ELIZABETH B. RILEY

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My strength as a scientist is **developing and refining understanding of complex systems** in the brain, including their relationships with **psychosocial and somatic factors, and their evolutionary past**. I combine a deep **technical background** with a **humanistic viewpoint**. From experimental design, to meticulous data collection, to creative and rigorous analysis, to engaging writing, I enjoy **all aspects of the scientific process**. I constantly strive to **generate a sense of community** among my colleagues, students, research participants, and the greater world through genuine love of knowledge, ethical leadership, cultural competence, and dedication to inclusion.

Education

Boston University School of Medicine *9/2009 - 9/2015*

Ph.D., Neuroscience and Pharmacology (Advisor: Irina Zhdanova)

Dissertation: Effects of cocaine on visual processing in zebrafish

Massachusetts Institute of Technology *9/2004 - 6/2008*

B.S., Biological Engineering

Skills

Leadership: outstanding communication and relationship building skills, project organization and management, teambuilding, mentoring

Technical: AFNI, MATLAB, Python, R, Bash scripting, SPSS, MS Excel/Word/PowerPoint

Human work: MRI, eyetracking/pupillometry, neuropsychological testing

Wet lab: tissue culture, bacterial and yeast culture, PCR, ELISA, DNA/RNA isolation, cloning, Western blotting, immunocytochemistry, transfection, confocal microscopy, calcium imaging

Animal models: larval and adult zebrafish, basic familiarity with rodents and rhesus macaques

Languages: conversational Spanish

Research Experience

Cornell University

Postdoctoral Fellow, Affect and Cognition Laboratory

Advisors: Adam Anderson and Eve De Rosa *9/2018 – present*

- NRSA Postdoctoral Fellowship (F32):
  - Developed and am currently running a large multi-age study to establish a link between locus coeruleus function (as measured by neuromelanin, functional MRI scans, and pupillometry), autonomic function, and cognitive aging.
  - Cultivated an ongoing partnership with the Community Research Recruitment Accelerator at SUNY Upstate Medical University to develop long-term inclusive recruitment practices and community engagement.

Postdoctoral Fellow, Attention, Memory and Perception Laboratory

Advisor: Khena Swallow *11/2017 – ongoing collaboration*

- Identifying the locus coeruleus:
  - Developing a rigorous, quantitative method by which to identify the locus coeruleus on neuromelanin-sensitive MRI scans, using structural and functional MRI data in addition to pupillometry

VA Boston Healthcare System/Harvard Medical School

Postdoctoral Fellow, Boston Attention and Learning Laboratory

Advisors: Joseph DeGutis and Michael Esterman *9/2015 – 9/2017*

- Assessing attention:
  - Analyzed large web-based and clinical data sets for differences in sustained attention across gender, country, and time of day
  - Developed design for tablet software to screen for cognitive impairment
  - Used eye tracking and pupillometry (Tobii) to detect lapses in attention during an auditory task
- Attention training and intervention:
  - Designed eye tracking protocol, trained research assistants, and programmed eye tracking and pupillometry analysis for study on effects of cognitive training on Parkinson's disease
  - Designed study to test the efficacy of cognitive training to improve abstinence in veterans with substance abuse disorders

Boston University School of Medicine

Graduate Researcher, Laboratory of Sleep and Circadian Physiology

Advisor: Irina Zhdanova *9/2011 – 9/2015*

- Measuring effects of cocaine exposure on visual processing and attention in zebrafish:
  - Developed three new transgenic zebrafish lines expressing a calcium reporter in the brain
  - Used calcium imaging with two photon microscopy to observe optic tectum (superior colliculus) and telencephalon responses in live transgenic larvae with and without cocaine and other dopamine system disruptions
  - Developed algorithm to analyze calcium imaging microscopy data
  - Used immunocytochemistry to measure the effect of cocaine on dopamine receptor expression
  - Measured behavioral consequences of dopamine system disruptions in larvae and adults
- Investigating circadian physiology
  - Participated in two lab-wide projects to study the effects of cocaine on circadian variation of adult neurogenesis in zebrafish
  - Helped train rhesus macaques for study on circadian rhythm
- Trained all incoming lab members in zebrafish procedures starting in 2013 and wrote standard operating procedures for zebrafish care and use

Graduate Researcher, Advisor: Alan Herbert (20h/week) *6/2010 – 12/2011*

- Developed method to extract circular episomal DNA from brain tissue, compared episomal DNA from schizophrenic and neurotypical patients to determine whether episome formation is involved
- Extracted and sequenced exome from human brain tissue, analyzed exome for rare mutations
- Used Gateway technology to clone a vector to report AMP kinase activity in neurons

Massachusetts Institute of Technology

Undergraduate Researcher (full time during summer), Advisor: Darrell Irvine *6/2007 – 9/2009*

- Extracted proteins from mouse spleen for placement on artificial HIV viral particle

Undergraduate Researcher (full time during summer), Advisor: Drew Endy *6/2006 – 1/2007*

- Characterized the size and behavior of a synthetic protein designed for nuclear localization

Honors and Awards

- Cornell Postdoc Achievement Award in Community Engagement 9/2022

- Awarded NRSA Individual Postdoctoral Fellowship 1F32AG058479 *9/2018 – 9/2021*
- Awarded VA Advanced Fellowship in Advanced Geriatrics *9/2015 – 9/2017*
- Awarded T32 NIGMS Biomolecular Pharmacology Training Grant *9/2010 – 6/2012*
- Myriam Marcelle Znaty Award for Distinguished Achievement in Biological Engineering *6/2008*
- Awarded Undergraduate Research Opportunities Program funding *6-9/2006 & 6-9/2007*

Teaching and Mentoring Experience

Cornell University

Postdoctoral Mentor *9/2018 – present*

- Currently mentoring 3-5 students per year (4-8 hours/week), including developing and delivering a curriculum for introducing research methods and ethics
- Helping to develop and overseeing undergraduate honors thesis projects
- Served as a member of an Undergraduate Thesis Committee

Guest Lecturer *2022*

- Guest lectures on impact of emotion on perception and cognition as part of an undergraduate course entitled "Affective and Social Neuroscience" (HD 3660 Summer 2022)

Instructor *2021-2022*

- Developed three-day hands-on functional MRI analysis "bootcamp" workshop (delivered 3x as of 9/2022)

Boston University School of Medicine

Pharmacology Tutor (SDM MD 530) *9/2012 –12/2013*

- Instruction in pharmacology and physiology for Goldman School of Dental Medicine students

Undergraduate Research Opportunity Program Mentor *6/2012 – 6/2015*

- Taught full-time undergraduate summer students and part-time academic year research assistants principles of good experimental design, data analysis, statistics, zebrafish husbandry, calcium imaging, microscopy, basic neuroscience, and scientific ethics. Supervised and critiqued literature discussion groups, poster sessions, papers and final presentations.

Massachusetts Institute of Technology

Terrascope Program Teaching Fellow (MIT course 12.000, Solving Complex Problems) *9/2005 – 6/2006*

- Taught research techniques, construction and problem solving to freshman students as they worked on solving complex environmental problems and building museum exhibits.

Publications

(* indicates a trainee)

*Cicero, N, **Riley, E**, Anderson, A, De Rosa, E (2022). Noradrenergic and cholinergic attention-dependent coupling across the lifespan. In development

Riley, E, *Cicero, N Swallow, K, Anderson, A, De Rosa, E (2022). Changes in norepinephrine, but not dopamine or acetylcholine, signaling may explain changes in memory in middle-aged and older adults. In development

Riley, E, Turker, H, Wang, D, Swallow, K, Anderson, A, De Rosa, E (2022). Nonlinear changes in pupillary orienting responses across the lifespan. Preparing for submission to Geroscience

Swallow, K, Broitman, A, **Riley, E**, Turker, H (2022). Grounding the attentional boost effect in events and the efficient brain. Frontiers in Psychology 12:892416. https://doi.org/10.3389/fpsyg.2022.892416

Turker, H, **Riley, E**, Luh, W, Colcombe, S, Swallow, K (2021). Estimates of locus coeruleus function with functional magnetic resonance imaging are influenced by localization approaches and the use of multi-echo data. Neuroimage 236:118047.

Swallow, K, Jiang, Y, **Riley, E**. (2019). Target detection increases pupil diameter and enhances memory for background scenes during multi-tasking. Scientific Reports 9:5255. https://doi.org/10.1038/s41598-019-41658-4

Riley, E., Mitko, A., Stumps, A., Robinson, M., Milberg, W., McGlinchey, R., Esterman, M., & DeGutis, J. (2019). Clinically Significant Cognitive Dysfunction in OEF/OIF/OND Veterans: Prevalence and Clinical Associations. Neuropsychology. Advance online publication. http://dx.doi.org/10.1037/neu0000529

Riley, E, Maymi, V, Pawlyszyn, S, Yu, L and Zhdanova, I (2017). Prenatal cocaine exposure leads to multifaceted disruption of the dopaminergic system and its responses to cocaine. Genes, Brain and Behavior 1601 – 183X. doi: 10.1111/gbb.12436

Riley, E, Esterman, M, Fortenbaugh, F and DeGutis, J (2017). Time-of-day variation in sustained attentional control. Chronobiology International 1-9. doi: 10.1080/07420528.2017.1308951

Kacsprzak, V, Patel, N, **Riley, E**, Kopotiyenko, K and Zhdanova, I (2017). Dopaminergic control of anxiety in young and aged zebrafish. Pharmacology, Biochemistry and Behavior 2017 Jun;157:1-8. doi: 10.1016/j.pbb.2017.01.005

Riley, E, Okabe, H, Germine, L, Wilmer, J, Esterman, M and DeGutis, J (2016). Gender differences in sustained attentional control relate to gender equality across countries. PLOS ONE 12(1): e0170876. doi: 10.1371/journal.pone.0170876

Riley E, Kopotiyenko K and Zhdanova I (2015) Prenatal and acute cocaine exposure affects neural responses and habituation to visual stimuli. Front. Neural Circuits 9:41. doi: 10.3389/fncir.2015.00041

Conference Presentations

(* indicates trainee)

Brangman, S, Royal, K, Dillenbeck, C, McNamara, S, Smith, N, De Rosa, E, Anderson, A, **Riley, E** (2022). Community Research Liaison Role in Increasing Participation of African Americans in Cognitive Research: A Case Study. *Alzheimer's Association International Conference*

Riley, E, *Cicero, N, Swallow, K, Anderson, A, De Rosa, E (2022). The relationship between locus coeruleus activity and pupillary responses changes with age. *Open Human Brain Mapping.*

Riley, E, *Cicero, N, Turker, H, Swallow, K, De Rosa, E, Anderson, A (2021). Multimodal evidence that pupillary responses are useful for examining aging in the locus coeruleus. Open Human Brain Mapping

*Cicero, N., **Riley, E.**, Anderson, A., & De Rosa, E. (2021). Attention and memory encoding in healthy aging and implications for cognitive impairment. *The BRAIN Conference*

*Cicero, N., **Riley, E.**, Anderson, A., & De Rosa, E. (2021). Attention and memory encoding in healthy aging and implications for cognitive impairment. *Human Brain Project Student Conference 2021: 5th HBP Student Conference on Interdisciplinary Brain Research*

Turker, H, **Riley, E**, Luh, W, Colcombe, S, Swallow, S (2020). Multi-echo fMRI and Localization Method Affect Functional Estimates of the Locus Coeruleus. *Open Human Brain Mapping*

*Cicero, N., **Riley, E.**, Anderson, A., & De Rosa, E. (2020). Attention and memory encoding in healthy aging and implications for cognitive impairment. *Cornell Undergraduate Research Board, Fall Forum 2020*

*Steinberg, S, **Riley, E**, De Rosa, E (2020). Cerebellar contributions to working memory in young and older adults. *International Neuropsychological Society*

Riley, E, *Steinberg, S, *Chen, L, Swallow, K, De Rosa, E, Anderson, A (2019). Measuring age-related changes in locus coeruleus intensity and its relationship to cognitive aging. *Society for Neuroscience*

Riley, E, Okabe, H, Germine, L, Wilmer, J, Esterman, M, and DeGutis, J (2016). Gender differences in sustained attentional control relate to gender equality across countries. *Psychonomic Society*

Okabe, H, **Riley, E**, Germine, L, Wilmer, J, Esterman, M, and DeGutis, J (2016). Gender differences in sustained attentional control are related to indices of gender inequality across countries. *International Neuropsychological Society*

Riley, E, Kopotiyenko, K and Zhdanova, I (2015). Early cocaine exposure and visual perception. *European Zebrafish Meeting*

Kopotiyenko, K, **Riley, E**, Herbert, A and Zhdanova, I (2012). Early cocaine exposure and responses to visual stimuli. *International Conference on Zebrafish Development*