

Michael Totty, PhD

POSTDOCTORAL FELLOW · JOHNS HOPKINS UNIVERSITY

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Professional Experience

- 2026-pres **Research Scientist**, Lieber Institute of Brain Development
- 2023-2026 **Postdoctoral Fellow**, Johns Hopkins University, Dept of Biostatistics
- Advisors: Dr. Stephanie Hicks & Dr. Keri Martinowich
 - Developed single cell and spatial transcriptomic atlases of the human brain, and created novel statistical methods and software for spatial transcriptomics.
- 2022-2023 **Postdoctoral Fellow**, Lieber Institute for Brain Development
- Advisor: Dr. Keri Martinowich
 - Established a novel research direction translating PTSD-associated transcriptomic changes to neural circuit function by integrating postmortem human transcriptomics with cell type-specific neural manipulation in rodents.
- 2017-2022 **Graduate Research Assistant**, Texas A&M Institute for Neuroscience
- Advisor: Dr. Stephen Maren
 - Investigated neural mechanisms of fear and extinction learning using neural circuit recording and manipulation techniques.
- 2015-2017 **Undergraduate Research Assistant**, University of Tennessee Medical Center
- Advisor: Dr. Subimal Datta
 - Investigated sleep-dependent consolidation of fear extinction memories using multi-region *in vivo* electrophysiology.
- 2015 **Undergraduate Research Assistant**, University of Tennessee
- Advisor: Dr. Eric Wade
 - Developed methods for classifying activities of daily living using off-the-market wearable biosensors.

Education and Training

Texas A&M University

PHD NEUROSCIENCE

College Station, Texas

2017 - 2022

University of Tennessee

BS BIOMEDICAL ENGINEERING

Knoxville, Tennessee

2012 - 2016

Awards, Fellowships, & Grants

2027 **Travel Award, American College of Neuropsychopharmacology**

PENDING **NIH Pathway to Independence Award (K99/R00), NIMH**

\$975,722

Title: *A translational approach to revealing stress susceptibility in amygdala-prefrontal circuits.*

Status: To be awarded, impact score of 19.

2026-2027	Young Investigator Grant, Brain & Behavior Research Foundation Title: <i>Revealing stress susceptibility in parallel amygdala-prefrontal circuits that bidirectionally regulate fear.</i> Role: Principal Investigator	\$70,000
2023-2026	NRSA F32 Fellowship, NIMH Title: <i>Neural substrates of extinction deficits in pathological fear.</i> Role: Principal Investigator	\$210,372
2017-2021	Travel Award (x4), Texas A&M Institute for Neuroscience	
2017-2021	Travel Award (x4), Dept. Psych. and Brains Sciences, TAMU	
2017 & 2018	Poster Award (x2), Texas A&M Institute for Neuroscience	

Manuscripts & Publications

equal contribution; * mentored student.

PREPRINTS AND CURRENT SUBMISSIONS

2. **Totty MS[#]**, Bach S[#], Valentine M, Tippani M, Maguire S, Miller R, Rosario I, Kleinman J, Maynard K, Hyde T, Page S, Hicks S, Martinowich K. "Multiscale spatial transcriptomics resolves the cellular and molecular architecture of the human amygdala." *bioRxiv*
1. Crowell HL[#], Dong Y[#], Billato I, Cai P, Emons M, Gunz S, Guo B, Li M, Mahmoud A, Manukyan A, Pagès H, Panwar P, Rao S, Sargeant C, Shepherd Kern L, Ramos M, Sun J, **Totty MS**, Carey V, Chen Y, Collado-Torres L, Ghazanfar S, Hansen KD, Martinowich K, Maynard KR, Patrick E, Righelli D, Risso D, Ritchie ME, Tiberi S, Waldron L, Gottardo R, Robinson MD[#], Hicks SC[#], Weber LM[#]. "Orchestrating Spatial Transcriptomics Analysis with Bioconductor." *bioRxiv*. doi: 10.1101/2025.11.20.688607. (Under revision at *Nature Methods*.)

PUBLISHED ARTICLES

21. Magnard R, Gonzalez-Padilla, Yalcinbas E, Chaloux-Pinette E, Eagles N, **Totty MS**, Janak P, Collado-Torres, Maynard K (2026). "Transcriptional response to chronic long-access fentanyl self-administration in rat habenula and amygdala." *Addiction Biology*. doi: 10.1111/adb.70179.
20. Salisbury A, Figueroa L, Martinowich K[#], **Totty MS[#]** (2026). "Cortistatin neurons in the prelimbic cortex regulate seizure susceptibility in female mice via BDNF-TrkB signaling." *Neurobiology of Disease*. doi: 10.1016/j.nbd.2026.107498.
19. Shah K, **Totty MS**, Bach SV, Valentine M, Chandra A, Divecha HR, Miller R, Kwon SH, Ramnauth A, Tippani M, Tyagi S, Kleinman JE, Collado-Torres L, Han S, Hyde TM, Page SC, Maynard KR, Hicks SC, Martinowich K (2026). "Spatio-molecular gene expression reflects dorsal anterior cingulate cortex structure and function in the human brain." *Cell Reports*. doi: 10.1016/j.celrep.2026.117500.
18. Chen X, **Totty MS**, Hicks SC (2026). "Spotsweeper-py: spatially-aware quality control metrics for spatial omics data in the Python ecosystem." *F1000Research*. doi: 10.12688/f1000research.175162.1
17. Goode TD, Bernstein M, **Totty MS**, Alipio JB, Vicidomini C, Pathak D, Besnard A, Chizari D, Sachdev N, Kritzer M, Chung A, Duan X, Macosko E, Hicks SC, Zweifel L, Sahay A (2026). "A dorsal hippocampus-prodynorphinergic dorsolateral septum-to-lateral hypothalamus circuit mediates contextual gating of feeding." *Neuron*. doi: 10.1016/j.neuron.2026.01.025
16. Mourao F, **Totty MS**, Tuna T, and Maren S (2026). "Hippocampal-prelimbic coupling during context-dependent extinction retrieval in rats." *Hippocampus*. doi: 10.1101/2025.05.03.652056
15. Tucker A, Eisdorfer JT, Thackray JK, Vo K, Thomas H, Tandon A, Moses J, Singletary B, Gillespie T, Smith A, Pauken A, Nadella S, Pitonak M, Letchuman S, Jang J, **Totty MS**, Jalufka FL, Aceves M, Adler AF, Maren S, Blackmon H, McCreedy DA, Abaira V, Dulin J. (2025). "Functional synaptic connectivity of engrafted spinal cord neurons with locomotor circuitry in the injured spinal cord." *Nature Communications*. doi: 10.1038/s41467-025-65395-7.

14. Miranda-Barrientos J, Adirahu S*, Reh J, **Totty MS**, Hallock H, Li Y, Carr G, and Martinowich K (2025). "Patterns of neural activity in prelimbic cortex neurons correlate with attentional behavior in the rodent continuous performance test." *Translational Psychiatry*. doi: 10.1038/s41398-025-03707-7.
13. **Totty MS**[#], Cervera-Juanes[#], R., Bach, S.V.[#], Ben Ameer, L., Valentine, M.R., Simons, E., Romac, M.D., Trinh, H., Henderson, K., Del Rosario, I., et al. (2025). "Transcriptomic diversity of amygdalar subdivisions across humans and nonhuman primates." *Science Advances*. doi: 10.1126/sciadv.adw1029
12. Tuna T[#], **Totty MS**[#], Badarnee M[#], Mourão F, Peters S*, Milad M, and Maren S (2025). "Associative coding of aversive events in thalamic nucleus reuniens in rodents and humans." *Communications Biology*. doi: 10.1038/s42003-025-08580-0.
11. **Totty MS**, Hicks S, Guo B (2025). "SpotSweeper: spatially-aware quality control for spatial transcriptomics." *Nature Methods*. doi: 10.1038/s41592-025-02713-3.
10. Liu J, **Totty MS**, Bayer H, and Maren S. "Integrating Aversive Memories in the Basolateral Amygdala (2025)." *Biological Psychiatry*. doi: 10.1016/j.biopsych.2025.03.019
9. **Totty MS**, Tuna T, Ramanathan K, Jin J, Peters S*, and Maren S (2023). "Thalamic nucleus reuniens coordinates prefrontal-hippocampal synchrony to suppress extinguished fear." *Nature Communications*. doi: 10.1038/s41467023-42315-1
8. **Totty MS** and Maren S. "Neural oscillations in Aversively Motivated Behavior (2022)." *Frontiers in Behavioral Neuroscience*. doi: 10.3389/fnbeh.2022.936036
7. Binette AN[#], **Totty MS**[#], Maren S (2022). "Sex differences in the immediate extinction deficit and renewal of extinguished fear in rats." *PLoS One*. doi: 10.1371/journal.pone.0264797
6. Liu J[#], **Totty MS**[#], Melissari L, Bayer H, Maren S (2022). "Convergent coding of recent and remote fear memory in the basolateral amygdala." *Biological Psychiatry*. doi: 10.1016/j.biopsych.2021.12.018
5. **Totty MS**, Warren N, Huddleston I*, Ramanathan K, Ressler R, Oleksiak C, Maren S (2021). "Behavioral and brain mechanisms mediating conditioned flight behavior in rats." *Scientific Reports*. doi: 10.1038/s41598-021-87559-3
4. Giustino TF, Ramanathan KR, **Totty MS**, Miles OM, and Maren S (2020). "Locus coeruleus norepinephrine drives stress-induced increases in basolateral amygdala firing and impairs extinction learning." *Journal of Neuroscience*. doi: 10.1523/JNEUROSCI.1092-19.2019
3. **Totty MS**, Payne M, Maren S (2019). "Event boundaries do not cause the immediate extinction deficit after Pavlovian fear conditioning in rats." *Scientific Reports*. doi: 10.1038/s41598-019-46010-4
2. **Totty MS**, Chesney LA, Geist PA, Datta S (2017). "Sleep-dependent oscillatory synchronization: a role in fear memory consolidation." *Frontiers in Neural Circuits*. doi: 10.3389/fncir.2017.00049
1. **Totty MS** and Wade E (2017). "Muscle Activation and Inertial Motion Data for Non-Invasive Classification of Activities of Daily Living." *IEEE Transactions on Biomedical Engineering*. doi: 10.3389/fncir.2017.00049

Selected Presentations

TALKS

12. "Cracking the almond: Revealing the cell type and molecular architecture of the human amygdala through multimodal transcriptomics." Kavli Neuroscience Discovery Group, JHU, November 2025.
11. "Transcriptomic profiling of amygdalar subdivisions across humans and nonhuman primates." UC Davis Biological Psychology Research Seminar, October 2025.
10. "From Mice to Men and Back Again: Unraveling neural circuit dysfunction in psychiatric disorders." Johns Hopkins OneNeuro Postdoctoral Seminar Series, February 2025.
9. "Multiscale Transcriptomic Mapping of the Human Amygdala." American College of Neuropsychopharmacology, December 2024.

8. "SpotSweeper: spatially-aware quality control for spatial transcriptomics." Bioconductor Annual Conference, July 2024.
7. "Transcriptomic mapping of basolateral amygdala cell types across humans and non-human primates." Winter Conference on Brain Research, February 2024.
6. "Using single cell and spatially-resolved transcriptomics to reveal psychiatric risk in amygdala cell types across species." Lieber Institute for Brain Development Postdoc Series, September 2023.
5. "Thalamic Nucleus Reuniens Coordinates Prefrontal-Hippocampal Synchrony to Suppress Extinguished Fear." Plexon: Neuroscience 2023 Data blitz, Virtual. January 2023.
4. "Thalamic Control of Prefrontal-Hippocampal Synchrony Mediating Fear Memory Suppression." Gordon Research Seminar: Thalamocortical Interactions, Lucca, Italy. Fall 2022.
3. "The nucleus reuniens mediates the retrieval of extinction memories via prefrontal-hippocampal synchronization." TAMIN Seminar Series, Texas A&M University. Spring 2022.
2. "Oscillatory dynamics underlying the retrieval of extinction memories and the role of the nucleus reuniens." BCN Graduate Seminar Series, Texas A&M University. Fall 2021.
1. "Does stress or event segmentation account for the immediate extinction deficit after conditioning in rodents?" TAMIN Annual Symposium, Texas A&M University. April 2019.

POSTERS

21. **Totty MS[#]**, Juanes R[#], Bach S.V.[#], Ameer L, Valentine M, Stocker M, Simons E, Tippianni M, Rosario I, Kleinman J, Page S, Saunders A, Hyde T, Martinowich K, Hicks S, Costa V. "Transcriptomic diversity of basolateral amygdala cell types across humans and non-human primates." Gordon Research Conference: Amygdala Function in Emotion, Cognition, and Disease. July 2025
20. **Totty MS[#]**, Bach S[#], Valentine M, Tippianni M, Maguire S, Miller R, Rosario I, Kleinman J, Maynard K, Hyde T, Page S, Hicks S, Martinowich K. "Mapping the Human Amygdala Through Multiscale Spatial Transcriptomics." American College of Neuropsychopharmacology. December 2024
19. **Totty MS[#]**, Juanes R[#], Bach S.V.[#], Ameer L, Valentine M, Stocker M, Simons E, Tippianni M, Rosario I, Kleinman J, Page S, Saunders A, Hyde T, Martinowich K, Hicks S, Costa V. "Transcriptomic diversity of basolateral amygdala cell types across humans and non-human primates." Society for Neuroscience. October 2024
18. **Totty MS[#]**, Juanes R[#], Bach S.V.[#], Ameer L, Valentine M, Stocker M, Simons E, Tippianni M, Rosario I, Kleinman J, Page S, Saunders A, Hyde T, Martinowich K, Hicks S, Costa V. "Transcriptomic diversity of basolateral amygdala cell types across humans and non-human primates." Biology of Genomes. May 2024
17. **Totty MS**, Ramanathan K, Peters S, Maren S. "Oscillatory dynamics underlying the retrieval of extinction memories and the role of the thalamic nucleus reuniens." Gordon Research Conference: Thalamocortical Interactions. February 2022
16. **Totty MS**, Ramanathan K, Peters S, Maren S. "Oscillatory dynamics underlying the retrieval of extinction memories and the role of the thalamic nucleus reuniens." Society for Neuroscience. November 2022
15. **Totty MS**, Ramanathan K, Maren S. "The nucleus reuniens of the thalamus is necessary for both the retrieval of recent extinction memories and prefrontal-hippocampal theta synchrony." Society for Neuroscience. November 2021
14. Liu J, **Totty MS**, Melissari L, Maren S. "Basolateral amygdala mediates retrieval of both recent and remote fear memories." Society for Neuroscience. November 2021.
13. **Totty MS**, Ramanathan K, Maren S. "The nucleus reuniens of the thalamus is necessary for both the retrieval of recent extinction memories and prefrontal-hippocampal theta synchrony." Pavlovian Society. November 2021
12. **Totty MS**, Ramanathan K, Maren S. "The nucleus reuniens of the thalamus is necessary for both the retrieval of recent extinction memories and prefrontal-hippocampal theta synchrony." IBRO-RIKEN CBS Summer Program. June 2021

11. **Totty MS**, Ramanathan K, Maren S. "The role of the nucleus reuniens in coordinating prefrontal-hippocampal synchrony during the expression of fear and extinction memories." Society for Neuroscience: Global Connectome. January 2021.
10. Liu J, **Totty MS**, Maren S. "Optogenetic inhibition of basolateral amygdala principle neurons attenuates the retrieval of both recent and remote cued fear memories in rats." Society for Neuroscience: Global Connectome. January 2021.
9. **Totty MS**, Warren N, Ressler R, Ramanathan K, Maren S. "The bed nucleus of the stria terminalis regulates context-dependent flight behavior." Society for Neuroscience. October 2021.
8. **Totty MS**, Warren N, Ressler R, Ramanathan K, Maren S. "Neural circuits mediating context-dependent flight behavior in rats." Pavlovian Society. October 2019.
7. **Totty MS**, Warren N, Ressler R, Ramanathan K, Maren S. "The bed nucleus of the stria terminalis regulates context-dependent flight behavior." Gordon Research Conference: Amygdala Function in Emotion, Cognition, and Disease. August 2019.
6. **Totty MS**, Warren N, Ressler R, Ramanathan K, Maren S. "Contextual regulation of flight behavior in rats is mediated by the bed nucleus of the stria terminalis." UT Austin Conference on Learning and Memory. April 2019.
5. **Totty MS** and Maren S. "Does stress or event segmentation account for the immediate extinction deficit?" Society for Neuroscience. November 2018.
4. Giustino TF, **Totty MS**, and Maren S. "Propranolol stabilizes shock-induced increases in spike firing in the basolateral amygdala: implications for the immediate extinction deficit." Society for Neuroscience. November 2018.
3. **Totty MS**, Chesney LA, Geist PA, Datta S. "The role of sleep-dependent neuronal network synchronization in fear memory consolidation." Society for Neuroscience. November 2017.
2. Geist PA, Barnes A, Dulka DN, **Totty MS**, Datta S. "The effects of BDNF on local EEG patterns and behavioral testing." Society for Neuroscience. November 2017.
1. **Totty MS** and Wade E. "Forearm EMG activation classifies activities of daily living." Biomedical Engineering Society Annual Meeting. October 2015.

Teaching Experience

Fall 2021	Psychology of Learning Guest lecture	<i>Texas A&M University</i>
Spring 2021	Introduction to Drug Delivery Virtual Guest lecture	<i>University of Tennessee</i>
Spring 2020	Elementary Statistics for Psychology Teaching Assistant	<i>Texas A&M University</i>

Mentoring

#mentored undergraduate thesis

2024-Pres	Suhaas Adiraju Neuroscience PhD student, Johns Hopkins University
2023-Pres	Aaron Salisbury Neuroscience PhD student, Johns Hopkins University
2021-2022	Tugce Tuna Neuroscience PhD student, Texas A&M University
2019-2021	Shaun Peters Undergraduate researcher, Texas A&M University
2018-2019	Isabella Huddleston [#] Undergraduate researcher, Texas A&M University

Outreach and Professional Development

SERVICE AND OUTREACH

- 2025-Pres **Postdoctoral Committee Member** OneNeuro Initiative at JHU
- 2020-2021 **Outreach Committee Member** Building Researchers And Innovators in Neuroscience and Society (BRAINS) at Texas A&M
- 2019-2021 **Webmaster** Texas A&M Institute for Neuroscience
- 2019-2020 **Guest Speaker** “Camp Dream, Speak, Live” for children who stutter
- 2019 **Oral Presentation Judge** Student Research Week, Texas A&M University
- 2019 **Volunteer and Speaker** BRAIN Day, Henderson Elementary School
- 2016-2017 **Guest Speaker** “Volunteer Your Voice” camp for children who stutter

PROFESSIONAL DEVELOPMENT

- 2021 **IBRO-RIKEN CBS Summer Program** RIKEN Center for Brain Science
- 2020 **Reviewer Mentor Program** Journal of Neuroscience

PEER REVIEW

American Journal of Psychiatry, Science Advances, Neuron, Nature Neuroscience (co-review with mentor), Nature Communications, Bioinformatics, Biological Psychiatry, Translational Psychiatry, Neuropsychopharmacology, eLife, eNeuro, Frontiers in Neural Circuits