Mathematical Cognition and Learning Society Conference, Loughborough, UK.

Prather, R.W., & Payne-Sturges, D., **Medrano, J.**, Kendall Brooks, L., Johnson, C., & Crnosija, N. (2022, March). An asset-based quantitative framework to characterize cognitive development of African-American children. In Rittle-Johnson, B. (Chair). *Barriers and supports for cognitive*

development and academic outcomes among marginalized youth. Bi-ennial Cognitive Development Society Conference 2022, Madison, WI.

Chen, R.*, Diallo, M.*, Hancock, M.*, Lampe, L.*, **Medrano, J.***, Salt, J.*, & Wright, J.* (2019). Motivation analysis of a multiage classroom: Exploring Agnor-Hurt Elementary. The Virginia Chapter of Association for Learning Environments Annual Conference, Williamsburg, VA.

*Presenters contributed equally.

Oral Presentations

Medrano, J.*, Crnosija, N.*, Prather, R.W., & Payne-Sturges, D., (2022). Bridging the environment and neurodevelopment for children's health study: An overview. GradTerp Exchange, College Park, MD.

Medrano, J. & Prather, R.W. (2021, March). Examining how numerical and non-numerical inhibitory control contribute to arithmetic skills: A path analytical approach. 2021 Mathematical Cognition and Learning Society Conference.

Paper Presentations

Medrano, J. & Miller-Cotto, D. Testing the opportunity-propensity model of achievement in Asian-American subgroups. Submitted to the 2025 Annual Meeting of the American Educational Research Association.

Chan, J. Y.-C., Miller-Cotto, D., & **Medrano, J. R.** Cracking the code: Identifying challenging math topics and knowledge types through students' problem-solving performance. Submitted to the 2025 Annual Meeting of the American Educational Research Association.

Miller-Cotto, D. & **Medrano, J.** Using offloading in math problem solving: the roles of working memory and prior knowledge. Submitted to the 2025 Annual Meeting of the American Educational Research Association.

Robertson, J.R., Medrano, J., & Lombardi, D. Shifts in scientific stance: Changing judgments about the plausibility of competing explanations. Submitted to the 2025 Annual Meeting of the American Educational Research Association.

Medrano, J., Mohan, S., Jaffe, J.B., & Lombardi, D. (2021, August). Executive functions in plausibility judgments and scientific evaluations [Paper Presentation]. 31st Annual Meeting of the Society for Text and Discourse.

Mohan, S., **Medrano, J.**, Lombardi, D., & Jaffe, J. (2021, August). Students' evaluations, plausibility perceptions, and knowledge shifts about climate change and water resources [Pre-recorded Poster Presentation]. 2021 Annual Meeting of the American Educational Research Association, San Diego, CA.

Poster Presentations

Parrish, L.^u, **Medrano, J.**, & Miller-Cotto, D. (2024, April). Whole number knowledge correlates with working memory and fraction understanding. [Poster Presentation]. 2024 Undergraduate Symposium for Research, Scholarship and Creative Endeavors, Kent State University, Kent, OH.

***** Poster Judged First Place Among Psychological Sciences Posters**

Ernst, L.^u, **Medrano, J.**, & Miller-Cotto, D. (2024, April). Understanding the underlying cognitive mechanisms of whole number bias in third graders. [Poster Presentation]. 2024

Undergraduate Symposium for Research, Scholarship and Creative Endeavors, Kent State University, Kent, OH.

- Medrano, J.**, Miller-Cotto, D., Thompson, C.A., Devlin, B., & Shingledecker, M. (2024, March). Individual differences in third and sixth graders' fraction understanding and relations to EF and spatial skills. [Poster Presentation]. 2024 Bi-ennial Cognitive Development Society Conference, Pasadena, CA.
- Crnosija, N., **Medrano, J.**, Prather, R.W., & Payne-Sturges, D. (2022, September). The effect of COVID-19 lockdown/post-lockdown and season on children's exposure to PM2.5 and time expenditure by environment type [Poster Presentation]. 34th Annual Conference of the International Society for Environmental Epidemiology, Athens, Greece.
<https://doi.org/10.1289/isee.2022.P-0519>.
- Medrano, J.**, Crnosija, N., Prather, R.W., & Payne-Sturges, D. (2022, March). Bridging the environment and neurodevelopment for children's health study: An overview [Poster Presentation]. Bi-ennial Cognitive Development Society Conference 2022, Madison, WI.
- Dobaria, A., Bailey, J. M., Mohan, S., Klavon, T. G., **Medrano, J. R.**, Jaffe, J. B., & Lombardi, D. (2021, August). Students' scientific evaluations of astronomy concepts [Poster Presentation]. EARLI 2021—the 19th Biennial EARLI Conference, Gothenburg, Sweden.
- Crnosija, N.*, **Medrano, J.***, Prather, R.W., & Payne-Sturges, D., (2021, August). Bridging the environment and neurodevelopment for children's health study: An overview [Poster Presentation]. Eighth Annual Public Health Research, College Park, MD.
- Medrano, J.** & Prather, R. W. (2021, April). Consistency of individual differences across number line tasks [Poster Presentation]. Society for Research in Child Development 2021 Virtual Biennial Meeting.
- Jaffe, J.,* **Medrano, J.,*** & Lombardi, D. (2020, August). Promoting scientific plausibility and knowledge shifts through modeled evaluation activities [Poster Presentation]. American Psychological Association Convention 2020, Washington, D.C.

***** Poster Selected for Presidential Poster Session**

- Medrano, J.** & Prather, R. W. (2020, June). Cognitive, behavioral, and affective influences of mathematical achievement [Conference Canceled]. 2020 Mathematical Cognition and Learning Society Conference, Dublin, Ireland.
- Medrano, J.,*** Jaffe, J.,* & Lombardi, D. (2020, April). Does the evidence support the model? Examining the effectiveness of two instructional scaffolds in science classrooms [Conference Canceled]. 30th Annual Meeting of the Society for Text and Discourse, Atlanta, GA.
- Medrano, J.** & Jirout, J. (2019, October). The role of relative magnitude reasoning in space-math relations [Poster Presentation]. Bi-ennial Cognitive Development Society Conference 2019, Louisville, KY.
- Medrano, J.** & Jirout, J. (2019, March). Thinking relatively: The role of magnitude in mathematical and spatial thinking [Poster Presentation]. 10th Curry Research Conference, Charlottesville, VA.

*Presenters contributed equally.

^U Undergraduate Mentee

INVITED DEPARTMENTAL TALKS

- Medrano, J.** (2024, May). Inhibitory control and mathematical thinking and learning: What, when, and how. University of Pittsburgh, Kid's Thinking Lab.
- Medrano, J.** (2024, April). Examining specific cognitive processes during arithmetic: The roles of inhibitory control and working memory. University of Notre Dame, Cognition, Brain, and Behavior Group Brown Bag.
- Medrano, J.** (2023, October). Examining how numerical and non-numerical inhibitory control contribute to arithmetic skills: A path analytical approach. Kent State University Cognitive Brown Bag.

RESEARCH ASSISTANTSHIPS

Graduate Research Assistant, Cognition and Development Lab, 2019-2023

University of Maryland, College Park, PI: Dr. Richard W. Prather

Projects: Bridging the Environment and Neurodevelopment for Children's Health; Accurate, Precise, Equitable and Useful Models of the State of the Learner; Maryland Order of Operations (MOOS)

Duties: Manuscript writing, designing research studies and procedures, training and mentoring research assistants, running participants on behavioral and EEG tasks, conducting data analysis using R and programming using MATLAB

Graduate Research Assistant, Science Learning Research Group, 2019-2020

University of Maryland, College Park, PI: Dr. Doug Lombardi

Projects: Model-Evidence-Link (MEL) Project, IC+MET

Duties: Manuscript writing, data entry, data analysis (using R, SPSS, and warpPLS), conference presentations, lab meetings, website design and maintenance

Graduate Research Assistant, Research in Education and Learning Lab, 2018-2019

University of Virginia, PI: Dr. Jamie Jirout

Projects: Spatial learning as play, Role of magnitude in math and spatial thinking

Duties: Data collection, data analysis and interpretation using SPSS, literature reviews, designing and running experiments using OpenSesame, conference presentations

Research Assistant, Cognitive Development Lab, 2014-2016

The Ohio State University, PI: Dr. Vladimir Sloutsky

Project: Development of categorization during inductive learning

Duties: Running participants in eye-tracking and behavioral experiments using EyeLink and PsychoPy, programming in experiments, reviewing literature, scheduling graduate researchers and undergraduate research assistants in designated preschools and daycare centers

Research Assistant Intern, Berkeley Early Learning Lab, 2015

University of California, Berkeley, PI: Dr. Fei Xu

Projects: Development of nonsymbolic probability judgments

Duties: Participant recruitment, running child participants on campus and in a museum, learning programming tools like MATLAB and BlendR, attending weekly meetings

TEACHING EXPERIENCE

As Instructor of Record

University of Maryland, Research Methods in Human Development (1 section, 40 undergraduate students), Spring 2023

As Guest Lecturer

Kent State University, Child Psychology (1 section, 145 undergraduate students), Spring 2024

Instructor: Dr. Dana Miller-Cotto, Lecture Title: "Early Adolescence: Physical and Cognitive Development"

Kent State University, Children's Thinking (1 section, 40 undergraduate students), Fall 2023

Instructor: Dr. Dana Miller-Cotto, Lecture Title: "Cognitive Development: Development of Academic Skills"

University of Maryland, Human Development Through The Life Span (1 section, 40 undergraduate students), Fall 2021, Instructor: Rachel Ghosh, Lecture Title: "Middle Childhood: Physical and Cognitive Development"

As Teaching Assistant

University of Maryland, Research Methods in Human Development (2 sections, 80 undergraduate students), Fall 2022, Instructor: Dr. Richard Prather

SERVICE

Ad-Hoc Journal Reviewing

Environmental Research

Educational Psychology Review

Infant Behavior and Development

Journal of Contemporary Educational Psychology

npj Science of Learning

Service to the Field

Reviewer, American Psychological Association Conference, Division 7, 2024

Reviewer, Mathematical Cognition and Learning Society Conference, 2021-Present

Volunteer for Mathematical Cognition and Learning Society Conference, 2024

Panelist, How to Find, Obtain, and Thrive in a Postdoctoral Position, Badar Kauffman Conference, Kent, OH, 2024

Feedback Reviewer, Application Statement Feedback Program, 2023 - Present

Editor, Application Statement Feedback Program, 2022 - Present

Symposium Moderator, Curry Research Conference, University of Virginia, 2019

Editor, Journal of Undergraduate Research at Ohio State (JUROS), 2015-2016

Service to the Department and University

Graduate School Field Committee for Developmental Science

Graduate Student Liaison, Executive Committee, 2021-2023

Human Development Graduate Student Organization

President, 2021-2022

Professional Development Committee Co-Chair, 2019-2021

Social Committee Co-Chair, 2019-2020
Graduate Student Government, University of Maryland
Department Student Representative/Assembly Member, 2020-2021
Graduate Research Appreciation Day Committee Member, 2020-2021

Outreach Experience

Children's Museum, Charlottesville, VA, 2018-2019.
Language Sciences Research Lab at Center for Science and Industry (COSI), Columbus, OH, Spring 2014
- Provided student assistance for the demonstration "Trick Sentences."
<https://u.osu.edu/thebln/language-outreach/>.

Other Professional Experience

Graduate Student Coordinator, Summer Undergraduate Research Program, University of Virginia, 2019
Administrative Assistant, T.C.P. World Academy, Cincinnati, OH, 2017-2018
Tutor/Corps Member, AmeriCorps/Ohio Math Corps, Cincinnati, OH, 2016-2017

PROFESSIONAL AFFILIATIONS

American Psychological Association
Division 7 - Developmental Psychology
Division 15 - Educational Psychology
Cognitive Development Society
Math Learning and Cognition Society
Society for Research in Child Development

MENTORSHIP ACTIVITIES

Mathematical Learning and Cognition Society

2024-present Patrick Ehrman

Kent State University

2024	Hannah Fender
2024	Amelia King
2024	Lauren Parrish
2023	Logan Ernst

University of Maryland

2021	Linus Ghanadan
2019-2020	Jasmine Williams
2019-2020	Divija Kambala