

Curriculum Vitae

Date Prepared: March 29, 2021
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Place of Birth: Norwalk, CT

Education:

2004-2008	B.A.	Psychology/Neuroscience	Wake Forest University
2009-2014	Ph.D.	Neurobiology (John H. Gilmore, MD)	University of North Carolina – Chapel Hill

Postdoctoral Training:

2014-2016	Stuart T. Hauser Clinical Research Training Program in Biological and Social Psychiatry Postdoctoral Research Fellow	Neuroimaging/Neurobiology (Marek Kubicki, MD/PhD)	Harvard Medical School
07/2016	Fellowship	Medical Imaging and Machine Learning Summer School	Favignana, Sicily (Selected as one of 100 attendees)

Faculty Academic Appointments:

2016-2019	Instructor	Psychiatry	Harvard Medical School
2016-2018	Visiting Lecturer	Psychology	Wellesley College
2019-	Assistant Professor	Psychiatry	Harvard Medical School

Appointments at Hospitals/Affiliated Institutions:

2014 -	Research Fellow	Psychiatry	Brigham and Women's Hospital
2015 -	Assistant in Research	Psychiatry	Massachusetts General Hospital

Committee Service

National and International

2020-2022	Program Committee (member)	Schizophrenia International Research Society, Florence,
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Italy

Professional Societies

2017 -	Schizophrenia International Research Society	Full Member
2017-2019	Society for the Teaching of Psychology	Professional Affiliate
2018-2019	American Psychological Association	Member

Grant Review Activities

2020	ZRG1 BDCN-C (02) M Special Emphasis Panel	<i>Ad hoc</i> Grant Reviewer
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Editorial Activities

Ad hoc Reviewer

Schizophrenia Research
Brain Imaging and Behavior
Journal of Neuropsychology
IEEE Transactions in Medical Imaging
BMC Psychiatry
Frontiers in Psychiatry
Schizophrenia Bulletin
Psychological Medicine
Biological Psychiatry
Translational Psychiatry
Neuroimage: Clinical
Personality Neuroscience
Cancer Medicine
Psychiatry Research: Neuroimaging
Neuroimage
Scientific Reports
npj Schizophrenia
Journal of the American Academy of Child and Adolescent Psychiatry
Psychiatry Research
Molecular Psychiatry

Other Editorial Roles

2020-	Frontiers in Neuroscience – Brain Imaging Methods	Review Editor
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Honors and Prizes:

2009	Director's Award	UNC Biological and Biomedical Sciences Program	Given to a promising incoming student entering the Biological and Biomedical Sciences Program at UNC
2009 – 2010	Doctoral Merit Assistantship	UNC Graduate School	Merit Assistantships support talented incoming master's and doctoral students from across all departments of the UNC Graduate School
2010 – 2011	NIH T32 Training Grant	UNC Neurobiology Curriculum	One of three graduate students within the entire UNC Neurobiology curriculum selected to be funded by an NIH Training Grant
2012	Student Travel Award for MICCAI 2012	UNC Neurobiology Curriculum	
2015	Myself Award Nomination	Harvard Medical School	Selected as one of best abstract submissions for all the Departments of Psychiatry at HMS
2016	Livingston Fellowship Award	Harvard Medical School	A highly competitive 1-year fellowship that provides support to two young investigators selected from all psychiatric research programs at HMS
2017	WFSBP Young Investigator Award	13 th World Congress of Biological Psychiatry	An educational grant for young investigators (under 40 years of age) to attend the WFSBP biennial congress.
2017	Young Investigator Best Poster Award	13 th World Congress of Biological Psychiatry	
2017	American College of Neuropsychopharmacology (ACNP) Travel Award	American College of Neuropsychopharmacology Education and Training Committee	A highly competitive travel grant to attend the annual ACNP meeting in December 2017
2019	NARSAD Young Investigator Award	Brain and Behavior Research Foundation	Highly competitive 2-year grant for early career scientists

Report of Funded and Unfunded Projects

Past Funding

2016 - 2019 *Imaging White Matter Maturation and Genetic High Risk for Schizophrenia*
NIMH/NICHHD 1 R03 MH110745-01
Principal Investigator (\$100,000)
This application aims to understand the neurodevelopmental timeline of structural aberrations in white matter tracts that may be related to specific neurocognitive deficits in individuals at genetic high risk for schizophrenia.

Current Funding

2018 - 2023 *Neuroimaging of the Biological Correlates of Early Psychosis: A MR-PET Study*
NIMH 1 K01 MH115247-01A1
Principal Investigator (\$700,000)
The central goal of this application is to utilize a comprehensive data collection paradigm to 1) understand the biological nature and trajectory of the acute brain response in early psychosis by investigating its connection to Type 5 metabotropic glutamate receptors (mGluR5) and 2) investigate the hypothesis that these are markers of cerebral immune activation which are linked to resiliency in early psychosis.

2020 - 2022 *Multimodal Imaging of Glutamate in Bipolar Disorder: A Joint GluCEST/MR-PET Study*
Brain and Behavior Research Foundation: 2019 NARSAD Young Investigator Award
Principal Investigator (\$69,917)
This proposal will be the first study to utilize both the GluCEST and [F18]-FPEB MR-PET *in vivo* imaging methods in patients with BD. The combination of these two cutting edge methods is a highly innovative and novel approach which will provide foundational evidence that will assist in the future development of more effective therapeutic interventions that target glutamate and metabotropic glutamate receptors.

Report of Local Teaching and Training

Teaching of Students in Courses

2016-2017	PSYC 219 – Biological Psychology <i>Wellesley Undergraduate Students</i>	Wellesley College <i>4-hrs a week per semester</i>
2017-2018	PSYC 217 – Cognition <i>Wellesley Undergraduate Students</i>	Wellesley College <i>4-hrs a week per semester</i>
2016 -	Mentor in the Harvard Graduate Women in Science and Engineering (HGWISE) Program <i>HMS Graduate Students (~2 students per year)</i>	Harvard University <i>12 – 15 hours a year</i>
2020	Massachusetts General Hospital Summer Jobs Program <i>Boston-area high school students</i>	Massachusetts General Hospital <i>1 hour a week for 4 weeks</i>

(WSMRF) in January 2017, where he was awarded the “Subspecialty Award”.

- 2016 - 2017 **Milena Quinci – Research Assistant at Brigham and Women’s Hospital in Boston, MA**
Worked under my direct supervision at the Psychiatry Neuroimaging Laboratory for one year for a research requirement.
- 2017 **James Robertson, MA – Biostatistician at North Carolina State University - Veterinary Medicine in Raleigh, NC**
Acquired a scholarship from NC State to work under my direct supervision for three months at the PNL.
- 2017 **Dana Fein-Schaffer, BS – Research Assistant at the National Center for Post-Traumatic Stress Disorder**
Psychology/Computer Science double major who volunteered under co-supervision of myself and a postdoctoral research fellow in the laboratory (Dr. Cetin-Karayumak) at the PNL for Fall 2017 semester.
- 2017-2018 **Felix Nägele – Medical Student from University Medical Center Hamburg-Eppendorg, Hamburg Germany**
Conducted work toward completion of his medical thesis. Has draft a first-author publication on his research as well as two shared co-first-authorship paper (one with myself and one with Dr. Seitz).
- 2017-2018 **Natalia Chunga-Iturry, MD – Neurology Resident at University of Rochester School of Medicine, Rochester, NY**
Dr. Chunga-Iturry worked under the joint supervision of myself and Dr. Kubicki during her 6-month postdoctoral fellowship before entering a neurology residency at the University of Rochester.
- 2017-2018 **Yurim Linette Kwon – Senior at Wellesley College, Wellesley, MA**
Psychology major who volunteering under my direct supervision at the PNL for Fall 2017. She decided to continue her tenure at the lab to conduct research with me as part of an independent study credit for the Spring and Fall 2018 semesters.
- 2018- **Mina Eghbalian - Medical Student from University Medical Center Hamburg-Eppendorg, Hamburg Germany**
Will publish at least one first-author publication and complete her medical thesis under my supervision.
- 2018-2019 **Alexandra Stanford – Senior at Wellesley College, Wellesley, MA**
Neuroscience major volunteering in the PNL under my direct supervision. She conducted research with me as part of an independent study credits for her Neuroscience Major at Wellesley College for the Spring 2018, Spring 2019, and Fall 2019 semesters. Recently, she was awarded the Eating Disorders Clinical and Research Program Summer Research Fellowship to continue her work.
- Present*
2015 - **Madhura Baxi, MA – PhD Candidate in the Boston University Computational Neuroscience Program**
Electrical engineering Master of Science student currently working in the Psychiatry Neuroimaging Laboratory as part of her doctoral work. I provide scientific and professional guidance on a daily basis as it pertains to her dissertation work. She has published two first-author manuscripts on her dissertation work.

- 2019- **Johanna Seitz, MD – Postdoctoral Research Fellow at the Psychiatry Neuroimaging Laboratory**
 Dr. Seitz returned to the PNL after she completed her medical degree. She has been working as a postdoctoral fellow under the supervision of myself and Dr. Kubicki for 18 months. She has published three first author publications during her fellowship thus far.
- 2019- **Kirolos Boulos, BS – Doctoral Student in Clinical Psychology from William James College**
 Will conduct research and complete his dissertation investigating neuropsychological correlates of Chronic Traumatic Encephalopathy with me at the Psychiatry Neuroimaging Laboratory; awarded Outstanding Professional Development Portfolio by William James College (2020) for his research within the lab
- 2020- **Emily Johns – Senior at Harvard University, Cambridge, MA**
 Neuroscience and Classics major conducting her senior thesis project under the supervision of myself and Dr. Martha Shenton. Was awarded the Harvard College Research Program award to fund her thesis work

Local Invited Presentations

No presentations below were sponsored by outside entities

- 2014 “Trajectories of Early Cortical Development in Healthy and At-Risk Children”
 Invited Speaker
 Psychiatry Neuroimaging Lab, Boston, MA
- 2014 T32 Clinical Research Training Program Fellow Presentation
 Judge Baker Children’s Center, Harvard Medical School, Boston, MA
- 2015 “Gray Matter Pathology in Schizophrenia”
 Psychiatry Neuroimaging Laboratory
 Brigham and Women’s Hospital, Department of Psychiatry, Boston, MA
- 2015 T32 Clinical Research Training Program End-of-Year Fellow Presentation
 Judge Baker Children’s Center, Harvard Medical School, Boston, MA
- 2015 T32 Clinical Research Training Program Fellow Presentation
 Judge Baker Children’s Center, Harvard Medical School, Boston, MA
- 2016 Journal Club
 Psychiatry Neuroimaging Laboratory
 Brigham and Women’s Hospital, Department of Psychiatry, Boston, MA
- 2016 T32 Clinical Research Training Program End-of-Year Fellow Presentation
 Judge Baker Children’s Center, Harvard Medical School, Boston, MA
- 2017 “Insights into Psychotic Disorders with *In Vivo* Neuroimaging: A Summary of Projects at the PNL”
 Laboratory of Mathematics in Imaging
 Brigham and Women’s Hospital, Harvard Medical School, Boston, MA
- 2018 “Neuroscience Primer for Biomedical Imaging: Part 1”
 MGH/HST Martinos Center for Biomedical Imaging: Positron Emission Tomography Modeling Meeting

- Massachusetts General Hospital, Harvard Medical School, Charlestown, MA
- 2018 “Neuroscience Primer for Biomedical Imaging: Part 2”
MGH/HST Martinos Center for Biomedical Imaging: Positron Emission Tomography Modeling Meeting
Massachusetts General Hospital, Harvard Medical School, Charlestown, MA
- 2018 “Understanding the Biological Bases of the Acute Brain Response in Early Psychosis”
Brigham and Women’s Hospital Research Initiatives Meeting
Brigham and Women’s Hospital, Harvard Medical School, Boston, MA
- 2018 “Positron Emission Tomography Primer”
Psychiatry Neuroimaging Laboratory
Brigham and Women’s Hospital, Department of Psychiatry, Boston, MA
- 2019 “Multimodal Imaging of Glutamate in Bipolar Disorder: A Joint GluCEST/MR-PET Study”
Dauten Family Center for Bipolar Treatment Innovation Science Talk
Massachusetts General Hospital, Department of Psychiatry, Boston, MA
- 2020 Career Presentation - T32 Clinical Research Training Program
Judge Baker Children’s Center, Harvard Medical School, Boston, MA
- 2020 PNL Training Presentation – Study Design and Measurement Basics
Psychiatry Neuroimaging Laboratory
Brigham and Women’s Hospital, Department of Psychiatry, Boston, MA
- 2020 “Understanding the Biological Bases of the Acute Brain Response in Early Psychosis”
Schizophrenia Clinical and Research Program Seminar Series
Massachusetts General Hospital, Department of Psychiatry, Boston, MA
- 2021 “7T CEST Imaging Update”
Brigham and Women’s Hospital 7T Users Group Quarterly Meeting
Brigham and Women’s Hospital, Department of Radiology, Boston, MA

Report of Regional, National and International Invited Teaching and Presentations

No presentations below were sponsored by outside entities

Invited Presentations and Courses:

Regional

- 2015 “Utilizing Diffusion Tensor Imaging to Understand the Relationship Between White Matter Maturation and Cognitive Deficits in Schizophrenia Risk”
Invited Speaker
NeuroCognition Lab, Tufts University, Medford, MA
- 2021 “Diffusion Imaging in Schizophrenia Biomarker Development”
Invited Speaker
Massachusetts Consortium on Psychosis and Early Intervention

National

- 2012 “Regional Development of Cortical Thickness and Surface Area from Birth to 2 Years of Age”
Selected Oral Abstract - MR Imaging Techniques Nanosymposium
Society for Neuroscience Annual Meeting, New Orleans, LA

- 2016 “Imaging White Matter Maturation and Genetic High Risk for Schizophrenia”
Invited Speaker
Early Brain Development Study/Neuroimage Analysis Research Laboratory
University of North Carolina-Chapel Hill, Chapel Hill, NC
- 2019 “Effects of Adjuvant Omega-3 Polyunsaturated Fatty Acids on White Matter in Individuals with Recent-Onset Psychosis Treated Concurrently with Risperidone”
Selected Oral Abstract
Schizophrenia International Research Society. Orlando, Florida.

International

- 2012 “Longitudinal Lateral Ventricle Morphometry Related to Prenatal Measures as a Biomarker of Normal Development”
Selected Oral Abstract - Pediatric and Perinatal Imaging Workshop
Medical Image Computing and Computer Assisted Interventions, Nice, France
- 2016 “Increase in Extracellular Free Water in First-Episode Schizophrenia Patients Is Related to Improved Cognitive Outcomes”
Selected Oral Abstract
Schizophrenia International Research Society. Florence, Italy
- 2019 “Understanding the Biological Bases of the Acute Brain Response in Early Psychosis”
Invited Symposium Speaker - Compensatory Brain Responses in the Emergence and Development of Psychosis
World Federations of the Societies of Biological Psychiatry. Vancouver, Canada.
- 2020 “Applications of Free Water Imaging Across the Psychosis Spectrum”
Invited Symposium Speaker – Novel Immune Biomarkers in Psychiatric Disorders
15th Annual Psychoimmunology Experts Meeting. Gunzberg, Germany. (postponed to April 2021 due to COVID-19)

Report of Scholarship

Peer reviewed publications in print or other media:

Research investigations

(*Indicates Past or Current Trainee; †Authors contributed equally)

1. **Lyall AE**, Swanson J, Liu C, Blumenthal T, Turner CP. Neonatal exposure to MK801 promotes prepulse-induced delay in startle response time in adult rats. *Experimental Brain Research*. (2009) Aug;197(3):215-22. PMID: [19565228](#). PMCID: [PMC2752751](#)
2. **Lyall AE**, Woolson S, Wolfe HM, Goldman BD, Reznick JS, Hamer RM, Lin W, Styner M, Gerig G and Gilmore JH. Prenatal Isolated Mild Ventriculomegaly is Associated with Persistent Ventricle Enlargement at Ages 1 and 2. *Early Human Development*. (2012) Aug;88(6):691-8. PMID: [22445211](#). PMCID: [PMC3386468](#)
3. Li G, Nie J, Wang L, Shi F, **Lyall AE**, Lin W, Gilmore JH, Shen D. Mapping Longitudinal Hemispheric Structural Asymmetries of the Human Cerebral Cortex from Birth to 2 Years of Age. *Cerebral Cortex* (2014) May;24(5):1289-300. PMID: [23307634](#). PMCID: [PMC4031675](#).
4. Paniagua B, **Lyall AE**, Berger JB, Vachet C, Hamer RM, Woolson S, Lin W, Gilmore JH, Styner M. Lateral

ventricle morphology analysis via mean latitude axis. *Proc Soc Photo Opt Instrum Eng.* (2013) Mar 29: 8672. PMID: [23606800](#). PMCID: [PMC3630372](#).

5. Li G, Wang L, Shi F, **Lyall AE**, Lin W, Gilmore JH, Shen D. Mapping Longitudinal Development of Cortical Local Gyri-fication from Birth to 2 Years of Age. *Journal of Neuroscience.* (2014) Mar; 34(12):4228-38. PMID: [24647943](#). PMCID: [PMC3960466](#)
6. **Lyall AE**, Shi F, Geng X, Woolson S, Li G, Wang L, Hamer RM, Shen D, Gilmore JH. Dynamic Development of Regional Cortical Thickness and Surface Area in Early Childhood. *Cerebral Cortex* (2015) Aug;25(8):2204-12. PMID: [24591525](#). PMCID: [PMC4506327](#)
7. Cherel M, Budin F, Prastawa M, Gerig G, Lee K, Buss C, **Lyall AE**, Consing KZ, Styner M. Automatic Tissue Segmentation of Neonate Brain MR Images with Subject-specific Atlases. *Proc SPIE Int Soc Opt Eng.* (2015) Feb 21; 9413. PMID: [26089584](#). PMCID: [PMC4469197](#)
8. Li G, Wang L, Shi F, Peng Z, Ahn M, **Lyall AE**, Zhu H, Lin W, Gilmore JH, Shen D. Cortical Thickness and Surface Area in Neonates at High Risk for Schizophrenia. *Brain Structure and Function.* (2016) Jan; 221(1):447-61. PMID: [25362539](#). PMCID: [PMC4452433](#).
9. Ohtani T, Bouix S, **Lyall AE**, Hosokawa T, Saito Y, Melonakos E, Westin C-F, Seidman LJ, Goldstein J, Meshulam-Gately R, Petryshen T, Wojcik J, Kubicki M. Abnormal White Matter Connections Between Medial Frontal Regions Predict Symptoms in Patients with First Episode Schizophrenia. *Cortex.* (2016) Oct; 71:264-76. PMID: [26277547](#). PMCID: [PMC4575843](#).
10. Seitz J*, Zuo JX, **Lyall AE**, Makris N, Kikinis Z, Bouix S, Pasternak O, Fredman E, Duskin J, Niznikiewicz M, Nestor P, Goldstein JM, Petryshen TL, Meshulam-Gately RI, Wojcik J, McCarley RW, Seidman LJ, Shenton ME, Koerte I, Kubicki M. Tractography analysis of five white matter bundles and their clinical and cognitive correlates in early course schizophrenia. *Schizophrenia Bulletin.* (2016) May;42(3):762-71. PMID: [27009248](#). PMCID: [PMC4838095](#).
11. Seitz J*, **Lyall AE**, Kanayama G, Makris N, Hudson JI, Kubicki M, Pope HG, Kaufman MJ. White Matter Abnormalities in long-term anabolic-androgenic steroid users. *Psychiatry Research: Neuroimaging.* (2017). Feb 28; 260:1-5. PMID: [27988413](#). PMCID: [PMC5272808](#)
12. Viher PV, Stegmayer K, Kubicki M, Karmacharya S, **Lyall AE**, Federspiel A, Vangelligen T, Bohlhalter S, Wiest R, Strik W, Walther S. The cortical signature of impaired gesturing: Findings from schizophrenia. *Neuroimage: Clinical.* (2017). Oct 18; 17:213-221. PMID: [29159038](#). PMCID: [PMC5683189](#)
13. Sollman N, Echlin PS, Schultz V, Viher PV, **Lyall AE**, Tripodis Y, Kaufmann D, Forwell LA, Johnson AM, Skopelja EN, MALS, Lepage C, Bouix S, Lin AP, Shenton ME, Koerte IK. Sex differences in repetitive subconcussive head impacts in collegiate ice hockey players. *Neuroimage: Clinical.* (2017). Nov 21; 17:642-649. PMID: [29204342](#) PMCID: [PMC5709295](#)
14. Oestreich LKL*, **Lyall AE**, Pasternak O, Kikinis Z, Newell DT, Savadjiev P, Bouix S, Shenton ME, Kubicki M, Australian Schizophrenia Research Bank, Whitford TJ, McCarthy-Jones S. Characterizing white matter changes in chronic schizophrenia: A free-water imaging multi-site study. *Schizophrenia Research* (2017). Nov;189:153-161. PMID: [28190639](#). PMCID: [PMC5552442](#)
15. Seitz J*, Yogesh R, **Lyall AE**, Pasternak O, del Re EC, Niznikiewicz M, Nestor P, Seidman LJ, Goldstein JM, Petryshen TL, Meshulam-Gately R, Wojcik J, McCarley RW, Shenton ME, Koerte I, Kubicki M. Alterations of Gray Matter Microstructure in Schizophrenia. *Brain Imaging and Behavior.* (2018). Feb; 12(1): 54-63. PMID: [28102528](#). PMCID: [PMC5517358](#)
16. **Lyall, AE**, Pasternak O, Newell D, Robinson DG, Gallego JA, Malhotra AK, Karlsgodt KH, Kubicki M[†], Szeszko PR[†]. Greater Extracellular Free Water in First-Episode Psychosis Predicts Better Neurocognitive

Functioning. *Molecular Psychiatry*. (2018). Mar; 23(3):701-707. PMID: [28348381](#). PMCID: [PMC5617750](#)

17. McCarthy-Jones, S, Oestreich LKL*, **Lyall AE**, Pasternak O, Kikinis Z, Newell DT, Savadjiev P, Bouix S, Shenton ME, Kubicki M, Australian Schizophrenia Research Bank, Whitford TJ. Childhood adversity is associated with decreased white matter integrity in the corpus callosum of psychiatrically healthy adults: a free-water DTI study. *Brain Imaging and Behavior*. (2018). Apr;12(2):449-458. PMID: [28341872](#). PMCID: [PMC6310006](#).
18. Kelly S, Jahanshad N, Zalesky A, Kochonov P, Hibar D, Chen J, Agartz I, Alloza C, Andreassen O, Arango C, Banaj N, Bouix S, Bousman C, Brouwer R, Bruggemann J, Bustillo J, Cahn W, Calhoun V, Cannon DM, Carr V, Catts S, Chen J, Chen X, Chiapponi C, Cho KIK, Ciullo V, Corvin A, Crespo-Facorro B, Croypley V, De Rossi P, Diaz-Caneja C, Dicki E, Doan NT, Fan F, Faskowitz J, Fatouros-Bergman H, Flyckt L, Ford J, Fouche J-P, Fukunaga M, Gill M, Glahn D, Gollub R, Gouzwaard E, Guo H, Gur R, Gur R, Hashimoto R, Hatton S, Henskens F, Hicki I, Hong LE, Horacek J, Howells F, Hulshoff Pol H, Hyde C, Isaev D, Whitford T, Jablensky A, Jansen P, Janssen J, Jonsson E, Kahn R, Kikinis Z, Kirra Liu, Klauser P, Knöchel C, Kubicki M, Kwon JS, Lagopoulos J, Langen C, Lawrie S, Lenroot R, Lim K, López-Jaramillo, **Lyall AE**, Magnotta V, Mandl R, Mathalon D, McCarley R, McCarthy-Jones S, McDonald C, McEwen S, McIntosh A, Melicher T, Mesholam-Gately R, Michie P, Mowry B, Mueller B, Newell D, O'Donnell P, Oertel V, Oestreich L, Paciga S, Pantelis C, Pasternak O, Pearlson G, Pereira A, Pineda J, Piras F, Piras F, Potkin S, Pred A, Passer P, Roalf D, Rois-Santiañez R, Pellicano GR, Roos A, Rotenberg D, Satterthwaite T, Savadjiev P, Schall U, Scott R, Seal M, Seidman LJ, Weicker C, Shenton ME, Spalletta G, Spaniel Filip, Sprooten E, Stäblien M, Stein D, Sundram S, Tan Y-L, Tan S, Tang S, Temmingh H, Tønnesen S, Tordesillas-Gutierrez, Vaidya J, van Haren N, Vargas C, Vecchio D, Velajoulis D, Voineskos A, Voyvodic J, Wang Z, Wang P, Wei D, Weickert T, Westlye LT, Whalley H, White T, Wojcik J, Xiang H, Xie Z, Yamamori H, Yang F-D, Yao N, Zhang G, Zhao J, van Erp T, Turner J, Ehrlich S, Jung L, Thompsons P, Donohue G. Widespread white matter microstructural differences in schizophrenia across 4,375 individuals: results from the ENIGMA Schizophrenia DTI Working Group. *Molecular Psychiatry*. (2018). May; 23(5):1261-1269. PMID: [29038599](#). PMCID: [PMC5984078](#).
19. Tuozzo C*, **Lyall AE**, Pasternak O, Leussis M, James A, Crow T, Kubicki M. Chronic Bipolar Disorder is Characterized by Significant Increases in Extracellular Free Water. *Bipolar Disorders*. (2018). Sep; 20(6):523-530. PMID: [29227016](#). PMCID: [PMC6420814](#).
20. Sydnor VJ, Rivas-Grajales AM, **Lyall AE**, Zhang F, Bouix S, Karmacharya S, Shenton ME, Westin C-F, Makris N, Wassermann D, O'Donnell LJ, Kubicki M. A Comparison of Three Fiber Tract Delineation Methods and their Impact on White Matter Analysis. *Neuroimage*. (2018). Sep; 178:318-331. PMID: [29787865](#). PMCID: [PMC6481642](#)
21. **Lyall AE**, Savadjiev P, del Re EC, Seitz J*, O'Donnell L, Seidman LJ, Goldstein J, Mesholam-Gately R, Petryshen T, Wojcik J, McCarley RW, Shenton ME, Kubicki M. Utilizing Mutual Information Analysis to Explore the Relationship Between Gray and White Matter Structural Pathologies in Schizophrenia. *Schizophrenia Bulletin*. (2019). Mar 7;45(2):386-395. PMID: [29618096](#) PMCID: [PMC6403063](#).
22. Kubicki M, Baxi M*, Pasternak O, Tang Y, Chunga N*, **Lyall AE**, Rathi Y, Eckbo R, Bouix S, Mortazavi F, Papadimitriou G, Shenton ME, Westin CF, Killiany R, Makris N, Rosene D. Lifespan trajectory of white matter changes in rhesus monkeys. *Cerebral Cortex* (2019). Apr 1; 29(4):1584-1593. PMID: [29701751](#). PMCID: [PMC6418383](#).
23. Gilbert T, Zurcher N, Catanese M, Tseng CJ, DiBiase MA, **Lyall AE**, Hightower B, Parmar A, Bhanot A, Wu C, Hibert M, Kim M, Mahmood U, Stuffelbeam S, Schroeder F, Wang C, Roffman J, Holt D, Greve D, Pasternak O, Kubicki M, Wey H, Hooker JM. Neuroepigenetic signatures of age and sex in the living human brain. *Nature Communications* (2019). July 3; 10(1):2945. PMID: [31270332](#). PMCID: [PMC6610136](#).

24. Di Biase MA, Zhang F, **Lyall AE**, Kubicki M, Mandl RCW, Sommer IE & Pasternak O. Neuroimaging auditory verbal hallucinations in schizophrenia patient and healthy populations. *Psychological Medicine*. (2020). Feb; 50(3):403-412. PMID: [30782233](#). PMCID: [PMC6702102](#).
25. Cetin-Karayumak S, Di Biase MA, Chunga-Iturry N, Reid B, Somes N, **Lyall AE**, Kelly S, Pasternak O, Vangel M, Pearlson G, Tamminga C, Sweeney J, Clementz B, Schretlen D, Viher PV, Stegmayer K, Walther S, Lee J, Crow T, James A, Voineskos A, Buchanan RW, Szeszko PR, Malholtra A, McCarley RW, Keshavan M, Shenton ME, Rathi Y, Kubicki M. Abnormal development, faulty maturation or accelerated aging? “White matter at the center stage of schizophrenia” revisited. *Molecular Psychiatry*. (2019). Sep 11 [Epub ahead of print]. PMID: [31511636](#). PMCID: [PMC7147982](#).
26. Levitt JJ, Nestor PG, Kubicki M, **Lyall AE**, Zhang F, Riklin-Raviv T, O’Donnell LJ, McCarley RW, Shenton ME, Rathi Y. Miswiring of Frontostriatal Projections in Schizophrenia. *Schizophrenia Bulletin*. (2020). Jul 8; 46(4):990-998. PMID: [31990358](#). PMCID: [PMC7342176](#).
27. Breithaupt L, Chunga-Iturry N*, **Lyall AE**, Cetin-Karayumak S, Becker KR, Thomas JJ, Slattery M, Makris N, Plessow F, Pasternak O, Holsen LM, Kubicki M, Misra M[†], Lawson EA[†], Eddy KT[†]. Developmental stage-dependent relationships between ghrelin levels and hippocampal white matter connections in low-weight anorexia nervosa and atypical anorexia nervosa. *Psychoneuroendocrinology* (2020). May 23;119:104722 [Epub ahead of print]. PMID: [32512249](#).
28. Nägele FL*, Pasternak O, Bitzan LV*, Mußmann M, Rauh J, Kubicki M, Leicht G, Shenton ME, **Lyall AE**[†], Mulert C[†]. Cellular and Extracellular White Matter Alterations Indicate Conversion to Psychosis among Individuals at Clinical High-Risk for Psychosis. *The World Journal of Biological Psychiatry* (2020). Jul 9; 1-14. [Epub ahead of print]. PMID: [32643526](#). PMCID: [PMC7798359](#).
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(*Indicates Past or Current Trainee; †Authors contributed equally)

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Narrative Report:

The primary focus of my research is to utilize advanced neuroimaging techniques to understand the structural connectivity of the human brain in healthy and clinical populations, with a specific focus on schizophrenia and schizophrenia risk. My background in neurobiology, and additional training in psychology/neuroscience, allows me to specialize in the biological interpretation of neuroimaging measures. My work leverages image analysis methodology and neurobiology, into an integrated training and research program that aims to gain a greater understanding of the biological factors and functional outcomes associated with psychosis onset.

I received my doctorate in Neurobiology from the University of North Carolina – Chapel Hill in May of 2014. My dissertation research focused on studying the developmental trajectories of cortical gray matter in early childhood in both typically developing and genetically at-risk for schizophrenia infants. My postdoctoral training started in 2014 when I was awarded a 2-year, highly competitive NIMH T32 fellowship within the Stuart T. Hauser Clinical Research Training Program in Biological and Social Psychiatry at Harvard Medical School, directed by Drs. Martha Shenton and Robert McCarley. My training, under the mentorship of Dr. Marek Kubicki in the Psychiatry Neuroimaging Laboratory (PNL), focused on utilizing advanced diffusion tensor imaging methodology to understand the role of white matter in schizophrenia and schizophrenia risk.

In August of 2016, I was awarded my first NIMH R03 grant application as a principal investigator after receiving a percentile score of 1% at first submission. The goal of this project was to analyze already collected data from three genetic high-risk cohorts that represent three key developmental stages of SZ risk: infancy, childhood, and early adulthood, with the aim to provide insight into both early and late neurodevelopmental changes associated with schizophrenia risk.

I was also awarded a K01 (funded started August 2018) entitled “Neuroimaging of the Biological Correlates of Early Psychosis: A MR-PET Study”. This study will be the first to employ the simultaneous collection of magnetic resonance imaging (MRI) and positron emission tomography (PET) imaging to investigate the role of metabotropic glutamate receptor type 5 (mGluR5) in early psychosis. The central scientific goal of my K01 is to utilize a comprehensive data collection paradigm to understand the biological nature and trajectory of a global increase in extracellular free water, a physiological pathology we described as an “acute brain response,” which takes place in early psychosis. We plan to investigate this response in connection with mGluR5 to explore the hypothesis that these markers of cerebral immune activation in early psychosis patients may be linked to resiliency. In January of 2020, I was awarded a NARSAD Young Investigator Award from the Brain and Behavior Research foundation to extend the work being conducted in my K01 to a population of patients with bipolar disorder. In this work, we also plan to include the acquisition of 7 Tesla MRI Glutamate Chemical Exchange Saturation Transfer (GluCEST) imaging with collaborators from the University of Pennsylvania (Dr. David Roalf).

During my time in the Department of Psychiatry at BWH, I have presented my work, or have been accepted to present my work, at 11 high profile scientific conferences: the American College of Neuropsychopharmacology (ACNP) (2015-2017); the World Federations of the Societies of Biological Psychology (WFSBP) (2015, 2017, 2019), the International Congress on Schizophrenia Research (2015, 2017), and the Schizophrenia International Research Society (SIRS) (2016, 2018, 2019). I also received a Young Investigator Travel Award to attend the 2017 WFSBP meeting, where I was awarded the Young Investigator Best Poster Award. I have also been awarded a prestigious ACNP Travel Award to attend the 2017 annual meeting to present preliminary results of my R03. In addition, I served as a Travel Award Mentor at the SIRS 2018 and 2019 meetings and was recently invited to be a member of the program committee for the SIRS 2022 meeting.

As an Assistant Professor in the Department of Psychiatry at BWH, I have several professional responsibilities. I estimate that 100% of my effort is dedicated to research. I serve various research-related roles as a member of the PNL (investigator, project manager, and mentor). I also spend considerable time mentoring and co-supervising trainees, research assistants and postdoctoral research fellows. Since 2016 I have also been a member of the Harvard Graduate Women in Science and Engineering mentoring program. Lastly, I am a member of a “Neuroinflammation Think Tank” hosted by the MGH Department of Psychiatry.

In summary, my expertise in neuroimaging, brain development, and schizophrenia have provided me with a strong foundation upon which to conduct innovative, focused, and interdisciplinary research at Harvard Medical School. Both my scientific contributions to investigation, and my educational activities within my laboratory setting, provide a strong base for my future career goal of being an independently funded investigator in a laboratory where I can train the next generation of scientists.

As an Assistant in Research at MGH, 100% of my time is dedicated to research. In this role, I work alongside our collaborators at the Martinos Center to foster collaborations with colleagues at MGH and associated Partners Healthcare Institutions.