Michael Totty, PhD

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Professional Experience

2023-pres **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. Thus far resulted in 2 first-author and 3 middle-author publications/preprints, and 1 awarded grant.

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. Thus far resulted in 1 awarded grant.

2017-2022 **Graduate Research Assistant**, Texas A&M Institute for Neuroscience
- Advisor: Dr. Stephen Maren
- Investigated neural mechanisms of fear and extinction learning using using neural circuit recording and manipulation techniques. Resulted in 7 first-author and 4 middle-author publications/preprints.

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* electrophyisology. Resulted in 1 first-author publication.

2015 **Undergraduate Research Assistant**, University of Tennessee
- Advisor: Dr. Eric Wade
- Developed methods for classifying activities of daily living using of off-the-market wearable biosensors. Resulted in 1 first-author publication.

Education and Training

Texas A&M University — *College Station, Texas*
PhD Neuroscience — *2017 - 2022*

University of Tennessee — *Knoxville, Tennessee*
BS Biomedical Engineering — *2012 - 2016*

Awards, Fellowships, & Grants

PENDING **NIH Pathway to Independence Award (K99/R00), NIMH** *$975,722*
Title: *A translational approach to revealing stress susceptibility in amygdala-prefrontal circuits.*
Status: Awaiting decision, impact score of 26.

2026-2027 **Young Investigator Grant, Brain & Behavior Research Foundation** *$70,000*
Title: *Revealing stress susceptibility in parallel amygdala-prefrontal circuits that bidirectionally regulate fear.*
Role: Principal Investigator

2023-2026	**NRSA F32 Fellowship, NIMH** Title: *Neural substrates of extinction deficits in pathological fear.* Role: Principal Investigator	*$210,372*
2017-2021	**Travel Award (x4), Texas A&M Institute for Neuroscience**	*$2,400 total*
2017-2021	**Travel Award (x4), Dept. Psych. and Brains Sciences, TAMU**	*$2,000 total*
2017 & 2018	**Poster Award (x2), Texas A&M Institute for Neuroscience**	*$300 total*

Manuscripts & Publications

*# equal contribution; * mentored undergraduate.*

In Preparation

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. "A multiscale spatial transcriptomic atlas of the human amygdala." *In prep.*

1. Salisbury A, Figueroa L, Martinowich K#, **Totty MS#**. "Regulation of hyperexcitability in the mouse medial prefrontal cortex by cortistatin-expressing neurons." *In prep.*

Preprints and Current Submissions

5. 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. "Spatio-molecular gene expression reflects dorsal anterior cingulate cortex structure and function in the human brain." *bioRxiv.* DOI: 10.1101/2025.07.14.664821. (Submitted.)

4. 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. "A dorsal hippocampus-prodynorphinergic dorsolateral septum-to-lateral hypothalamus circuit mediates contextual gating of feeding." (Under revision.)

3. Miranda-Barrientos J, Adirahu S, Rehg J, **Totty MS**, Hallock H, Li Y, Carr G, and Martinowich K. "Patterns of neural activity in prelimbic cortex neurons correlate with attentional behavior in the rodent continuous performance test." (Under revision at *Translational Psychiatry.*)

2. Mourao F, **Totty MS**, Tuna T, and Maren S. "Hippocampal-prelimbic coupling during context-dependent extinction retrieval in rats." *bioRxiv.* DOI: 10.1101/2025.05.03.652056. (Under revision at *Hippocampus.*)

1. 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, Abraira V, Dulin J. "Functional synaptic connectivity of engrafted spinal cord neurons with locomotor circuitry in the injured spinal cord." *bioRxiv.* DOI: 10.1101/2025.04.05.644402. (Under revision at *Nature Communications.*)

Published Articles

13. **Totty MS#**, Cervera-Juanes#, R., Bach, S.V.#, Ben Ameur, L., Valentine, M.R., Simons, E., Romac, M.D., Trinh, H., Henderson, K., Del Rosario, I., et al. "Transcriptomic diversity of amygdalar subdivisions across humans and nonhuman primates." *Science Advances.* DOI: 10.1101/2025.07.14.664821

12. Tuna T#, **Totty MS#**, Badarnee M#, Mourão F, Peters S*, Milad M, and Maren S. "Associative coding of aversive events in thalamic nucleus reuniens in rodents and humans (2025)." *Communications Biology.*DOI: 10.10.1038/s42003-025-08580-0.

11. **Totty MS**, Hicks S, Guo B. "SpotSweeper: spatially-aware quality control for spatial transcriptomics (2025)." *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

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.#, Ameur L, Valentine M, Stocker M,Simons E, Tippani 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, Tippani 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.#, Ameur L, Valentine M, Stocker M,Simons E, Tippani 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.#, Ameur L, Valentine M, Stocker M,Simons E, Tippani 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 activites of daily living.” Biomedical Engineering Society Annual Meeting. October 2015.

Teaching Experience

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

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 Initative 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

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

References

Dr. Stephanie Hicks ***(Postdoctoral Mentor)***
Assistant Professor
Department of Biostatistics
Johns Hopkins Bloomberg School of Public Health
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Dr. Keri Martinowich ***(Postdoctoral Mentor)***
Senior Investigator and Director
Translational Neuroscience Division
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Dr. Stephen Maren ***(Ph.D. Mentor)***
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Beckman Institute for Advanced Science and Technology
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