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Licensed Psychologist, California #26583

Current Academic Positions

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| 2015-present | Assistant Professor, Department of Psychiatry, University of Pennsylvania Perelman School of Medicine |
| 2019-present | Associate Director, Penn Center for Neuromodulation in Depression and Stress (CNDS) |
| 2021-present | Co-Director, Penn Brain Science, Translation, Innovation, and Modulation Center (brainSTIM) |
| 2016-present | Neuroscience Graduate Group Faculty (Biomedical Graduate Studies) University of Pennsylvania Perelman School of Medicine |

Previous Positions

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| 2013-2015 | Instructor and Research Associate, Department of Psychiatry Stanford School of Medicine and Palo Alto Veterans Institute for Research |
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Education

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| 2009-2013 | Stanford University Department of Psychiatry and VA Palo Alto Postdoctoral Research Fellow |
| 2006-2009 | The University of Wisconsin-Madison Postdoctoral Fellow, Departments of Psychiatry and Psychology NRSA (NIMH F32): " <i>Temporal dynamics of emotional processing in anxiety</i> " |
| 2006 | Pennsylvania State University Ph.D. Clinical Psychology, minor Psychophysiology |
| 2005-2006 | V.A. Western New York Healthcare System Clinical Internship |
| 2002 | Pennsylvania State University M.S. Psychology |
| 1999 | California State University, Hayward (East Bay) B.A. magna cum laude, Psychology |

Honors/Awards

Neuromodec NYC 2020 Neuromodulation Conference Poster Award (2020)
 Google Cloud Platform Research Credit (\$15,000) for project “*Non-invasive brain stimulation optimized targeting using multi-modal MRI*” (2019-2020)
 Buffalo Innovation Lab Invitee, National Center for Advancing Translational Sciences of the National Institutes of Health – ‘Rapid Solutions to the Opioid Misuse Epidemic’ (2017) -declined
 Research Partner Program award for NARSAD grant, Brain & Behavior Research Foundation (2016-2017)
 University of Pennsylvania Department of Radiology Protocol Development Fund Award (2016)
 Mahoney Institute for Neurosciences Symposium Poster Award, University of Pennsylvania (2016)
 Anxiety and Depression Association of America (ADAA), Alies Muskin Career Development Leadership Award (Basic Neuroscience Track; 2016)
 Poster selected for ‘Poster Tours’ ADAA, Guide: Barbara Rothbaum, Ph.D. (2016)
 NIH Clinical Loan Repayment Award (2014-2016)
 Stanford Center for Cognitive and Neurobiological Imaging (CNI) Seed Grant Award (2013-2014 and 2015)
 NIH National Research Service Award (NRSA); Postdoctoral, NIMH F32 (2009-2012)
 War Related Illness and Injury Study Center (WRIISC) Fellowship, Palo Alto VA (2010-2013)
 Poster selected for Media Materials: ‘Hot Topics in Neuroscience,’ Society for Neuroscience (Chicago, October 2009)
 Wisconsin Symposium on Emotion, Poster Award (2009)
 Functional MRI workshop travel award, University of Michigan (May, 2007)
 Grant-in-Aid, Penn State Graduate School (Spring, 2004 & Summer, 2005)
 Tursky Student Poster Award, 43rd Annual Meeting of the Society for Psychophysiological Research (Chicago, October 2003)*
 Neuroscience Fellowship (National Institute of Neurological Disorders & Stroke, NIH, Summer 2003)
 Psychology Department Fellowship (summer tuition, 2003)
 Trumbo Travel Award, Penn State (2001 & 2002)
 Liberal Arts Travel Award, Penn State (2001, 2003, 2005, 2006)
 Bruce V. Moore Graduate Fellowship (travel expenses; 2002)
 Phi Theta Kappa Honor Society, Cal State Hayward (East Bay)
 Outstanding Psychology Student Award 1999, Cal State Hayward (East Bay)
 Psi Chi National Honor Society, Cal State Hayward (East Bay)

Publications

Balderston, N.L., Beer, J.C., Seok, D., Makhoul, W., Deng, Z., Girelli, T., Teferi, M., Smyk, N., Jaskir, M., **Oathes, D.J.**, Sheline, Y.I. (in press). Proof of concept study to develop a novel connectivity-based electric-field modelling approach for individualized targeting of transcranial magnetic stimulation treatment. *Neuropsychopharmacology*.

Cieslak, M., Cook, P.A., He, X., Yeh, F-C., Dhollander, T., Adebimpe, A., Aguirre, G.K.,

- Bassett, D.S., Bourque, J., Cabral, L., Davatzikos, C., Detre, J., Earl, E., Elliott, M.A., Fadnavis, S., Fair, D., Foran, W., Fotiadis, P., Garyfallidis, E., Giesbrecht, B., Gur, R.C., Gur, R.E., Kelz, M., Keshavan, A., Larsen, B., Luna, B., Mackey, A., Milham, M., **Oathes, D.J.**, Perrone, A., Pines, A., Roalf, D.R., Richie-Halford, A., Rokem, A., Sydnor, V.J., Tapera, T.M., Tooley, U., Vettel, J.M., Yeatman, J., Grafton, S.C., Satterthwaite, T.D. (2021) QSIPrep: An integrative platform for preprocessing and reconstructing diffusion MRI data. *Nature Methods*. <https://doi.org/10.1038/s41592-021-01185-5>
- Yu, M., Cullen, N., Linn, K.A., **Oathes, D.J.**, Seok, D., Cook, P.A., Duprat, R., Aselcioglu, I., Moore, T.M., Davatzikos, C., Oquendo, M.A., Weissman, M.M., Shinohara, R.T., Sheline, Y.I. (2021). Structural brain measures linked to clinical phenotypes in major depression replicate across clinical centers. *Molecular Psychiatry*. <https://doi.org/10.1038/s41380-021-01039-8>
- Oathes, D.J.**, Balderston, N., Kording, K.P., DeLuisi, J., Perez, G., Medaglia, J.D., Fan, Y., Duprat, R., Satterthwaite, T.D., Sheline, Y.I. Linn, K.A. (2021). Interleaved TMS/fMRI for probing and modulating circuits relevant to affective disorders. *WIREs Cognitive Science*. <https://doi.org/10.1002/wcs.1553>
- Oathes, D.J.**, Zimmerman, J., Duprat, R., Japp, S., Scully, M., Rosenberg, B., Flounders, M.W., Long, H., DeLuisi, J.A., Elliott, M., Shandler, G., Shinohara, R.T., & Linn, K.A. (2021). Resting fMRI guided TMS results in subcortical and brain network modulation indexed by interleaved TMS/fMRI. *Experimental Brain Research*, 239(4), 1165-1178. [10.1007/s00221-021-06036-5](https://doi.org/10.1007/s00221-021-06036-5)
- Fonzo, G.A., Goodkind, M.S., **Oathes, D.J.**, Zaiko, Y.V., Harvey, M., Peng, K.K., Weiss, M.E., Thompson, A.L., Zack, S.E., Lindley, S.E., Arnow, B.A., Jo, B., Rothbaum, B.O., Etkin, A. (2021). Amygdala and insula connectivity changes following psychotherapy for posttraumatic stress disorder: A randomized clinical trial. *Biological Psychiatry*, 89 (9), 857-867. <https://doi.org/10.1016/j.biopsych.2020.11.021>
- Editorial: Kaye, A.P. Amygdala-insula circuit computations in posttraumatic stress disorder, (2021). *Biological Psychiatry*, 89 (9), e49-e50.
- Cui, Z., Stiso, J., Baum, G.L., Kim, J.Z., Roalf, D.R., Betzel, R.F., Gu, S., Lu, Z., Xia, C.H., He, X., Ciric, R., **Oathes, D.J.**, Moore, T.M., Shinohara, R.T., Ruparel, K., Davatzikos, C., Pasqualetti, F., Gur, R.E., Gur, R.C., Bassett, D.S., Satterthwaite, T.D. (2020). Optimization of energy state transition trajectory supports the development of executive function during youth. *eLife*, e53060. <https://doi.org/10.7554/eLife.53060>
- Pines, A.R., Cieslak, M., Baum, G.L., Cook, P.A., Adebimpe, A., Davila, D.G., Elliott, M., Jirsaraie, R., Murtha, K., **Oathes, D.J.**, Piiwaa, K., Rosen, A.F.G., Rush, S., Shinohara, R.T., Bassett, D.S., Roalf, D.R., Satterthwaite, T.D. (2020). Advantages of multi-shell diffusion models for studies of brain development in youth. *Developmental Cognitive Neuroscience*, 43. <https://doi.org/10.1016/j.dcn.2020.100788>.
- Cui, Z., Li, H., Xia, D.H., Larsen, B., Adebimpe, A., Baum, G.L., Cieslak, M., Gur, R.E., Gur, R.C., Moore, T.M., **Oathes, D.J.**, Raznahan, A., Roalf, D.R., Shinohara, R.T., Wolf, D.H., Fair, D.A., Bassett, D.S., Davatzikos, C., Fan, Y., Satterthwaite, T.D. (2020).

Individual variation in control network topography supports executive function in youth. *Neuron*, 106(2), 340-353. <https://doi.org/10.1016/j.neuron.2020.01.029>.

Baum, G.L., Cui, Z., Roalf, D.R., Ciric, R., Betzel, R.F., Larsen, B., Cieslak, M., Cook, P.A., Xia, C.H., Moore, T.M., Ruparel, K., **Oathes, D.J.**, Alexander-Bloch, A.F., Shinohara, R.T., Raznahan, A., Gur, R.C., Gur, R.E., Bassett, D.S., Satterthwaite, T.D. (2020).

Development of structure-function coupling in human brain networks during youth. *Proceedings of the National Academy of Sciences*, 117, 1, 771-778.

Yu, M., Linn, K.A., Shinohara, R.T., **Oathes, D.J.**, Cook, P.A., Duprat, R., Moore, T., Oquendo, M., Phillips, M.L., McInnis, M., Fava, M., Trivedi, M.H., McGrath, P.J., Parsey, R., Weissman, M.M., & Sheline, Y.I. (2019). Childhood trauma history is linked to abnormal brain connectivity in major depression. *Proceedings of the National Academy of Sciences*, 116, 17, 8582-8590.

Etkin, A., Maron-Katz, A., Wu, W., Fonzo, G.A., Huemer, J., Vertes, P.E., Patenaude, B., Richiardi, J., Goodkind, M.S., Keller, C.J., Cejudo, J.R., Zaiko, Y.V., Peng, K.K., Shippel, E., Longwell, P., Toll, R.T., Thompson, A., Zack, S., Gonzalez, B., Edelstein, R., Chen, J. Akingbade, I., Weiss, E., Hart, R., Mann, S., Durkin, K., Baete, S., Boada, F., Genfi, A., Autea, J., Newman, J., **Oathes, D.J.**, Lindley, S.E., Abu-Amara, D., Arnow, B.A., Crossley, N., Hallmayer, J., Fossati, S., Rothbaum, B.A. Marmer, C.R., Bullmore, E.T., O'Hara, R. (2019). Using fMRI connectivity to define a treatment-resistant form of post-traumatic stress disorder. *Science Translational Medicine*, 11, 486, eaal3236, DOI: 10.1126/scitranslmed.aal3236.

Yang, Z., Gu, S., Honnorat, N., Linn, K., Shinohara, R., Aselcioglu, I., Bruce, S., **Oathes, D.J.**, Davatzikos, C., Satterthwaite, T., Bassett, D., Sheline, Y.I. (2018). Network changes associated with transdiagnostic depressive symptom improvement following cognitive behavioral therapy in MDD and PTSD. *Molecular Psychiatry*, 23, 2314-2323.

Yang, Z., **Oathes, D.J.**, Bruce, S.E., Linn, K.A., Satterthwaite, T.D., Cook, P.A., Satchell, E.K., Shou, Haochang., Sheline, Y.I. (2018). Cognitive behavioral therapy is associated with enhanced cognitive control network activity in major depression and post-traumatic stress disorder. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 3, 311-319.

Fonzo, G.A., Goodkind, M.S., **Oathes, D.J.**, Zaiko, Y.V., Harvey, M., Peng, K.P., Weiss, M.E., Thompson, A.L., Zack, S.E., Lindley, S.E., Arnow, B.A., Jo, B., Gross, J.J., Rothbaum, B.O., Etkin, E. (2017). PTSD psychotherapy outcome predicted by brain activation during emotional reactivity and regulation. *American Journal of Psychiatry*, 174(12), 1163-1174.

Fonzo, G.A., Goodkind, M.S., **Oathes, D.J.**, Zaiko, Y.V., Harvey, M., Peng, K.P., Weiss, M.E., Thompson, A.L., Zack, S.E., Mills-Finnerty, C.E., Rosenberg, B.M., Edelstein, R., Wright, R.N., Kole, C.A., Lindley, S.E., Arnow, B.A., Jo, B., Gross, J.J., Rothbaum, B.O., Etkin, E. (2017). Selective effects of psychotherapy on frontopolar cortical function in post-traumatic stress disorder. *American Journal of Psychiatry*, 174(12), 1175-1184.

Drysdale, A.T., Grosenick, L., Downar, J., Dunlop, K., Mansouri, F., Meng, Y., Fetcho, R., Zebley, B., **Oathes, D.J.**, Etkin, A., Schatzberg, A.F., Sudheimer, K., Keller, J., Mayberg,

H.S., Gunning, F.M., Alexopoulos, G.S., Fox, M.D., Pascual-Leone, A., Voss, H.U., Casey, B.J., Dubin, M.J., Liston, C. (2017). Resting state connectivity biomarkers define neurophysiological biotypes of depression. *Nature Medicine*, 23 (1), 28-38.

Editorial: Wager, T. & Woo, C-W. Imaging biomarkers and biotypes for depression. (2017). *Nature Medicine*, 23 (1), 16-17.

Jiang, Y., **Oathes, D.J.**, Hush, J., Darnall, B., Charvat, M., Mackey, S., Etkin, A. (2016). Perturbed connectivity of the amygdala and its subregions with the central executive and default mode networks in chronic pain. *Pain*, 157 (9), 1970-1978.

Oathes, D.J., Patenaude, B., Schatzberg, A.F., & Etkin, A. (2015). Neurobiological signatures of anxiety and depression in resting fMRI. *Biological Psychiatry*, 77 (4), 385-393.

Goodkind, M.S., Eickhoff, S.B., **Oathes, D.J.**, Jiang, Y., Chang, A., Jones-Hagata, L.B., Ortega, B.N., Zaiko, Y.V., Roach, E.L., & Etkin, A. (2015). Identification of a common neurobiological substrate for mental illness. *JAMA Psychiatry*, 72 (4), 305-315.

Oathes, D.J., Hilt, L.M., & Nitschke, J.B. (2015). Affective neural responses modulated by serotonin transporter genotype in generalized anxiety disorder, social anxiety disorder, and depression. *PLoS ONE*, 10(2): e0115820.

Chen, C.N., **Oathes, D.J.**, Chang, C., Zhou, Z., Williams, L.M., Glover, G., Deisseroth, K., & Etkin, A. (2013). Causal interactions between fronto-parietal central executive and default-mode networks in humans. *Proceedings of the National Academy of Sciences*, 110(49), 19944-19949.

Grupe, D.W., **Oathes, D.J.**, & Nitschke, J.B. (2013). Dissecting the anticipation of aversion reveals dissociable neural networks. *Cerebral Cortex*, 23(8), 1874-1883.

Tromp, D.P.M., Grupe, D.W., **Oathes, D.J.**, McFarlin, D.R., Hernandez, P.J., Kral, T.R.A., Lee, J.E., Adams, M., Alexander, A.L., & Nitschke, J.B. (2012). Reduced structural connectivity of a major frontolimbic pathway in generalized anxiety disorder. *JAMA Psychiatry*, 69(9), 925-934. [*Archives of General Psychiatry*]

Oathes, D.J., Siegle, G.J. & Ray, W.J. (2011). Chronic worry and the temporal dynamics of emotional processing. *Emotion*, 11(1), 101-114.

Oathes, D.J., Squillante, C.M., Ray, W.J. & Nitschke, J.B. (2010). The effects of worry on attention and threat vigilance. *PLoS ONE*, 5(10): e13411.

Nitschke, J.B., Sarinopoulos I., **Oathes, D.J.**, Johnstone, T., Whalen, P.J., Davidson, R.J., & Kalin, N.H. (2009). Anticipatory processing in the amygdala and anterior cingulate in generalized anxiety disorder and prediction of treatment response. *American Journal of Psychiatry*, 166, 302-310.

Oathes, D.J. & Nitschke, J.B. (2008). State of the union between cognitive neuroscience and emotion. *Expert Review of Neurotherapeutics*, 8(7), 1025-1027.

- Oathes, D.J.**, Bruce, J.M., & Nitschke, J.B. (2008). Worry facilitates corticospinal motor response to transcranial magnetic stimulation. *Depression and Anxiety*, 25(11), 969-976.
- Oathes, D.J.**, Ray, W.J., Yamasaki, A.S., Borkovec, T.D., Newman, M.G., Castonguay, L.G., & Nitschke, J.B. (2008). Worry, generalized anxiety disorder, and negative affect: Evidence from EEG gamma before and after psychotherapy. *Biological Psychology*, 69, 165-170.
- Oathes, D.J.**, & Ray, W.J. (2008). Dissociative tendencies and facilitated emotional processing. *Emotion*, 8(5), 653-661.
- Oathes, D.J.** & Ray, W.J. (2006). Depressed mood, index finger force and motor cortex stimulation: A transcranial magnetic stimulation (TMS) study. *Biological Psychology*, 72(3), 271-277.
- Ray, W.J. & **Oathes, D.J.** (2003). Brain imaging techniques. *International Journal of Clinical and Experimental Hypnosis*, 51(2), 97-104.

In Progress Manuscripts

- Brethel-Haurwitz, K.M., **Oathes, D.**, & Kable, J.W. (submitted). *Inhibitory TMS to right temporoparietal junction modulates inequity aversion.*
- Adebimpe, A., Bertolero, M., Dolui, S., Cieslak, M., the ALLFTD Consortium, Murtha, K., Baller, E.B., Boeve, B., Boxer, A., Butler, E.R., Cook, P., Colcombe, S., Covitz, S., Davatzikos, C., Davila, D.G., Elliott, M.A., Flounders, M.W., Franco, A.R., Gur, R.E., Gur, R.C., Jaber, B., McMillan, C., Milham, M., Mutsaerts, H.J.M.M., **Oathes, D.J.**, Olm, C.A., Phillips, J.S., Tackett, W., Roalf, D.R., Rosen, H., Tapera, T.M., Tisdall, M.D., Esteban, O., Poldrack, R.A., Detre, J.A., Satterthwaite, T.D. (submitted). *ASLPrep: A generalizable platform for processing of arterial spin labeled MRI and quantification of regional brain perfusion.*
- Li, H., Dhivya, S., Cui, A., Zhuo, C., **Oathes, D.J.**, Davatzikos, C., Satterthwaite, T.D., & Fan, Y. (submitted). *Computing personalized brain functional networks from fMRI using self-supervised deep convolutional neural networks.*
- Zhao, K., Duka, B., **Oathes, D.J.**, Calhoun, V., & Zhang, Y. (submitted). *A novel dynamic graph convolutional neural network architecture to characterize the functional connectome reveals new insights into ADHD.*
- Duprat, R., Flounders, M.W., Linn, K., Cavdaroglu, S., Scully, M., Long, H., Adams, G., Sharika, K.M., Dallstream, A., Gold, J., Kable, J., Platt, M., Sheline, Y.I., Satterthwaite, T.D. & **Oathes, D.J.** (in prep). *Causal evidence for a prefrontal to subgenual anterior cingulate pathway using interleaved TMS/fMRI.*
- Oathes, D.J.**, Linn, K.A., Long, H., Scully, M., Sheline, Y.I., Liang, X., Duprat, R. (in prep). *Non-invasively targeting, probing and modulating a deep brain circuit for depression remediation.*
- Oathes, D.J.**, Lyu, M., Scully, M., Figueroa-Gonzalez, A., Hosseini, G., Long, H., Duprat, R., Scott, J.C., Cristancho, M., Thase, M.E., Sheline, Y.I., Linn, K.A. (in prep). *Cognitive*

predictors and fMRI guided rTMS treatment of PTSD and Trauma Related Depression.

Sydnor, V.J., Cieslak, M., Duprat, R., Scully, M., Long, H., Flounders, M.W., Bassett, D.S., Satterthwaite, T.D., & **Oathes, D.J.** (in prep). Cortical-subcortical white matter supports transcranial magnetic stimulation engagement of the amygdala.

Research Support

- (pending) The Hart Fund in Cognitive Neuroscience Oathes 2022-2028
Decoding and modulating affective brain states
 Targeting individual brain networks related to affective dysregulation and repetitive thinking, we aim to disrupt these brain patterns using rTMS.
 Role: PI [15% me, 10% Ximo, 10% Justin, 50% new RA]
- (pending) AE Foundation Kable 2021-2023
Enhancing the ability to build trust through excitatory transcranial magnetic stimulation to the temporal-parietal junction
 As a model for treating patients with related behavioral deficits, we plan to establish a causal link between the TPJ and decision-making involving trust.
 Role: Co-Investigator [5% me, 10% Romain]
- AE Foundation Kable 2021-2022
Discovering replicable and robust activity differences between high and low discounters
 Here we aim to identify systematic differences in functional brain activity between high and low discounters
 Role: Co-Investigator
- R01 MH120811 Oathes/Fan 09/01/19-06/30/24
Individualized closed loop TMS for working memory enhancement
 This tool development and validation study will use a deep learning approach to decode a multi-modal imaging based working memory brain state that will be stimulated in closed-loop fashion with interleaved rTMS/fMRI to optimize brain readouts.
 Role: contact PI/MPI
- AE Foundation Kable 2019-2021
Reducing delay discounting and selfishness with excitatory transcranial magnetic stimulation of the temporoparietal junction
 As a model for treating patients with related behavioral deficits, we plan to establish a causal link between the TPJ and several behavioral economics measures related to social decision making.
 Role: Co-Investigator
- RF1 MH116920 Oathes/Bassett/Satterthwaite 09/02/18-08/31/22
Network control and functional context: Mechanisms for TMS response
 We propose to test the hypothesis that brain responses to TMS are governed both by the network properties of the stimulation site and by cognitive context during TMS administration.
 Role: contact PI/MPI
- R01 MH111886 Oathes 09/26/16-06/30/21
 NIH /NIMH/ NINDS

Non-invasive neuromodulation mechanisms and dose/response metrics

To better understand the influence of transcranial magnetic stimulation on the brain, we will acquire resting and interleaved TMS/fMRI responses to neuromodulatory TMS in healthy as well as depressed individuals.

Role: PI

Supplement to R01 MH11886-02 Oathes 05/18/18-05/17/19

Leveraging network control theory to explain individual differences in non-invasive brain stimulation.

Adding high resolution diffusion imaging to define control points hypothesized to contribute to evoked TMS brain responses recorded in functional MRI signals.

Role: PI

CureAccelerator Mid-Atlantic Repurposing Award Oathes 11/15/16-04/30/21

Cures Within Reach and the Kahlert Foundation (+20% Co-Funding from Penn Medicine)

Functional brain imaging to guide targeted brain stimulation for depression and posttraumatic stress

A traditional brain target for treating depression will be compared with a resting fMRI guided target in terms of treatment efficacy for depression and PTSD.

Role: PI

1T32MH106442-01A1 Sheline 05/01/16-04/30/21

NIMH

Integrative Training in the Neurocircuitry of Affective Disorders

The Institutional National Research Service Award Training Program will provide basic and clinical neuroscientists with the skills and mentor-guided experiences to propel them into an interdisciplinary research career.

Role: Primary mentor

NARSAD Young Investigator Grant Oathes 01/15/17-03/01/21

Brain & Behavior Foundation

TMS/fMRI as a probe of neuroplasticity towards optimizing brain based treatments in MDD

This project has the goal of linking resting fMRI and TMS evoked fMRI BOLD responses to neuroplasticity following several rounds of neuromodulatory TMS in MDD patients.

Role: PI

K01 MH121777 Balderston 09/17/19-07/31/23

Examining the mechanisms of anxiety regulation using a novel, sham-controlled, fMRI-guided rTMS protocol and a translational laboratory model of anxiety

In the context of anxiety induction (threat of shock), working memory and emotion regulation, we will probe and modulate brain and task performance using single pulse, high and low frequency rTMS.

Role: Co-Mentor

K23 MH118580 Goldschmied 2019-2023

Investigating the role of slow-wave activity as a marker of impaired plasticity in major depressive disorder

The project will disrupt slow-wave activity during sleep in depression then measure changes in EEG, TMS, serum BDNF and behavioral measures hypothesized to normalize in patients in response to the intervention.

Role: Co-Mentor

R21 MH119564 Francis 09/17/19-08/31/20

Repetitive transcranial magnetic stimulation as a probe of episodic memory neurocircuitry in schizophrenia

In this project we will use MRI targeting as well as fMRI and behavioral performance readouts from an episodic memory task to evaluate a novel rTMS treatment for schizophrenia.

Role: Consultant

F32 MH115661 Brethel-Haurwitz 07/27/18-07/26/20

Neural mechanisms of pathological selfishness

Using neuroeconomic models of social decision making in a modified dictator game to study selfish behavior and empathy as well as their disruption with TMS.

Role: Co-Sponsor

R35 CA197461-03 Lerman 08/01/15-03/01/19

NIH/NCI

Outstanding Investigator Award

Neuroscience-based interventions for Cancer Risk Behavior Change

This project will develop novel neuroscience-based interventions to help people gain control over risk factors that lead to cancer.

Role: Investigator

McCabe Fund Pilot Grant Oathes 07/12/16-02/11/18

University of Pennsylvania Perelman School of Medicine

Affective neurocircuit plasticity as a benchmark for novel non-invasive neurotherapeutics

Examine TMS evoked and resting connectivity changes in the fMRI BOLD signal before and after acute neuromodulation to prefrontal sites functionally linked to subcortical targets in major depressive disorder.

Role: PI

VA MIRECC Pilot Grant Oathes 10/01/16-09/29/17

Veterans Affairs Mental Illness Research, Education and Clinical Centers (VISN 4)

Non-invasive brain stimulation in disorder specific contexts for PTSD and MDD

Using structural and functional MRI guidance, modulate fear and reward neurocircuitry in the context of task probes to generate novel non-invasive brain stimulation treatment targets for MDD and PTSD.

Role: PI

Translational Neuroscience Initiative Platt, Sheline 04/01/16-06/30/20

Penn Medicine Translational Neuroscience Center (PTNC)

Elucidating mechanisms of TMS efficacy in neuropsychiatric disorders

Use innovative, complementary studies in non-human primates and humans to identify for the first time causal relationships between non-invasive brain stimulation (transcranial magnetic stimulation, or TMS) and changes in neural activity and behavior.

Role: Investigator

- R03 MH103745-01 Oathes/Etkin 08/01/14-07/31/17
NIH / NIMH
Developing Methods for Brain Stimulation Enhanced Fear Reversal in PTSD
The goal of the study is to determine ideal methods for enhancing reversal of learned fear reactions in healthy participants using MRI-guided transcranial magnetic stimulation (TMS) for subsequent application to patients with posttraumatic stress disorder (PTSD).
Role: PI (awarded to Oathes PI, transferred to Etkin 2015 for data collection continuity)
- 1 I21 RX001772-01A1 Johanson 04/01/15-03/29/17
Veterans Affairs, Rehabilitation Research and Development SPiRE Grant
Evaluating Neural Adaptation after Tendon Transfer and Task-based Training in SCI
Use fMRI to evaluate predictors and neural correlates of muscle re-education following tendon transfer surgery (distal tendon transfer brachioradialis muscle to the paralyzed flexor pollicis longus) to restore upper limb function in C5/6 SCI.
Role: Co-Investigator
- PAVIR Opportunity Fund Oathes 05/28/15-09/30/15
Palo Alto Veterans Institute for Research (PAVIR)
Individualized Brain Based Targeting for TMS/fMRI
Comparison of atlas and individualized targeting methods for activating subcortical brain areas with TMS via surface accessible prefrontal stimulation sites.
Role: PI
- PAVIR Opportunity Fund Oathes 05/15/15-08/31/15
Palo Alto Veterans Institute for Research (PAVIR)
Rapid Shifts in Mood Brain Dynamics in Resting fMRI
Covers participant reimbursement costs for the Stanford CNI project listed below.
Role: PI
- Seed Grant Award (Innovation) Oathes 04/02/15-07/31/15
Stanford Center for Cognitive and Neurobiological Imaging (CNI)
Rapid Shifts in Mood Brain Dynamics in Resting fMRI
Using sub-second rapid TR multi-band echo planar fMRI to capture affective/cognitive dynamics in the brain, we seek to characterize the signature of these influences on resting fMRI abnormalities in anxiety and depression.
Role: PI
- NIH LRP Oathes 07/01/14-06/30/16
Mapping Critical Neurocircuitry Interactions in PTSD
Supports my work combining TMS with fMRI to study causal brain network interactions in PTSD patients relative to trauma exposed healthy adults.
Role: PI
- Seed Grant Award Oathes 10/25/13-06/30/14
Stanford Center for Cognitive and Neurobiological Imaging (CNI)
Intrinsic and context dependent neural correlates of affective perturbation in anxious/depressed older adults

This project seeks to determine context dependent connectivity changes in the brains of older (and younger) adults in response to affective perturbation as well as to map cognitive/affective interactions in participants with or without significant affective symptoms.

Role: PI

1F32MH081667-01A2 Oathes 07/01/09-06/29/12
NIH / NIMH

Temporal Dynamics of Emotional Processing in Anxiety

Supported investigation of dynamic neural fluctuations during anticipation of, response to, and recovery from evocative emotional stimuli in generalized anxiety disorder, social anxiety disorder, and major depressive disorder patients with Dr. Jack Nitschke.

Role: PI

NIMH 5T32MH018931 Davidson 08/01/07-07/31/08
University of Wisconsin-Madison

Training Program in Emotional Research

Supported my role doing fMRI research on emotional processing in generalized anxiety disorder with PI Jack Nitschke (NIH 5R01MH074847-05).

Role: Postdoctoral Scientist

Past Research Experience

9/06-12/09 Postdoctoral Research Scientist (NIH Postdoctoral NRSA F32), Waisman Laboratory for Brain Imaging and Behavior, University of Wisconsin, Madison
- Conduct neuroimaging (fMRI, DTI) studies in affective neuroscience related to emotional processing chronometry in anxiety and depression (also incorporating numerous other psychophysiological, behavioral, and subjective experience measures)

Supervisor: Jack Nitschke, Ph.D., Depts. of Psychiatry and Psychology
Director: Richard Davidson, Ph.D., Depts. of Psychiatry and Psychology

3/06-9/06 Psychologist Intern Researcher/ Principle Investigator, Women's and Children's Hospital of Buffalo/University of Buffalo/Buffalo Veteran's Hospital
- set up high density EEG system, analyzed pilot data for EEG source analysis projects

6/03-8/03 Summer Internship in the Neurosciences; National Institute of Neurological Disorders & Stroke, National Institutes of Health
- study use-dependent plasticity of the motor cortex using Transcranial Magnetic Stimulation (TMS) in patient groups and control participants

Supervisor: Leonardo Cohen, M.D. (Human Cortical Physiology Unit, Senior Director)

Clinical Experience

2015-present Clinical consultation for diagnostic and neuropsychological assessments, Center

- for Neuromodulation in Depression and Stress, UPenn, Philadelphia, PA
- 9/14-9/15 Supervision of Clinical Psychology student trainees in diagnostic and neuropsychological assessments for Etkin Lab, Stanford, CA
- 2/15-9/15 Clinical Trial Therapist, Stanford Mood Disorders Center, Stanford, CA
Insomnia, behavioral sleep medicine treatment
- 1/10-9/14 Diagnostic assessments for NIH funded study of PTSD with fMRI, TMS/fMRI and therapy outcome to prolonged exposure (PE); Etkin Lab, Stanford, CA
- 9/08-9/09 Postdoctoral Clinician, Wisconsin Psychiatric Institute and Clinics, Madison, WI.
- Didactic training and provision of psychotherapy services to Madison community patients
- Supervision of graduate student clinicians and training in psychotherapy supervision
- 9/05-9/06 Assessor, Treatment Coordinator/Therapist; VA Western NY Healthcare Rotations in: Neuropsychology, Partial Hospitalization (Severe Mental Illness; Gestalt/Milieu Therapy, Motivational Interviewing, Group Therapy), Post-Traumatic Stress Disorder (Individual+Group Therapy, Exposure Therapy)
- 8/99 – 9/05 Staff Therapist; Staff Assessor; The Penn State Psychological Clinic, University Park, PA
-psychotherapy within various frameworks including Cognitive Behavioral Therapy, Experiential & Existential Psychotherapy, Transference Focused Psychotherapy
-intake diagnostic interviews, psychological & neuropsychological assessments

Teaching Positions/Experience

- 9/21 Guest lecture, ‘Personalized brain stimulation treatment’ for Psychiatry Residency course in Neuroscience, University of Pennsylvania Perelman School of Medicine.
- 4/21 Co-leader, Responsible Conduct in Research Workshop, University of Pennsylvania Perelman School of Medicine, Biomedical Graduate Studies
- 12/17 Guest lecture, ‘Emerging Neurotechnologies’ for Psychiatry Residency course in Neuroscience. University of Pennsylvania Perelman School of Medicine.
- 8/99 – 9/05 Instructor for ‘Introductory Psychology’ and ‘Adolescent Psychology’ Courses at Penn State. Teaching assistant for various courses in Penn State Psychology and Statistics Departments.

Affiliations

Society of Biological Psychiatry; Society for Neuroscience; Organization for Human Brain Mapping; Society for Psychophysiological Research; Association for Behavioral and Cognitive Therapies; Anxiety and Depression Association of America

Service

Ad hoc reviewer *Biological Psychiatry, Proceedings of the National Academy of Sciences, Neuropsychopharmacology, NeuroImage, Human Brain Mapping, Depression and Anxiety, the American Journal of Geriatric Psychiatry, Psychiatry Research: Neuroimaging, Psychophysiology, Behavior Therapy, Journal of Abnormal Psychology, Psychological Medicine, Cognitive Therapy and Research, Psychiatry Research, PLoS One, Cognitive, Affective, and Behavioral Neuroscience, Frontiers in Psychology, Biological Psychology, Anxiety, Stress, & Coping, Behavioral Neuroscience, Journal of Psychiatry and Neuroscience, Neuropsychologia, Cognition and Emotion, Journal of Psychiatric Research, Drug and Alcohol Dependence, Neuromodulation: Technology at the Neural Interface, Communications Biology, EBioMedicine, Addiction Biology.*

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| National Institute on Drug Abuse (NIDA/NIH) 022/01 ZDA1 PXN-F (11) S “Device-Based Treatments for Substance Use Disorders” UG3/UH3 | 2021 |
| Penn School of Arts and Sciences Mind DivE-In; Diversity and Equity Initiative in the Mind Sciences mentor | 2021 |
| Penn Center for Neuromodulation in Depression and Stress weekly international speaker series (clinical/cognitive neuroscience and brain stimulation) creator and host | 2021- |
| Penn Neuroscience Graduate Group (NGG) Action Against Bias (AAB) mentor | 2021- |
| National Institute of Mental Health Special Emphasis Panel “NIMH Early Phase Psychosocial and Confirmatory Efficacy Clinical Trials” 2021/ ZMH ERB-B (08) | 2021 |
| Penn Psychiatry Cognitive Behavioral Therapy Education Committee | 2021- |
| Penn Biomedical Postdoctoral Council Diversity Committee Mentoring Circles mentor | 2021- |
| Society of Biological Psychiatry Travel Fellowship Mentor | 2021 |
| Cures Within Reach/Cure Accelerator grant reviewer | 2021 |
| University of Pennsylvania Mahoney Institute of Neuroscience, Year of Neuromodulation, Program Committee | 2021-2022 |
| Society of Biological Psychiatry Program Committee | 2020-2023 |
| PLoS One Editorial Board | 2020- |
| Penn brainSTIM Center Faculty Steering Committee (Penn Neurology) | 2020- |
| Intersections Science Fellows Symposium (Postdoc Diversity Initiative) mentor | 2020 |
| Organization for Human Brain Mapping Student and Postdoc Special Interest Group International Online Mentoring Program, Mentor | 2020 |
| National Institutes of Health Special Emphasis Panel “Non-Invasive Neuromodulation – New Tools and Techniques for Spatiotemporal Precision” 2020/08 ZMH1 ERB-S(08) R | 2020 |
| VA Merit, CSR&D 2021/01 ZRD1 NURA-J (01) 2, Neurobiology-A Study Section | 2020 |
| VA Merit, CSR&D 2020/08 ZRD1 NURA-J (01) 1, Neurobiology-A Study Section | 2020 |
| Association of British Neurologists Clinical Research Training Fellowship reviewer | 2019 |
| Penn Faculty Senate Executive Committee and University Council Representative | 2019-2021 |
| University of Pennsylvania Council Committee on Personnel Benefits | 2021-2022 |
| National Institutes of Health Special Emphasis Panel “Device-based Treatments for Substance Use Disorders” 2019/01 ZMH1 ERB-D (02) S UG3/UH3 | 2019 |
| National Institutes of Health Special Emphasis Panel “Device-based Treatments for Substance | |

Use Disorders” 2020/10 ZDA1 IXN-O(07) S UG3/UH3 2020

National Institutes of Health Special Emphasis Panel “Device-based Treatments for Substance Use Disorders” 2020/01 ZMH1 ERB-D (02) S UG3/UH3 2020

National Institutes of Health Special Emphasis Panel “Early Stage Testing of Pharmacological or Device-based Interventions for the Treatment of Mental Disorders” 2020/01 ZDA1 IXN-O (14) S 2019

National Institutes of Health Special Emphasis Panel “Brain Initiative: Biology and Biophysics of Neural Stimulation” 2019/10 ZRG1 ETTN-D (50) R01 2019

NIH study section (Emerging Imaging Technologies in Neuroscience; EITN) 2019(1)

NIH study section (Emerging Imaging Technologies in Neuroscience; EITN) 2019(2)

NIH study section (Adult Psychopathology and Disorders of Aging; APDA) 2019

Penn Medicine Translational Neuroscience Center Neuromodulation Working Group member 2018-

Canada Foundation for Innovation (CFI) John R. Evans Leaders Fund infrastructure proposal expert reviewer 2018

Health Research Council of New Zealand Sir Charles Hercus Research Fellowship grant reviewer 2018

Anxiety and Depression Association of America Annual Conference research symposia / roundtable scientific reviewer 2018

National Institute on Drug Abuse (NIDA/NIH) Special Emphasis Panel “Device-Based Treatments for Substance Use Disorders” 2018, 2020

National Institute of Mental Health (NIMH/NIH) BRAIN Initiative: Kirchstein NRSA Individual Postdoctoral Fellowship (F32) Review Panel 2018/10 ZMH1 ERB-C (09) 2018

National Institutes of Health Special Emphasis Panel “Understanding and Modifying Temporal Dynamics of Coordinated Neural Activity” 2018/10 ZRG1 IFCN-J (58) R01+R21 2018

National Institute of Mental Health (NIMH/NIH) Special Emphasis Panel “Addressing Suicide Research Gaps: Aggregating and Mining Existing Data Sets for Secondary Analyses (R01) – 2018/05 ZMH1 ERB-B (03) 2018

Penn Medicine Clinical Neuroscience Training Program Summer Internship Grant Reviewer 2018

NIH study section (Biobehavioral Mechanisms of Emotion, Stress and Health [MESH]) 2017

Medical Research Council (MRC) UK Grant Reviewer 2017, 2018

Penn Biomedical Postdoctoral Research Symposium judge 2017

ADAA Genetics and Neuroscience Special Interest Group 2016-2017

VA Merit, Special Emphasis Panel 2017/08 Mental Health and Behavioral Sciences (MHBB 1) Grant Reviewer 2017

Penn PROMOTES Research on Sex and Gender in Health grant reviewer 2017

Panelist, Penn Neuroscience Advisory Committee planning meeting 2017

Scientific Quality Reviewer, Tufts Clinical and Translational Science Institute 2017

Neuroscience Graduate Group faculty, University of Pennsylvania 2016-

Neuroscience Graduate student mentor, University of Pennsylvania 2017-

Hong Kong SAR Government Innovation and Technology Commission grant reviewer 2016

Anxiety and Depression Association of America (ADAA), Annual Meeting Scientific Reviewer 2017, 2018

Science adviser, CureAccelerator.org 2016-

Grant reviewer, Romanian National Council for Scientific Research 2011, 2013, 2015

Grand Awards Judge, Intel International Science and Engineering Fair 2010

Society for Psychophysiological Research, Program Committee 2009

Wisconsin Symposium on Emotion, Discussant 2007, 2008

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| Human Brain Mapping Annual Meeting, Scientific Advisory Board | 2007 |
| Research training mentor, AP Biology (152) for two students, UW-Madison | 2007 |
| Association for Psychological Science (APS), Student Grant Competition Reviewer | 2005-2006 |
| APS, Student Research Competition Reviewer | 2005-2006 |
| APS, Graduate Representative (Penn State) | 2004-2005 |
| Clinical Training Committee, Penn State | 2004-2005 |
| Penn State Liberal Arts Travel Award Committee | 2004-2005 |
| Penn State Cognitive & Affective Neuroscience Colloquium Committee | 2002-2003 |

Selected Presentations

Oathes, D.J. (2021, November). Invited talk, McLean Hospital/Harvard Medical School Center for Depression, Anxiety, and Stress Research's (CDASR) 2021-2022 Speaker Series. *Noninvasive brain mapping to understand TMS mechanisms in neuropsychiatric treatment.* To be given at the Harvard Medical School, Boston, MA.

Oathes, D.J. (2021, September). Invited talk, Melbourne Neuropsychiatry Centre and Department of Biomedical Engineering. *TMS/fMRI causal mapping with relevance for rTMS depression treatment outcome.* Given at the University of Melbourne, Melbourne, Victoria, Australia.

Oathes, D.J. (2021, December). Invited talk, Psychiatry Grand Rounds. *Circuit focused neuropsychiatry towards personalized neuromodulation.* To be given at the University of Indiana Department of Psychiatry, Bloomington, IN.

Oathes, D.J. (June, 2021). Invited talk. *Combining TMS with fMRI for probing and modulating brain circuits.* Brainbox Initiative Webinar series, virtual.

Oathes, D.J. & Jong, Y. (co-Chairs; 2021, April-May). *Mood Disorders/Treatment Oral Session.* Symposium presented at the annual meeting of the Society of Biological Psychiatry, virtual.

Sydnor, V., **Oathes, D.J.** (2021, April-May). *Amygdala TMS-fMRI evoked response is influenced by prefrontal-amygdala white matter pathway fiber density.* Poster presented at the annual meeting of the Society of Biological Psychiatry, virtual.

Oathes, D.J. (2021, April-May). *Depression improvement from rTMS facilitated by subgenual cingulate engagement indexed by interleaved TMS/fMRI.* Poster presented at the annual meeting of the Society of Biological Psychiatry, virtual.

Oathes, D.J. (2021, February). Invited talk, Psychiatry Department Mood Disorder Lecture Series. *Brain circuit probe and neuromodulation evidence for how TMS improves depression.* Given at the University of Texas at Austin Dell Medical School, Austin, TX (virtual).

Oathes, D.J. (June, 2020). Invited talk, Neurology Grand Rounds. *Neuroimaging informed transcranial magnetic stimulation.* Given at the University of Pennsylvania, Perelman School of Medicine, Philadelphia, PA.

- Oathes, D.J.** (2020, April). *Interleaved TMS/fMRI for causal mapping of cortical-subcortical connections towards novel personalized treatment targets*. In Roy Hamilton (Chair), Utilizing Network Imaging to Personalize and Optimize Neuromodulation in Translational Cognitive Neuroscience. Neuromodec NYC Neuromodulation 2020, Online international conference.
- Oathes, D.J.** (2020, May). Invited talk, BRAIN Initiative funded (Opitz PI) ‘Computational Modeling in Non-Invasive Brain Stimulation Workshop 2020’. *Interleaved TMS/fMRI methods*. Given at the University of Minnesota, Minneapolis, MN.
- Oathes, D.J.** (December, 2019). Invited talk. *TMS/fMRI and rTMS towards causal human neuroscience and brain-based treatments*. Given at the Center for Molecular and Behavioral Neuroscience at Rutgers University-Newark, Newark, NJ.
- Oathes, D.J.** (November, 2019). Invited talk. *Circuit mapping and neuromodulation for moving brain networks and behavior*. Given at the Drexel University Applied Cognitive & Brain Science Program, Philadelphia, PA.
- Balderston, N.L., Beydler, E.M., Roberts, C., Deng, Z., Radman, T., Luber, B., Lisanby, S.H., Ernst, M., **Oathes, D.J.**, Sheline, Y., Grillon, G. (2019, December). *High-frequency rTMS to the right dlPFC increases anxiety potentiated startle in healthy volunteers*. Poster presented at the annual meeting of the American College of Neuropsychopharmacology, Orlando, FL.
- Oathes, D.J.**, Duprat, R., Scully, M., Long, H., Balderston, N., Bagdon, G., Deluisi, J., Lyu, M. Sheline, Y. (2019, December). *Functional MRI guided targeting with interleaved TMS/fMRI readouts of evoked amygdala responses*. Poster presented at the annual meeting of the American College of Neuropsychopharmacology, Orlando, FL.
- Oathes, D.J.**, Bassett, D.S., & Satterthwaite, T.D. (2019, November). Invited talk. *Targeting TMS using Network Control Theory to Augment Working Memory in ADHD*. In R. Gur & A. Rostain (Chairs), Neurodevelopment and Neuromodulation Research Symposium. Symposium presented at the annual International Conference on ADHD, Philadelphia, PA.
- Oathes, D.J.** (2019, August). Invited talk, Neuronetics-Neurostar. *Brain imaging to guide causal brain pathway interrogation with TMS/fMRI*. Given at Neuronetics-Neurostar Headquarters, Malvern, PA.
- Oathes, D.J.** (2019, July). Invited lecture. *Leveraging neuroscience for brain-based treatments of psychiatric disorders*. Given as part of the Interdisciplinary Mind Brain /MindCORE summer fellow lecture series, School of Arts and Sciences, University of Pennsylvania, Philadelphia, PA.
- Oathes, D.J.** (June, 2019). Invited talk. *Individual circuit-focused engagement of putative depression and anxiety brain regions in the subcortex*. Given at the Baylor College of Medicine, Houston, TX.
- Oathes, D.J.** (April, 2019). Invited poster. *Effective engagement of subgenual cingulate cortex via non-invasive TMS evidenced by interleaved TMS/fMRI*. Given at the Annual NIH/NSF/DARPA/IARPA/FDA BRAIN Initiative Investigators Meeting, Washington, D.C.

Duprat, R., Linn, K., Satterthwaite, T., Ciric, R., Sheline, Y., Platt, M., Gold, J., Kable, J., Adams, G., Kalamveetil-Meethal, S., Dallstream, A., Long, H., Scully, M., Shinohara, R., **Oathes, D.J.** (2019, February). *Functional connectivity as a tool to individualize DLPFC targeting in TMS*. Poster presented at the bi-annual International Brain Stimulation Conference, Vancouver, BC, Canada.

Oathes, D.J. (2019, February). Invited talk. *Optimizing non-invasive brain stimulation treatment for depression by individualized fMRI guided targeting*. Given at the Penn Biomedical Postdoctoral T32 Fellow Training Seminar. University of Pennsylvania, Philadelphia, PA.

Oathes, D.J. (2018, December). Invited talk (by graduate students). *Why hasn't brain imaging helped to fix mental illness and what should we do about it?* Given at the Penn Neuroscience Public Lecture series. University of Pennsylvania, Philadelphia, PA.

Duprat, R., Flounders, M., Scully, M., Long, H., Elliott, M., Sheline, Y., Platt, M., Gold, J., Kable, J., Adams, G., Dallstream, A., Sharika, K.M., Cristancho, M., Linn, K., Shinohara, R.T. **Oathes, D.J.**, (2018, December). *Transcranial magnetic stimulation causally influences the subcallosal cingulate cortex indexed by interleaved TMS/fMRI*. Poster presented at the annual meeting of the American College of Neuropsychopharmacology, Hollywood, FL.

Oathes, D.J. (2018, November). Invited talk. *Psychophysiology as an outcome tool for anxiety and depression neuromodulation*. In K. Sharma-Patel (Chair), Integrating physiological tools and technology into CBT prevention and treatment outcome research. Symposium presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Washington, D.C.

Oathes, D.J. (2018, November). Invited lecture. *The neurobiology of mood disorders*. Given as part of Penn Psychiatry residency course in neuroscience, University of Pennsylvania, Perelman School of Medicine, Philadelphia, PA.

Oathes, D.J. (2018, July). Invited lecture. *Causal neuroscience with interleaved TMS/fMRI*. Given as part of the Interdisciplinary Mind Brain /mindCORE summer fellow lecture series, School of Arts and Sciences, University of Pennsylvania, Philadelphia, PA.

Oathes, D.J. (April, 2018). Invited poster. *Engagement and modulation of subgenual cingulate and amygdala via non-invasive TMS as evidenced by interleaved TMS/fMRI*. Given at the Annual NIH/NSF/DARPA/IARPA/FDA BRAIN Initiative Investigators Meeting, Rockville, MD.

Oathes, D.J. Rosenberg, B., Scully, M., Cavdaroglu, S., Drysdale, A.T., Grosenick, L., Downar, J., Dunlop, K., Mansouri, F., Meng, Y., Fetcho, R.N., Zebley, B., Schatzberg, A.F., Sudheimer, K., Keller, J., Mayberg, H.S., Gunning, F.M., Alexopoulos, G.S., Fox, M.D., Pascual-Leone, A., Voss, H.U., Casey, B.J., Dubin, M.J., Glover, G., Etkin, A., Sheline, Y., Liston, C. (October, 2017). Invited talk. *Matching patient subtypes to neural circuits for novel brain stimulation treatments in affective disorders*. Given at the European Conference on Brain Stimulation in Psychiatry (ECBSP), Munich, Germany.

- Oathes, D.J.** (October, 2017). Invited talk, Division of Neurotherapeutics lecture series. *Noninvasive brain stimulation with neuroimaging to define novel pathways and treatments in neuropsychiatry*. Given at Massachusetts General Hospital and Harvard Medical School Department of Psychiatry, Boston, MA.
- Oathes, D.J.** (October, 2017). Invited talk, Experimental Therapeutics and Pathophysiology Branch - NIMH/NIH. *Neurocircuit probe and modulation using interleaved TMS/fMRI and in-scanner theta-burst repetitive TMS*. Given at the National Institute of Mental Health, Bethesda, MD.
- Oathes, D.J.** (November, 2017). Invited talk, Neuroscience Faculty Meeting. *Probing and modulating neural circuits to define causal brain networks and brain-behavior relationships*. Given at the University of Pennsylvania, Philadelphia, PA.
- Oathes, D.J.** (August, 2017). Invited talk, Center for the Treatment and Study of Anxiety. (Director: Edna Foa, PhD). *Neural pathways and novel brain based interventions for PTSD*. Given at the University of Pennsylvania Perelman School of Medicine, Philadelphia, PA.
- Oathes, D.J.** (July, 2017). Invited talk, Cohen Military Family Clinic. *Making neuroscience useful for PTSD and Depression*. Given at the University of Pennsylvania Perelman School of Medicine, Philadelphia, PA.
- Oathes, D.J.** (June, 2017). Invited talk, Philadelphia VA Mental Illness Research Education and Clinical Center Fellowship Program. *Succeeding in mental health research careers*. Given at the Corporal Michael J. Crescenz VA Medical Center, Philadelphia, PA.
- Oathes, D.J.** (March, 2017). Invited talk, Clinical Neurosciences Training Program (for students). *Tools to define novel circuit pathways for treating neuropsychiatric disorders*. Given at the University of Pennsylvania Perelman School of Medicine, Philadelphia, PA.
- Oathes, D.J.** (October, 2016). Invited talk, Psychiatry Grand Rounds. *Targeting and modulating neural circuitry relevant to affective disorders*. Given at the Medical University of South Carolina, Charleston, SC.
- Oathes, D.J.** (October, 2016). Invited talk, Psychiatry Research Day. *Towards individualized TMS therapy*. Given at the University of Pennsylvania School of Medicine, Philadelphia, PA.
- Oathes, D.J.**, Goodkind, M.S., Fonzo, G.A., Etkin, A. (April, 2016). *Human pathway to amygdala inhibition and disruption in PTSD*. Poster given at the annual meeting of the Anxiety and Depression Association of America, Philadelphia, PA.
- Oathes, D.J.** (February, 2016). Invited talk. *Using TMS and fMRI to Probe Neural Circuits and Promote Novel Neurotherapeutics*. Given at the Maryland Neuroimaging Center, University of Maryland, College Park, MD.
- Oathes, D.J.** (January, 2016). Invited talk. *Brain Circuitry Probes and Neuromodulation for Addiction*. Given at the Center for Interdisciplinary Research on Nicotine Addiction, University of Pennsylvania Perelman School of Medicine, Department of Psychiatry.

Fonzo, G.A., Goodkind, M.S., **Oathes, D.J.**, Zaiko, Y.V., Harvey, M., Peng, K.P., Weiss, M.E., Etkin, A. (December, 2015) *Neural mechanisms of psychotherapy for PTSD: Emotional reactivity and regulation*. Poster presented at the annual meeting of the American College for Neuropsychopharmacology, Hollywood, FL.

Oathes, D.J. (November, 2015). Invited talk. *Defining Brain Circuit Communication Pathways with Interleaved TMS/fMRI*. Given at the Laboratory for Cognition and Neural Stimulation, University of Pennsylvania Perelman School of Medicine, Department of Neurology.

Oathes, D.J. (2015, April). Invited lecture. *Cognitive neuroscience and clinical applications of transcranial magnetic brain stimulation*. “The Science of Decision Making” course, Worldview Stanford (worldview.stanford.edu).

Oathes, D.J., & Etkin, A. (2015, May). *Concurrent TMS/fMRI defined causal amygdala control and abnormalities in PTSD*. Poster presented at the annual meeting of the Society of Biological Psychiatry, Toronto, Canada.

Oathes, D.J. (2015, February). Invited talk. *Probing fear memory circuitry with concurrent TMS-fMRI*. Given at the Stanford Memory, Attention, and Decision Group monthly speaker Series, Stanford, CA.

Oathes, D.J., & Etkin, A. (2014, December). *Brain stimulation induced connectivity between amygdala and ventral cingulate in humans*. Poster presented at the annual meeting of the American College of Neuropsychopharmacology, Phoenix, AZ.

Oathes, D.J., Schatzberg, A.F., & Etkin, A. (2013, December). *Categories and dimensions of anxiety and depression in the resting fMRI signal*. Poster presented at the annual meeting of the American College of Neuropsychopharmacology, Hollywood, FL.

Oathes, D.J., Patenaude, B., Greicius, M.D., Schatzberg, A.F., & Etkin, A. (2013, May). *Intrinsic activation and functional connectivity findings across affective disorders*. Oral session given at the annual meeting of the Society for Biological Psychiatry, San Francisco, CA.

Oathes, D.J. (2011, May). Invited talk. *Are anxiety and depression the same? It depends on the measure*. Given at the VA National Fellows Teleconference for Mental Illness Research, Education, and Clinical Centers, Palo Alto, CA.

Oathes, D.J., Siegle, G.J., Ray, W.J., Lambert, J., Schatzberg, A.F., Nitschke, J.B., & Etkin, A. (2011, March). *Behavioral and physiological discrimination of generalized anxiety disorder from major depressive disorder*. In D. Mennin & G. Hajcak (Chairs), D. Pine (Discussant), Are GAD and MDD distinct? Utilizing laboratory methodologies to address diagnostic convergence and divergence. Symposium presented at the annual meeting of the Anxiety Disorders Association of America, New Orleans, LA.

Oathes, D.J. (2011, March). Invited talk. *From behavior to neurobiology: Advantages of multimodal assessment in differentiating GAD from MDD*. Given at the Pennsylvania State University Department of Psychology, University Park, PA.

- Oathes, D.J.**, Siegle, G.J., Ray, W.J., Bruce, J.M., & Nitschke, J.B. (2010, November). *Psychophysiological evidence that worry is a symptom of general avoidance tendencies in chronic worriers and in generalized anxiety disorder*. In S. Llera & M.G. Newman (Chairs), Scientific exploration of emotional functioning in generalized anxiety disorder: Emphasis on the nature and pathogenic mechanisms. Symposium presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, San Francisco, CA.
- Oathes, D.J.** & Etkin, A. (2010, October). Invited talk. *Neuroimaging of emotion circuitry in PTSD and novel opportunities for circuit-level interventions*. Given at the San Francisco VA Medical Center, VISN 21 Mental Illness Research, Education, and Clinical Center (MIRECC) Advisory Meeting.
- Nitschke, J.B., Tromp, D.P.M., **Oathes, D.J.**, McFarlin, D.R., & Sarinopoulos, I. (2010, March). *The neuroanatomy of anticipatory and regulatory dysfunction in GAD*. In K. Beesdo-Baum & S. Schoenfeld (Chairs), Improving understanding of generalized anxiety disorder: What can we learn from epidemiological, experimental and clinical studies? Symposium presented at the annual meeting of the Anxiety Disorders Association of America, Baltimore, MD.
- Nitschke, J.B., **Oathes, D.J.**, Hilt, L.M., Tromp, D.P.M., McFarlin, D.M., & Sarinopoulos, I. (2009, November). *Neural mechanisms of anticipatory processing in GAD*. In J. Mohlman (Chair), Universal processes in GAD: A lifespan neurobiological perspective. Symposium given at the annual meeting of the Association for Behavioral and Cognitive Therapies, New York, NY.
- Hilt, L.M., **Oathes, D.J.**, Green, D., Kral, T.R.A., Ferrell, R.E., Hariri, A.R., & Nitschke, J.B. (2009, November). *Short allele of the serotonin transporter gene associated with anticipatory anxiety in the amygdala*. Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, New York, NY.
- Oathes, D.J.**, McFarlin, D.R., Kral, T.R.A., & Nitschke, J.B. (2009, October). *Anxiety, anticipation, and conditions of uncertainty: Evidence from fMRI in Generalized Anxiety Disorder*. Poster presented at the annual meeting of the Society for Neuroscience, Chicago, IL.
- Nitschke, J.B., Tromp, D.P.M., **Oathes, D.J.**, McFarlin, D.R., Kral, T.R.A., Lee J., & Alexander, A.L. (2009, December). *Decreased structural connectivity between frontal and limbic areas in generalized anxiety disorder*. Poster session presented at the annual meeting of the American College of Neuropsychopharmacology, Hollywood, FL.
- Oathes, D.J.** McFarlin, D.R., Jenson, M.J., Kral, T.R.A., & Nitschke, J.B. (2009, June) *Correlations between amygdala activity during the anticipation of aversion and trait worry symptoms in generalized anxiety disorder*. Poster presented at the annual meeting of the Organization for Human Brain Mapping, San Francisco, CA.
- Oathes, D.J.** (2009, May). Invited talk. *Neurobiological and Behavioral Evidence for Vigilance and Avoidance in Anxiety*. Given at the Wisconsin Psychiatric Institute and Clinics, Clinical Science seminar, Department of Psychiatry, University of Wisconsin-Madison.

- Oathes, D.J.**, Sarinopoulos, I., Lor, M., Kalin, N.H., & Nitschke, J.B. (2009, April). *Normalization of amygdala function in generalized anxiety disorder patients following treatment with venlafaxine*. Poster presented at the annual Wisconsin Symposium on Emotion, Madison, WI.
- Oathes, D.J.**, McFarlin, D.R., Kral, T.R.A., Jenson, M.J., Sarinopoulos, I., & Nitschke, J.B. (2009, March). *The aftermath of affective stimuli: Evidence from fMRI recorded insula and amygdala activity in generalized anxiety disorder*. Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
- Oathes, D.J.**, McFarlin, D.R., Jenson, M.J., Kral, T.R.A., Staples, A.M., Nitschke, J.B. (2008, November). *Neural dynamics of anticipation and response to emotional pictures in generalized anxiety disorder*. Talk given at the annual meeting of the Society for Neuroscience, Washington, D.C.
- Oathes, D.J.** (2008, October). *Psychophysiological evidence for vigilance and avoidance in worry and generalized anxiety disorder*. In B.H. Friedman (Chair), *The psychophysiology of anxiety and worry: A symposium in honor of the contributions of Thomas D. Borkovec*. Symposium given at the annual meeting of the Society for Psychophysiological Research, Austin, TX.
- Oathes, D.J.**, Lee, J.E., Kral, T.R.A., Alexander, A.L., Nitschke, J.B. (2008, September). *Diffusion tensor imaging and chronic worry symptoms in generalized anxiety disorder*. Poster presented at the annual meeting of the Society for Research in Psychopathology, Pittsburgh, PA.
- Oathes, D.J.**, Sarinopoulos, I., Lor, M., Kalin, N.H., & Nitschke, J.B. (2007, October). *Normalization of amygdala function in generalized anxiety disorder patients following treatment with venlafaxine*. Poster presented at the annual meeting of the Society for Research in Psychopathology, Iowa City, IA.
- Oathes, D.J.** & Siegle, G.J. (2006, October). *Temporal dynamics and negatively valenced stimulus subtypes in emotional processing by anxious worriers*. Poster presented at the annual meeting of the Society for Neuroscience, Atlanta, GA.
- Oathes, D.J.** & Bruce, J.M. (2006, April). *Worry and motor activation induced by transcranial magnetic stimulation*. Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
- Oathes, D.J.** (2006, March). Invited talk. *Emotion and psychophysiology in the study of worry*. Presented at the Department of Human Sciences, University of Osnabrück, Germany.
- Oathes, D.J.** (2006, March). Invited workshop. *Heart rate variability analysis for the study of emotional reactivity*. Presented at the Department of Human Sciences, University of Osnabrück, Germany.
- Oathes, D.J.** & Ray, W.J. (2003, October). *Depressed mood, index finger force and motor*

cortex stimulation: A Transcranial Magnetic Stimulation (TMS) study. Poster presented at the annual meeting of the Society for Psychophysiological Research, Chicago, IL.*

Yamasaki, A.S., **Oathes, D.J.**, & Ray, W.J. (November, 2002). *Is there a failure to process general emotionality, regardless of valence in generalized anxiety disorder?* Symposium presented at the Association for Advancement of Behavior Therapy Annual Convention, Reno, Nevada.

Yamasaki, A.S., **Oathes, D.J.**, Ray, W.J., Borkovec, T.D., & Newman, M.G. (2002, September). *Generalized anxiety disorder and parasympathetic activity: The effects of worry and cognitive-behavioral therapy.* Poster presented at Society for Research in Psychopathology, San Francisco, CA.

Oathes, D., Yamasaki, A., Borkovec, T. & Ray, W.J. (2001, November). *EEG measures in generalized anxiety disorder before and after psychotherapy.* Poster presented at the annual meeting of the Society for Research in Psychopathology. Madison, Wisconsin.

Yamasaki, A., **Oathes, D.**, Ray, W.J. & Borkovec, T.D. (2001). *Vagal tone in generalized anxiety disorder before and after psychotherapy.* Poster presented at the annual meeting of the Society for Psychophysiological Research. Montreal, Quebec.

Trainees

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| Justin Reber, PhD Postdoc Penn | 2021- |
| Romain Duprat, PhD Postdoc Penn | 2017- |
| Gianna Perez, Penn Neuroscience PhD student (Oathes primary) | 2020- |
| Valerie Sydnor, Penn Neuroscience PhD student (Satterthwaite primary) | 2019- |
| Nicholas Balderston, PhD, Penn Assistant Professor CNDS (K23 co-mentor) | 2019- |
| Kenji Kobayashi, PhD Postdoc Penn (shared with Kable) | 2019- |
| Jared Zimmerman, Penn Neuroscience PhD student | 2016-2018 |
| and dissertation thesis committee chair | 2019- |
| Andrew Murphy, Penn MD-PhD student (Neuroscience; Bassett Primary) | 2018- |
| Kristin Brethel-Haurwitz, PhD Postdoc Penn (shared with Kable) | 2016-2021 |
| Jennifer Goldschmied, PhD Instructor Penn (shared K23 fellow) | 2017- |
| Mengqun (Monica) Lyu, post-baccalaureate research coordinator | 2019-2021 |
| Varuna Jasodanand, post-baccalaureate intern (Penn Institute for Translational Medicine and Therapeutics, Clinical and Translational Research Award) | 2019-2020 |
| Christina Dicindio, Penn undergraduate (Interdisciplinary Mind Brain Summer Fellows Program) | 2019 |
| Golkoo Hosseini, MD TMS clinician Penn (now Penn Psychiatry resident) | 2016-2018 |
| Ortal Nakash, Penn undergraduate (Interdisciplinary Mind Brain Summer Fellows Program) | 2018 |
| Jeni Stiso, Penn Neuroscience PhD student (Qualifying Exam Committee) | 2018 |
| Gavriella Shandler, Oberlin College undergraduate summer research assistant | 2018 |
| Nicole Fridling, Penn undergraduate (Biological Basis of Behavior) | 2018 |
| Seda Cavdaroglu, PhD Postdoc Penn (shared with Sheline) | 2016-2017 |
| Nicholas Cullen, Penn Engineering graduate student (shared with Sheline) | 2016-2017 |

Media Coverage

<https://www.pennmedicine.org/news/news-releases/2019/april/penn-led-study-finds-childhood-trauma-has-effect-brain-connectivity-in-patients-with-depression-2>

<https://www.bbrfoundation.org/content/brain-signature-predicts-who-benefits-exposure-therapy>

<https://neurosciencenews.com/childhood-trauma-depression-11042/>

<http://www.philly.com/philly/health/in-despair-from-major-depression-i-turned-to-a-last-resort-magnets-20180307.html>

<https://www.nimh.nih.gov/news/science-news/2017/imaging-pinpoints-brain-circuits-changed-by-ptsd-therapy.shtml>

<https://medicalxpress.com/news/2017-07-imaging-reveals-ptsd-patients-psychotherapy.html>

<https://www.scientificamerican.com/article/brain-imaging-identifies-different-types-of-depression/>

<https://www.onemindinstitute.org/news/dr-conor-liston-neurobiologically-distinguishing-depression-subtypes>

<http://med.stanford.edu/news/all-news/2015/02/different-mental-disorders-cause-same-brain-matter-loss.html>

<http://www.sciencedaily.com/releases/2015/02/150204125808.htm>

http://www.biospace.com/news_story.aspx?StoryID=363571

<http://www.news.wisc.edu/21010>