

Patrick K. Kirkland

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EDUCATION

- 2022 **University of Notre Dame**, Notre Dame, IN
Ph.D., Psychology: Cognition, Brain, and Behavior Area
Advanced Quantitative Social Science Minor
- 2020 **University of Notre Dame**, Notre Dame, IN
Master of Arts, Psychology
- 2012 **University of Notre Dame**, Notre Dame, IN
Master of Education, Middle School Mathematics Certification
- 2010 **University of Notre Dame**, Notre Dame, IN
Bachelor of Business Administration, Finance and Political Science

PROFESSIONAL POSITIONS

- 2022– **Assistant Professor of the Practice**, Institute for Educational Initiatives, University of Notre Dame
- 2021 **Math Tutoring Instructional Coach**, TutorND, University of Notre Dame
- 2017–22 **Graduate Student Research Assistant**, Cognition, Learning, and Development Lab
- 2016–17 **Associate Director of Academics**, ACE Teaching Fellows, University of Notre Dame
- 2013–16 **Associate Program Director of Academics**, ACE Teaching Fellows, University of Notre Dame
- 2012–13 **Business Intelligence Analyst**, inVentiv Medical Management, Charlotte, NC
- 2010–12 **Middle School Mathematics Teacher** as a member of ACE Teaching Fellows, St. Frances Cabrini School, Savannah, GA

GRANTS, FELLOWSHIPS, AND AWARDS

- 2024– **PI, National Science Foundation (NSF) Grant**: ECR DRL-2400686, “Assessing the malleability and impact of third through eighth grade students’ mature number sense.” (Lead on development of the project, writing the proposal, and implementing the project. Co-PIs: Nicole McNeil, Ph.D., Ying Cheng, Ph.D.) [\$496,337]
- 2023– **Co-PI, AmeriCorps 23VG257630** (with Nicole McNeil, PI; Gerald Haeffel, co-PI; Jill Pentimonti, co-PI, Kati Macaluso, co-PI; & Matthew Kloser, co-PI) “Connecting Volunteer Tutors to Cognitive Science” [\$1,010,746 annually with 63.3% financed with federal sources and 36.7% financed with non-governmental sources.]
- 2022–24 **Co-PI, National Science Foundation (NSF) Grant**: ECR DRL-2100214, “Characterizing and assessing number sense in third through eighth grade students.” (Co-led development of the project, writing the proposal, and implementing the project. PI: Nicole McNeil, Ph.D.; Co-PI: Ying Cheng, Ph.D.) [\$553,429]

- 2021 **Outstanding Graduate Student Teacher Award**, The Graduate School and ND Learning | Kaneb Center for Teaching Excellence, University of Notre Dame
- 2018–19 **Community-Engaged Research Grant**, Center for Social Concerns, University of Notre Dame. “Using Number Talks in Mathematics Classrooms to Improve Student Number Sense and Advance Restorative Justice in the SBCSC.” [\$5,667]
- 2017–22 **James A. Burns Fellowship**, Notre Dame Program for Interdisciplinary Education Research (ND PIER)

TEACHING AND SUPERVISION

- 2025 **Instructor:** Moreau First-Year Seminar (FYS 10101)
- 2024 **Instructor:** Number and Operations (EDU 63502)
- 2023–Present **Instructor:** ESS Research Lab (ESS 47602)
- 2023, 2025 **Co-Instructor:** Topics in Educational Psychology (EDU 60410)
- 2023–Present **Instructor:** Methods in Educational Research (ESS 30600)
- 2023–Present **Instructor:** Capstone Seminar (EDU 65935)
- 2022–Present **Instructor:** Assessment in Elementary Education (EDU 60172)
- 2022–Present **Field Supervisor:** Supervised Teaching (EDU 65950)
- 2022–Present **Instructor:** Clinical Seminar (EDU 65930)
- 2021–Present **Instructor:** Mathematics in Elementary Education II (EDU 60112)
- 2020–Present **Instructor:** Mathematics in Elementary Education I (EDU 60132)
- 2020 **Field Supervisor:** Introduction to Teaching Practicum (EDU 65034)
- 2020 **Co-Instructor:** Quantitative Methods I (PSY 60100)
- 2019 – 2020 **Teaching Assistant:** Quantitative Methods I & II (PSY 60100 & 60101)
- 2019 – 2020 **Instructor:** Quantitative Methods I & II Lab (PSY 61100 & 61101)
- 2016 – 2019 **Clinical Faculty:** Mathematics Education I & II (EDU 60665, 60765)
- 2015 **Teaching Assistant:** Education, Schooling, and Society (ESS 33600)
- 2014 – 2015 **Instructor:** Introduction to Computers in Education (EDU 60040)

REFEREED JOURNAL ARTICLES

(*) for undergraduate research assistants, (@) for graduate students or post-baccalaureate research assistants, (+) for postdoctoral appointees.

Kirkland, P.K., Guang, C.@, Cheng, Y. & McNeil, N.M. (2024). Mature Number Sense Uniquely Predicts Middle School Students' Growth in Mathematics Achievement Over a School Year. *Journal of Educational Psychology*.
<https://doi.org/10.1037/edu0000880>

Kirkland, P. K., Guang, C. @, Otuonye, C. @, & McNeil, N. M. (2024). A Brief, Multiple-Choice Assessment of Mature Number Sense Is Strongly Correlated with More Resource-Intensive Measures. *Journal of Numerical Cognition*, 10, 1–18.
<https://doi.org/10.5964/jnc.12679>

O'Rear, C.D., **Kirkland, P.K.**, Purpura, D., (2024). The How Many and Give-N Tasks: Conceptually Distinct Measures of the Cardinality Principle. *Early Childhood Research Quarterly*, 66, 61–74. <https://doi.org/10.1016/j.ecresq.2023.08.010>.

Kirkland, P.K., Cheng, Y., & McNeil, N.M. (2024). A Validity Argument for a Brief Assessment of Mature Number Sense. *Journal for Research in Mathematics Education*, 55(1), 51–67. <https://doi.org/10.5951/jresmetheduc-2022-0071>

Simsek, E., Xenidou-Dervou, I., Hunter, J., Dowens, M. G., Pang, J.S., Lee, Y., McNeil, N. M., **Kirkland, P. K.**, & Jones, I. (2022). Factors associated with children's understanding of mathematical equivalence: An investigation across six countries. *Journal of Educational Psychology*.

Kirkland, P.K. & McNeil, N. M. (2021). Question design affects students' sense-making on mathematics word problems. *Cognitive Science*, 45, e12960.

O'Rear, C. D., **Kirkland, P. K.**, & McNeil, N. M. (2020). Partial knowledge in the development of number word understanding. *Developmental Science*, 25(5), e12944.

REFEREED PUBLICATIONS IN PROCEEDINGS

Kirkland, P.K., Guang, C. @, McNeil, N.M. (2023). Exploring the Association between Upper Elementary Students' Mature Number Sense and Grade-Level Mathematics Achievement. *Proceedings of the Forty-Fifth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Reno, NV

Kirkland, P.K., Guang, C. @, Cheng, Y., Trinter, C., Kumar, S.*, Nakfoor, S.*, Sullivan, T.*, McNeil, N.M. (2022). Middle School Students' Mature Number Sense is Uniquely Associated with Grade-Level Mathematics Achievement. *Proceedings of the Forty-Fourth Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Nashville, TN

Cobb, W.; Guang, C. @; **Kirkland, P.K.**; Bahadursingh, A.*; Kumar, S.*; Ona, C. S*; O'Rear, C.D., McNeil, N.M., (2022). Race moderates the effect of tactility on children's learning

from counting books. *Proceedings of the Annual Meeting of the Cognitive Science Society*, 44.

O'Rear, C.D., McNeil, N.M., & **Kirkland, P.** (2018) Evidence of Partial Number Knowledge on the Give-N Task. In C. Kalish, M. Rau, J. Zhu, & T.T. Rogers (Eds.), *Proceedings of the 40th Annual Conference of the Cognitive Science Society*. Madison, WI: Cognitive Science Society.

REFEREED CONFERENCE PRESENTATIONS

Kirkland, P.K. (Accepted for 2025). *Assessing Students' Number Sense as a Deep Mathematical Understanding*. Presentation accepted to be given at the 2025 National Council of Teachers of Mathematics (NCTM) Research Conference, Atlanta, GA.

Kirkland, P.K. (Accepted for 2025). *What is the "Science of Math" and How Does It Impact K-8 Schools?* Presentation accepted to be given at the 2025 Indiana Non-Public Educators' Conference (INPEC), Indianapolis, IN.

Poston, B.; Walter, K.; Quinn, C.; Luna, M.L.; Pentimonti, J.M.; **Kirkland, P.K.**; Macaluso, K.; Otuonye, C.J.; Angst, W.; Gibbs, C.R.; McNeil, N.M. (2025). *Early numeracy is underemphasized in pediatric practice, but opportunities exist to promote it*. Poster accepted to be presented at 2025 Annual Conference of the Mathematical Cognition and Learning Society (MCLS), Hong Kong.

Kirkland, P.K. (2025). *What is the "Science of Math" and How Does It Impact Catholic Schools?* Presentation given at the 2025 annual convention of the National Catholic Education Association (NCEA), Orlando, FL.

Gesuelli, K.⁺, **Kirkland, P.K.**, & McNeil, N.M., (2024). *Elementary and Middle School Students' Multiplication Fluency is Strongly Correlated with their Mature Number Sense*. Research talk given as part of a symposium, *Multiplication Fact Knowledge: Integrating Findings from Multiple Methods*, at the 2024 Annual Conference of the Mathematical Cognition and Learning Society, Washington, D.C.

Kirkland, P.K. (2023). *Ensuring Our Students Can Make Sense of Math: Using Rich Formative Assessment in K-8 Mathematics*. Presentation given at the 2023 Indiana Non-Public Educators' Conference, Indianapolis, IN.

Kirkland, P.K., Guang, C. @, Cheng, Y., Trinter, C., & McNeil, N.M., (2022). *Does Students' Number Sense Predict Grade-Level Math Learning?* Poster accepted to be presented at the 2022 in-person annual National Council of Teachers of Mathematics (NCTM) Research Conference, Los Angeles, CA.

Kirkland, P.K., Guang, C. @, Campbell, N.*, Kumar, S.*, Mogan, A.*, McNeil, N.M. (2022). *Investigating Mature Number Sense: Middle School Students' Brief Assessment Scores Correlate with Their Use of Number Sense Strategies*. Poster presented at the Mathematical Cognition and Learning Society Conference (MCLS), Antwerp, Belgium.

- Maron, M.*, Seip, I.*, Celeste, S.*, Azar, J., O'Rear, C. D., Gomez, J.*, Jarrell, E.*, **Kirkland, P.K.**, Cobb, W. T., & McNeil, N. M. (2022). *The effect of tactile versus non-tactile counting books on children's number talk during shared book reading*. Poster presented at the Biennial Meeting of the Cognitive Development Society (CDS), Madison, WI.
- Kirkland, P.K.** (2022) *Ensuring Our Students Can Make Sense of Math: Using Rich Formative Assessment in K-8 Mathematics*. Presentation given at the 2022 annual convention of the National Catholic Education Association (NCEA), New Orleans, LA.
- Kirkland, P.K.**, Cheng, Y., Trinter, C., & McNeil, N.M. (2022) *Analyzing Student Use of Number Sense Strategies*. Paper presented virtually at the 2022 annual National Council of Teachers of Mathematics (NCTM) Research Conference.
- Kirkland, P.K.**, Streeter, K., & McNeil, N.M. (2021) *Using Number Talks to Improve Student Number Sense and Advance Restorative Justice*. P. Kirkland (Presenter), Individual Session, research report presented virtually at the Twenty-Fifth Annual Conference of the Association of Mathematics Teacher Educators (AMTE).
- Kirkland, P.K.**, Cheng, Y., Trinter, C., & McNeil, N.M. (2020) *Developing a Measure of Student Number Sense with Valid and Reliable Scores*. Poster was accepted to be presented at the 2020 annual National Council of Teachers of Mathematics (NCTM) Research Conference, Chicago, IL. (Conference canceled)
- O'Rear, C.D., McNeil, N.M., **Kirkland, P.K.** (2019). *Partial Number Word Knowledge on the Give-N Task*. Paper presented at the 2019 annual conference of the Mathematical Cognition and Learning Society (MCLS), Ottawa, ON.
- Kirkland, P.K.** (2019). *Helping Students Make Sense of Math: Lessons from Cognitive Science*. Presentation given at the 2019 annual convention of the National Catholic Education Association (NCEA), Chicago, IL.
- Kirkland, P.K.** (2019). "A Simple Yes or No?": *How Word Problem Design Affects Student Sense-Making*. Poster presented at the 2019 annual meeting of the American Educational Research Association (AERA), Toronto, ON.
- Kirkland, P.K.** (2019). "A Simple Yes or No?": *How Word Problem Design Affects Student Sense-Making*. Poster presented at the 2019 annual National Council of Teachers of Mathematics (NCTM) Research Conference, San Diego, CA.
- Kirkland, P.K.** and Trinter, C. (2019). "Using an Online Environment to Coach Teachers in their Development of Core Instructional Practices." Presentation given at the Twenty-Third Annual Conference of the Association of Mathematics Teacher Educators (AMTE), Orlando, FL.
- Svarovsky, G.N. and **Kirkland, P.** (2018). *Designing and Implementing Teacher Professional Development that Connects Social Justice and STEM Integration*. Paper presented at the annual conference of the Collaborative Network for Engineering and Computing Diversity Conference. Crystal City, VA.

INVITED PRESENTATIONS OR TALKS

- Kirkland, P.K.** (October 2025). *What is the “Science of Math”? Evidence from the Science of Learning for Effective K-8 Math Instruction*. Online professional development presentation to be given for faculty at Basilica School of St. Mary Star of the Sea. Key West, FL.
- Kirkland, P.K.** (2025). *What is the “Science of Math” and How Does It Impact Catholic Schools?* Invited webinar presentation given for the National Catholic Education Association (NCEA).
- Kirkland, P.K.** (2025). *Using Technology in K-12 Mathematics Classrooms: Best Practices and Common Pitfalls*. Presentation given at the 8th annual Blended Learning in Catholic Schools Symposium, University of Notre Dame.
- Kirkland, P.K.** (2024) *Helping Our Students Make Sense of Math: Effective TK-8 Math Instruction*. Full-day professional development for faculty at American Martyrs Catholic School. Manhattan Beach, CA.
- Kirkland, P.K.** (2024) *Helping Students Make Sense of Math: Evidence from the Science of Learning*. Full-day professional development for teachers and evening session for parents at St. Theresa’s Catholic School. Palatine, IL.
- Kirkland, P.K.** (2024) *Making Sense of a Mathematical World*. Keynote presentation at the 2024 Excellence in Teaching Conference. Notre Dame, IN.
- Kirkland, P.K.** (2024) *Building Early Numeracy Skills in Pre-K – 2nd Grade*. Session presentation at the 2024 Excellence in Teaching Conference. Notre Dame, IN.
- Kirkland, P.K.** (2024) *Ensuring Our Students Can Make Sense of Math: Using Rich Formative Assessment in 3rd-8th Grade*. Session presentation at the 2024 Excellence in Teaching Conference. Notre Dame, IN.
- Kirkland, P.K.** (2023) *Assessing Students’ Number Sense*. Invited virtual presentation for the JRME Talks Series.

MANUSCRIPTS UNDER REVIEW OR IN PREPARATION

- Kirkland, P.K.**, Guang, C. @, Otuonye, C. @, Cheng, Y., & McNeil, N.M. (*revision under review*). Developing a Vertically Scaled Assessment of Elementary Students’ Number Sense. *Journal of Psychoeducational Assessment*.
- Kirkland, P.K.** (*under review; accepted abstract for special issue*). Mature Number Sense as a Form of Mathematical Understanding. *Journal of Numerical Cognition: Special Issue on the Development of Mathematical Understanding*.
- Gesuelli, K. ⁺, **Kirkland, P.K.**, & McNeil, N.M. (*in preparation*). Examining the Unique Association between Students’ Mature Number Sense and Multiplication Fluency.

PREPARED RESOURCES FOR EDUCATORS

Kirkland, P.K., Cheng, Y., & McNeil, N.M. (2025) The Number Sense Assessment numbersense.nd.edu. Online web-based app for number sense assessment.

Pattison, S., **Kirkland, P.**, & Svarovsky, G. (2020). Storybook STEM resource spreadsheet. TERC. <https://www.terc.edu/storybookstem/>

Pattison, S., Svarovsky, G., Ramos-Montañez, S., & **Kirkland, P.** (2020). Storybook STEM: Children's literature as a tool for supporting informal STEM learning. TERC. www.terc.edu/storybookstem/

PROFESSIONAL EXPERIENCE – MEMBERSHIPS

2016 – Present	National Council of Teachers of Mathematics (NCTM)
2018 - Present	Association for Mathematics Teacher Educators (AMTE)
2021 – Present	Cognitive Science Society (CSS)
2023 – Present	The Mathematical Cognition and Learning Society (MCLS)

SERVICE

Manuscript Reviewer (*ad hoc*)

- Journal for Research in Mathematics Education
 - o JRME Outstanding Reviewer 2023
- Journal of Numerical Cognition
- Teaching and Teacher Education
- Mathematics Teacher: Learning and Teaching PreK-12 (NCTM)
- Cognitive Development
- Cognitive Science
- Mathematical Thinking and Learning
- Humanities and Social Sciences Communication

Conference Submission Reviewer

- AERA 2026 Annual Meeting
- NCTM 2025 Research Conference
- NCTM 2024 Research Conference
- PME-NA 2023 Annual Meeting
- SREE 2022 Annual Meeting: Teachers and Leaders Section
- PME-NA 2022 Annual Meeting
- NCTM 2021 Research Conference
- MCLS 2021 Annual Meeting

- AERA 2020 Annual Meeting: Catholic Education SIG, Division C – Section 1c Mathematics, and Division D – Section 1 – Educational Measurement, Psychometrics, and Assessment
- NCTM 2019 Research Conference

University and Department Service

- Search Committee Member, *Math Education Faculty Search for ACE Ascent Program*, (2023-24).
- Chair, *Excellence in Teaching Conference* (2024). “Making Sense of a Mathematical World.”
- ACE Executive Committee Member (2022-2023)
- Co-Chair, Graduate Student Professional Development, Department of Psychology (2021-22)
- Graduate Student Representative for the CBB Area, Department of Psychology Faculty Meetings (2020-21)
- Guest Lecture, Developmental Psychology (Fall 2020)
- Math Tutor Training, PATH Companions (Fall 2020, Spring 2021)

Community Service

- Panelist, United Way Youth Success Committee, Grant Review (Spring 2019)
- Ongoing Math Professional Development
 - o Holy Family Catholic School, Austin, TX
 - o St. Adalbert Catholic School, South Bend, IN

Undergraduate Research Advising

- Senior Thesis Advisor: Carolina Bolivar, *Impact of Perceived Academic Rigor on Student Academic Self-Concept at the University of Notre Dame*. 2024
- Senior Thesis Advisor: Ashley Utnage, *Inclusive Education in the Mainstream Catholic School Classroom: a case study of a Catholic K-8 school with a high percentage of ISPs*. 2024
- Senior Thesis Co-Advisor: Nicole Campbell, *Investigating the specific nature of the relationship between cognitive reflection and mature number sense in middle school students*. 2023
- Senior Thesis Co-Advisor: Chloe Spang, *An Analysis of Word Problems in Reform-Based and Traditional 7th-Grade Math Textbooks*. 2021

Postdoctoral Mentoring

- Co-Advisor: Kelly-Ann Gesuelli, Ph.D (2022-2025)