

BIOGRAPHICAL SKETCH

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NAME: Suarez-Jimenez, Benjamin

eRA COMMONS USER NAME (credential, e.g., agency login): JIMENEZB

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Puerto Rico, Mayagüez	B.A.	05/2009	Psychology
University College London, London, UK – National Institute of Mental Health, Bethesda, MD (Joint Partnership Program)	Ph.D.	06/2016	Neuroscience
Columbia University	Postdoc	10/2018	Neuropsychology

A. Personal Statement

My long-term career goals are to elucidate the neural mechanisms underlying normal anxiety and discrimination learning, especially how these mechanisms break down in pathological anxiety and PTSD. Through my experiences and training, I have acquired the expertise and skills to study anxiety disorders and to carry out the proposed research. During my time at Columbia University I have collaborated in several projects with Drs. Lazarov, Neria, Schneier, and Zhu to understand the neural underpinnings of PTSD and its diagnosis and treatment. Additionally, through my career I study conditioning processes (threat and reward) and learning, to which I apply computational analyses of emotional process and learning. Specifically, my research deals with virtual reality environments to explore complex, real-world related, processes and brain activity during threat discrimination learning to assess fear and anxiety related physiological and behavioral responses.

1. Lazarov A, **Suarez-Jimenez B**, Tamman A, Falzon L, Zhu X, Edmondson DE, Neria Y (2018). Attention to threat in posttraumatic stress disorder using eye-tracking methodology: A systematic review. *Psychological Medicine* 4: 1-22.
2. Lazarov A, **Suarez-Jimenez B***, Levy O, Coppersmith DDL, Lubin G, Pine DS, Bar-Haim Y, Abend R, Neria Y (2019). Symptom structure of PTSD and co-morbid depressive symptoms – a network analysis of combat veteran patients. *Psychological Medicine*, 1-17 DOI: <https://doi.org/10.1017/S0033291719002034>.
3. Zilcha-Mano S, Zhu X, **Suarez-Jimenez B**, Pickover A, Tal S, Such S, Marohasy C, Chrisanthopoulos M, Salzman C, Lazarov A, Neria Y, Rutherford BR (2019). Diagnostic and Predictive Neuroimaging Biomarkers for Posttraumatic Stress Disorder. Manuscript submitted for publication at *Biological Psychiatry*.
4. Salminen LE, Sämann PG, Zheng Y, et al. [including **Suarez-Jimenez B**] (2019). Hippocampal subfield volumes are uniquely affected in PTSD and depression: International analysis of 31 cohorts from the PGC-ENIGMA PTSD Working Group. Manuscript submitted for publication at *Biological Psychiatry*. bioRxiv 739094 doi: <https://doi.org/10.1101/739094>

***Co-First author**

B. Positions and Honors

Position and Employment

- 2016-2018 National Institute of Health T32 Ruth L. Kirschstein Institutional National Research Service Award (NRSA) Postdoctoral Research Fellow, Columbia University, New York, NY
- 2018- Assistant Professor of Clinical Neurobiology, Psychiatry Department, Research Scientist IV, Research Foundation for Mental Hygiene, Columbia University, New York, NY

Other Experience

- 2008-2009 Research Assistant, Department of Psychology, University of Puerto Rico, Mayagüez
- 2009 National Science Foundation-funded Summer Program for Undergraduate Research (SPUR), Department of Psychology, University of Massachusetts, Amherst
- 2009-2010 Post-baccalaureate Research Education Program (PREP), Department of Chemistry, University of Massachusetts, Amherst
- 2010-2012 Post-baccalaureate Research Fellow at the National Institutes of Health National Institute of Mental Health, Bethesda, MD

Professional Membership

- 2005- Psychology Association of Puerto Rico (APPR)
- 2005-2009 Psychology Student Association (AEPSIC)
- 2008- American Psychology Association (APA)
- 2008- Psychology International Society (SIP)
- 2009- Society for Neuroscience (SfN)
- 2009- Advancing Hispanics/ Chicanos & Native Americans in Science (SACNAS)

Honors

- 2005-2009 University of Puerto Rico, Mayagüez Scholarships:
 - National Science and Mathematics Scholarship, 2005
 - SMART Scholarship, 2005
- 2009 Outstanding poster presentation at the 2009 Annual Biomedical Research Conference for Minority Students in Phoenix, Arizona.
- 2010 National GEM Consortium 2010 Fellowship
- 2011 Outstanding poster presentation at the 2011 National Institutes of Health Post-Baccalaureate Poster Day, Bethesda, MD
- 2013 UCL, Finalist at the University College London Bright Ideas Awards
- 2013 UCL, Institute of Cognitive Neuroscience Prize for best upgrade from MPhil to PhD
- 2013 Won Peer Review Prize at Engineering YES Entrepreneurship Competition
- 2013-2014 UCL, Division of Psychology & Language Sciences – Sully Scholarship
- 2014 UCL, Runner-up at the Dragons' Den Psychology Entrepreneurship Competition
- 2016 Selected to participate in the Lasker Lessons in Leadership from the Lasker Foundation in collaboration with the International Biomedical Research Alliance and the NIH Oxford-Cambridge Scholars Program
- 2016 Selected to participate in the NIH Management Bootcamp
- 2016 T32 Ruth L. Kirschstein Institutional National Research Service Award (NRSA) recipient at Columbia University
- 2016-2017 NIH Scientific Directors FARE Award Winner
- 2019 Broadening the Representation of Academic Investigators in NeuroScience (BRAINS) Fellow.

2019	American College of Neuropsychopharmacology (ACNP) 2019 Annual Meeting Travel Award Recipient.
2019	Carl Storm Underrepresented Minority (CSURM) Fellowship of the 2019 Amygdala Function in Emotion, Cognition and Disease Gordon Research Conference.
2019	NVIDIA GPU Grants Program.
2020	Outstanding science poster at the Second Annual Columbia Psychiatry Science Celebration, New York, NY.

C. Contribution to Science

Basic Research in Behavior - I studied resiliency in undergraduate students coming from difficult backgrounds and their ability to complete their degree. Also, I looked at how the war in Iraq was affecting children, especially with PTSD, and their ability to do well in school. To further understand the biological processes of anxiety disorders, I started a Post-Baccalaureate Fellowship at the University of Massachusetts, Amherst working with Dr. Agnes Lacreuse where I studied testosterone decline in aging rhesus monkeys and its effect on anxiety. We found that testosterone increased anxiety in male rhesus monkeys, a contradictory finding from smaller animal models which found anxiolytic effects of testosterone. This finding is significant since testosterone replacement has been considered as a potential therapeutic intervention for anxiety. Afterward, I was recruited at the National Institute of Mental Health by Dr. James Winslow and Dr. Eric Nelson to study behavioral and anxious development in infant rhesus monkeys. We found that distress of being separated from their mothers declined with age. Also, we found active exploration of the environment increased with age. These results are important because they suggest that infant early life temperament is not a reliable index of enduring temperament. During my participation in this research, I also created a small project investigating how maternal anxiety and behavior affected infant behavior and anxiety. We found that infant of dominant mothers displayed lower startle potentiation, higher aggressive behavior, spend more time away from their mothers, and had lower cortisol levels. We found opposite effects on infants from low-ranking mothers. These findings suggest that behavior can be reflected from mother to infant from early infancy, this is an important finding since early life stress, and cortisol levels, in infancy, are a huge predictor of anxiety disorders later in life.

1. Zhang B, **Suarez-Jimenez B**, Hathaway A, Waters C, Vaughan K, Noble PL, Fox NA, Suomi SJ, Pine DS, Nelson EE (2011). Developmental changes of rhesus monkey in response to separation from the mother. *Dev Psychobiol.* 54(8):798-807.
2. **Suarez-Jimenez B**, Hathaway A, Waters C, Vaughan K, Suomi SJ, Noble PL, Pine DS, Fox NA, Nelson EE (2012). Effect of mother's dominance rank on offspring temperament in infant rhesus monkeys (*Macaca mulatta*). *Am J Primatol.* 75(1):65-73.
3. **Suarez-Jimenez B**, Gore HE, Hachey J, King HM, Lacreuse A (2013). Testosterone modulation of anxiety in gonadally-suppressed male rhesus monkeys: A role for gonadotropins? *Pharmacol Biochem Behav.* 104: 97-104.

Threat Learning Discrimination Using Location-Specific Information with Virtual Reality - Interested in translational applications of my previous research into humans, I focused on threat learning discrimination using location-specific information to assess safety or threat in healthy adults. In collaboration with Prof. Neil Burgess at UCL and Drs. Daniel Pine and Christian Grillon at the NIMH, I developed a novel virtual reality task that assesses internal spatial boundary formations. That is, I studied what brain areas were involved in creating a mental representation of an environment to judge where danger might loom. I could describe a more complex neural network for the process of threat learning and discrimination. One circuit was active once participants had learned which areas of the environment were predictive of safety and danger (regardless of the valence of the area the participant was navigating). Another circuit was active when participants navigated the dangerous areas of the environment. Taken together, this is the first-time fear learning discrimination has been demonstrated within one environment without boundaries delineating safety and danger. These experiments are important since we experience the world in a continuous manner where boundaries are not always as clear-cut as they tend to be under laboratory constraints. Currently, this is being assessed in patients with Generalized anxiety disorders at the NIMH.

1. **Suarez-Jimenez B**, Bisby JA, Horner AJ, King JA, Pine DS, Burgess N (2018). Linked networks for learning and expressing location-specific threat. *Proceedings of the National Academy of Sciences:* 115 (5) E1032-E1040.

Neural Signatures of PTSD and Treatment - At Columbia University, in collaboration with Dr. Yuval Neria, I have been able to focus on PTSD and its treatment. Specifically, I have been looking at how treatment changes neural connectivity between brain areas linked to emotional memory formation. Before treatment, we found a lack of functional connectivity differences between anterior and posterior hippocampus and higher cortical areas. After treatment, we found increased functional connectivity between the hippocampus and higher cortical areas, which was also true for the amygdala, this is important because PTSD is associated with impaired neuronal activity in the hippocampus and amygdala. We found that after treatment, functional connectivity of these areas is similar to controls, suggesting brain plasticity and efficacy of treatment. Furthermore, we found that increased connectivity between cortical areas and the amygdala positively correlated with PTSD symptom reductions. With the proposed research, I aim to elucidate further into these neuronal systems and treatment of PTSD.

1. Lazarov A, Zhu X, **Suarez-Jimenez B**, Rutherford B, Neria Y (2017). Resting-state functional connectivity of anterior and posterior hippocampus in posttraumatic stress disorder. *Journal of Psychiatric Research* 94: 15-22.
2. Zhu X, **Suarez-Jimenez B**, Helpman L, Markowitz JC, Papini S, Lowell A, Milad M, Schneier F, Lindquist M, Wager T, Neria Y (2018). Exposure-based therapy changes amygdala and hippocampus resting-state functional connectivity in patients with PTSD. *Depression and Anxiety*, 35(10):974-984. doi: 10.1002/da.22816.
3. Lazarov A, **Suarez-Jimenez B***, Abend R, Naim R, Shvil E, Helpman L, Zhu X, Papini S, Durosky A, Rom R, Schneier FR, Pine DS, Bar-Haim Y, Neria Y (2018). Bias-contingent attention bias modification and attention control training in treatment of PTSD: A randomized control trial. *Psychological Medicine*, 1-9 DOI: 10.1017/S0033291718003367.
4. **Suarez-Jimenez B**, Zhu X, Lazarov A, Mann JJ, Schneier F, Gerber A, Barber JP, Chambless DL, Neria Y, Milrod B, Markowitz JC (2019). Anterior Hippocampal Volume Predicts Affect-Focused Psychotherapy Outcome. *Psychol Med*. 18:1-7. doi:10.1017/S0033291719000187.
5. **Suarez-Jimenez B**, Albajes-Eizagirre A, Lazarov A, Zhu X, Harrison BJ, Radua J, Neria, Y, Fullana MA (2019). Neural signatures of conditioning, extinction learning, and extinction recall in posttraumatic stress disorder: a meta-analysis of functional magnetic resonance imaging studies. *Psychological Medicine*, 1-10 DOI: <https://doi.org/10.1017/S0033291719001387>.

***Co-First author**

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

NARSAD Young Investigator Grant 01/15/20-01/14/22

Neural Correlates of Location-Specific Reward Memory Learning and Discrimination in PTSD

This grant will be used to look at reward learning and discrimination of PTSD and Trauma exposed participants using virtual reality paradigms and fMRI.

Role: PI

K01 MH118428-01 10/01/18-09/30/22

Neural correlates of location-specific contextual threat discrimination in PTSD

This project aims to understand how the brain forms a representation of contextual threat discrimination and how it relates to symptom severity and brain fluctuations.

Role: PI

Past Research Support

NARSAD Young Investigator Grant 01/15/18-01/14/20

This grant will be used to look at neural signatures of PTSD and Trauma exposed participants using virtual reality paradigms and fMRI.

Role: PI

T32 MH015144 Dr. Steve Roose (PI) 07/01/16-09/30/18

Postdoctoral National Research Service Award to study neural mechanism underlying PTSD.

Role: Postdoctoral Research Fellow

NYSPI MRI Pilot Award

07/01/17-06/30/18

This MRI pilot award will be used to look at brain areas involved in location-specific learning in participants exposed to traumatic experiences.

Role: PI

Irving Pilot Award

07/01/17-06/30/18

This grant supports structural and functional pilot imaging studies in human subjects with relevance to the neural underlying mechanism of PTSD.

Role: PI