

BIOGRAPHICAL SKETCH

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NAME: Williams, Zachary J.

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

POSITION TITLE: MD/PhD Candidate and Graduate Student Research Assistant; Medical Scientist Training Program, Vanderbilt Brain Institute, and Department of Hearing and Speech Sciences; Vanderbilt University

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

INSTITUTION AND LOCATION	DEGREE (if applicable)	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
Yale University, New Haven, CT	B.S.	08/2013	05/2017	Psychology
Vanderbilt University, Nashville, TN	M.D.	06/2017	Present	Medicine
Vanderbilt University, Nashville, TN	Ph.D.	06/2017	Present	Neuroscience

A. Personal Statement

Bridging the fields of psychology, psychiatry, and neuroscience, my primary research interest is to better understand the phenomenology, clinical features, and neurobiological correlates of autism spectrum disorder (hereafter “autism”) as it presents in adulthood. In my current graduate program at Vanderbilt University, I study the phenomena of aberrant sensory reactivity under the mentorship of Drs. Tiffany Woynaroski and Carissa Cascio. I have seven years of experience conducting clinical and translational human studies in autistic individuals, with my most recent work focusing on (a) validating and in some cases developing psychometric instruments for use as measures of clinically meaningful outcomes in autistic adults, (b) examining individual differences in risk factors for co-occurring psychopathology in autistic adults (particularly mood disorders), and (c) understanding the phenomenology of decreased sound tolerance (DST) in both autistic and non-autistic people across the lifespan. I currently have 17 publications in this area (14 as first or co-first author), along with four reference work entries for Springer’s *Encyclopedia of Autism Spectrum Disorders* and over 15 conference presentations. In addition, I have extensive training in quantitative methods such as latent variable modeling, and I am the lead data analyst on several major studies, including an R01-funded project examining the phenomenology and clinical correlates of repetitive thinking in autism and an integrative data analysis of sensory questionnaire data from ten different research groups. As I am on the autism spectrum myself (having been diagnosed with Asperger syndrome in 1999, at age four), I also serve as an autistic advocate within the research sphere, providing stakeholder perspectives to both academic and industry partners (including Roche, the Autism Speaks Autism Care Network, the Autism Intervention Research Network on Physical Health and the International Society for Autism Research [via the Autistic Researchers Committee]). Clinically, I am interested in the psychiatric care of autistic adults, an area of psychiatry with few evidence-based practices at present. Throughout my career, I aim to contribute clinical evidence to this subfield, validating evidence-based diagnostic algorithms and designing outcome measures for use in trials of behavioral and biomedical interventions in the autistic population.

- **Williams, Z. J.**, He, J. L., Cascio, C. J., & Woynaroski, T. (2021). A review of decreased sound tolerance in autism: Definitions, phenomenology, and potential mechanisms. *Neuroscience and Biobehavioral Reviews*, 121, 1-17. <https://doi.org/10.1016/j.neubiorev.2020.11.030>
- **Williams, Z. J.**, McKenney, E. E., & Gotham, K. O. (2021). Investigating the structure of trait rumination in autistic adults: A network analysis. *Autism*, 25(7), 2048-2063. <http://dx.doi.org/10.1177/13623613211012855>

- **Williams, Z. J.**, Everaert, J., & Gotham, K. O. (2021). Measuring depression in autistic adults: Psychometric validation of the Beck Depression Inventory–II. *Assessment*, 28(3), 858-876. <https://doi.org/10.1177/1073191120952889>
- **Williams, Z. J.** (2021). Commentary: The construct validity of ‘camouflaging’ in autism: Psychometric considerations and recommendations for future research – reflections on Lai et al. (2020). *Journal of Child Psychology and Psychiatry*, Advance online publication. <https://doi.org/10.1111/jcpp.13468>
- **Williams Z. J.**, & McPartland J. C. (2018). Balovaptan. In: Volkmar F. (eds) *Encyclopedia of Autism Spectrum Disorders*. Springer, New York, NY. http://dx.doi.org/10.1007/978-1-4614-6435-8_102135-2

B. Positions and Honors

Positions and Employment

- 2014 - 2017 Undergraduate Research Assistant, Yale Child Study Center
 2017 - Graduate Student Research Assistant, Vanderbilt University Medical Center

Other Experience and Professional Memberships

- 2014 - Student Member, International Society for Autism Research (INSAR)
 2016 - Member, Psi Chi
 2017 - Member, Phi Beta Kappa
 2019 - Family Partner, Autism Speaks Autism Care Network, Vanderbilt Site
 2019 - 2020 Vanderbilt Consortium LEND: Long-term Trainee (2019-20 academic year)
 2019 - Peer Reviewer for: *Psychological Medicine*, *JAMA Network Open*, *Molecular Autism*, *Journal of Autism and Developmental Disorders*, *Autism Research*, *Autism*, *NeuroImage: Clinical*, *Ear and Hearing*, *Journal of Psychosomatic Research*, *BMC Psychiatry*, *BMC Geriatrics*, and *Scientific Reports*
 2020 - Member, Sigma Xi
 2020 - Student Member, American Medical Association
 2020 - Autistic Researcher Review Board Member, Autism Intervention Research Network on Physical Health (AIR-P)
 2020 - Autism Consultant: F. Hoffman LaRoche, Ltd.
 2020 - Member, INSAR Autistic Researchers Committee
 2021 - Medical Student Member, American Psychiatric Association
 2021 - 2022 Secretary, INSAR Autistic Researchers Committee
 2021 - 2022 Associate Guest Editor for Special Issue: *Journal of Autism and Developmental Disorders*

Honors and Awards

- 2015 Autism Science Foundation Undergraduate Summer Research Grant
 2016 INSAR Annual Meeting Travel Award
 2017 INSAR Annual Meeting Travel Award
 2017 Distinction in Psychology Major
 2017 Magna Cum Laude
 2019 INSAR Annual Meeting Travel Award
 2020 Medical Scientist Training Program Travel Award, Gatlinburg Conference
 2020 David Zeaman Student Travel Award, Gatlinburg Conference
 2020 INSAR Annual Meeting Travel Award
 2021 Family S Endowed Scholarship in Autism Research

C. Contributions to Science

- Provided novel insights into the prevalence, nature, and neurophysiologic foundations of auditory alterations in people on the autism spectrum and other clinical populations.** In recent years, my research has become increasingly focused on alterations in sensory processing in the auditory domain. A meta-analysis that I conducted suggests that disruptions in auditory processing are highly prevalent in autistic people across the lifespan, manifest via a multitude of measures (behavioral, neural, and self-report), and produce a pervasive impact on daily living and quality of life. I have systematically reviewed and quantitatively synthesized a large extant literature, delineated a comprehensive theory regarding the phenomenology of decreased sound tolerance (DST) in autism, and further drawn on big data to conduct phenotypic comparisons of sound tolerance types in non-autistic individuals, laying a strong foundation for my ongoing dissertation study, which will take a transdiagnostic approach to unveiling the nature and neural foundations of DST across clinical populations.

 - Williams, Z. J.,** Suzman, E., Woynaroski, T. (2021). A phenotypic comparison of loudness and pain hyperacusis: Symptoms, comorbidity, and associated features in a multinational patient registry. *American Journal of Audiology*, 30(2), 341-358. https://doi.org/10.1044/2021_AJA-20-00209
 - Williams, Z. J.,** Suzman, E., Woynaroski, T. (2021). Prevalence of decreased sound tolerance (hyperacusis) in individuals with autism spectrum disorder. *Ear and Hearing*, 42(5), 1137-1150. <https://doi.org/10.1097/AUD.0000000000001005>
 - Williams, Z. J.,** He, J. L., Cascio, C. J., & Woynaroski, T. (2021). A review of decreased sound tolerance in autism: Definitions, phenomenology, and potential mechanisms. *Neuroscience and Biobehavioral Reviews*, 121, 1-17. <https://doi.org/10.1016/j.neubiorev.2020.11.030>
 - Rosenthal, M. Z., Anand, D., Cassiello-Robbins, C., **Williams, Z. J.,** Guetta, R., Trumbull, J., & Kelley, L. (2021). Development and Initial Validation of the Duke Misophonia Questionnaire. *Frontiers in Psychology*, 12, Article 708828. <https://doi.org/10.3389/fpsyg.2021.709928>
 - Williams, Z. J.,** Abdelmessih, P. G., Key, A. P., & Woynaroski, T. G. (2021). Cortical auditory processing of simple stimuli is altered in autism: A meta-analysis of auditory evoked responses. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 6(8), 767-781. <https://doi.org/10.1016/j.bpsc.2020.09.011>
- Assessed the psychometric properties of multiple novel and existing questionnaires to quantify sensory processing differences, psychopathology, and quality of life in autistic and non-autistic individuals.** Much of my work focuses on examining the psychometric properties of existing questionnaires in autistic individuals and validating these forms for use in this specific clinical population. Ongoing work in this area includes the development and psychometric validation of several novel questionnaires (measuring constructs such as sound tolerance, depression, suicidality, and quality of life) for use in the general population and autistic adults

 - Williams, Z. J.,** & Gotham, K. O. (2021). Improving the measurement of alexithymia in autistic adults: a psychometric investigation of the twenty-item Toronto Alexithymia Scale and generation of a general alexithymia factor score using item response theory. *Molecular Autism*, 12, Article 56. <https://doi.org/10.1186/s13229-021-00463-5>
 - Williams, Z. J.,** & Gotham, K. O. (2021). Assessing general and autism-relevant quality of life in autistic adults: A psychometric investigation using item response theory. *Autism Research*, 14(8), 1633-1644. <https://doi.org/10.1002/aur.2519>
 - Williams, Z. J.,** Everaert, J., & Gotham, K. O. (2021). Measuring depression in autistic adults: Psychometric validation of the Beck Depression Inventory–II. *Assessment*, 28(3), 858-876. <https://doi.org/10.1177/1073191120952889>
 - Williams, Z. J.** (2019). Additional psychometric properties of the WHODAS-II in individuals with autism spectrum disorder. *Autism Research*, 12(12), 1724-1725. <https://doi.org/10.1002/aur.2215>
 - Williams, Z. J.,** Failla, M. D., Gotham, K. O., Woynaroski, T. G., & Cascio, C. (2018). Psychometric evaluation of the short sensory profile in youth with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 48(12), 4231-4249. <https://doi.org/10.1007/s10803-018-3678-7>
- Explored the nature of non-auditory sensory disturbances and their clinical correlates in autistic people across the lifespan.** As part of my involvement in the Cascio lab, I have contributed to a number of projects investigating various aspects of interoceptive and exteroceptive somatosensory processing in autistic children and adults. Findings from this line of work question the long-held assumption that autistic

individuals are frequently insensitive to pain and temperature, as these differences (typically observed via parent-report) were unable to be verified using rigorous psychophysical tests.

- Suzman, E., **Williams, Z. J.**, Feldman, J. I., Failla, M., Cascio, C. J., Wallace, M., ... & Woynaroski, T. (2021). Psychometric validation and refinement of the Interoception Sensory Questionnaire (ISQ) in adolescents and adults on the autism spectrum. *Molecular Autism*, 12, Article 42. <http://dx.doi.org/10.1186/s13229-021-00440-y>
- Failla, M. D., Gerdes, M. B., **Williams, Z. J.**, Moore, D. J., & Cascio, C. J. (2020). Increased pain sensitivity and pain-related anxiety in individuals with autism. *Pain Reports*, 5(6), Article e861. <https://dx.doi.org/10.109/PR9.0000000000000861>
- Noel, J.-P., Failla, M., Quinde-Zlibut, J., **Williams, Z.J.**, Gerdes, M., Tracy, J., ... & Cascio, C. (2020). Visual-tactile spatial multisensory interaction in adults with autism and schizophrenia. *Frontiers in Psychiatry*, 11. <http://dx.doi.org/10.3389/fpsy.2020.578401>
- Quinde-Zlibut, J. M., Okitondo, C. D., **Williams, Z. J.**, Weitlauf, A., Mash, L. E., Heflin, B. H., ... & Cascio, C. J. (2020). Elevated thresholds for light touch in children with autism reflect more conservative perceptual decision-making rather than a sensory deficit. *Frontiers in Human Neuroscience*, 14, 122. <https://doi.org/10.3389/fnhum.2020.00122>
- **Williams, Z. J.**, Failla, M. D., Davis, S. L., Heflin, B. H., Okitondo, C. D., Moore, D. J., & Cascio, C. J. (2019). Thermal perceptual thresholds are typical in autism spectrum disorder but strongly related to intra-individual response variability. *Scientific Reports*, 9(1), 1-14. <https://doi.org/10.1038/s41598-019-49103-2>
- **Undergraduate Research:** I spent three academic years and one summer working in the lab of Jamie McPartland at the Yale Child Study Center. Dr. McPartland's research focuses primarily on the neural underpinnings of social perception in ASD, as measured by event-related potentials (ERPs). Over my first year in the lab, I familiarized myself with the ERP technique, learning to process and analyze EEG data. That year, I assisted in processing EEG data and conducting statistical analyses for a project in which we related ERPs recorded in response to dynamic social stimuli to clinical characteristics in children with ASD. This was presented as a poster at that year's INSAR annual meeting. The following year, I worked primarily on a pilot project testing whether Pivotal Response Treatment, a behavioral therapy for ASD, altered face-elicited ERPs in a small group of children with ASD. This too was presented as a poster at INSAR. During my final year in the lab, I ran my own EEG study in typically developing adults, testing whether ERPs associated with cognitive control recorded during a Go/No-go task were associated with subclinical autistic traits or ADHD symptoms. This project gave me experience in designing my own stimuli, piloting and refining a behavioral paradigm, collecting EEG and clinical data, and performing more advanced statistical analyses. However, results were inconclusive and thus never published. In a separate independent project, I pooled clinical data from the lab to determine the magnitude of the relation between ASD and ADHD symptoms and domains of adaptive behavior in a large group of children with and without ASD. The latter study was presented at that year's INSAR annual meeting.
 - **Williams, Z.**, Jackson, S., Rolison, M. J., Day, T., McNaughton, K., Morett, L., & McPartland, J. (2017, May). Differential influences of ASD and ADHD symptom severity on adaptive functioning in youth with and without ASD. Poster presented at International Meeting for Autism Research, San Francisco, CA.
 - **Williams Z. J.**, Rolison M., Stavropoulos K. K., Foss-Feig J. H., Malak S. M., Naples A., Pelphrey, K., Ventola, P.E., & McPartland, J. (2016, May). Pivotal response treatment increases neural processing efficiency of faces in children with autism spectrum disorder. Poster presented at the International Meeting for Autism Research, Baltimore, MD.
 - Law, K., Naples, A., Levy, E., Reuman, H., Tillman, R., Stavropoulos, K., **Williams, Z.**, Czemerinski, D., & McPartland, J. (2015, May). Neural response to interactive faces is associated with clinical characteristics in ASD and typical development. Poster presented at the International Meeting for Autism Research, Salt Lake City, Utah.

For a full list of published work, see <https://www.researchgate.net/profile/Zachary-Williams-6>

D. Additional Information: Research Support and Scholastic Performance

Ongoing Research Support

F30-DC019519, NIH/NIDCD Williams (PI) 07/01/2021–06/30/2025
Investigating the Phenomenology and Physiologic Underpinnings of Decreased Sound Tolerance in Adults with Autism Spectrum Disorder

The goal of this study is to develop a novel, multidimensional self-report measure of decreased sound tolerance (DST) symptomatology for use in autistic and non-autistic adults. Subjective DST symptoms in multiple domains (i.e., hyperacusis, misophonia, phonophobia) will then be examined in relation to a comprehensive battery of psychoacoustic and physiologic tests of auditory function in a transdiagnostic sample that includes both autistic and non-autistic adults with varying levels of DST.

Role: PI

Nancy Lurie Marks Family Foundation Schaaf (PI) 1/01/2019–12/31/2021
Sensory Functions in Autism Spectrum Disorders

This grant funds the Autism Sensory Research Consortium (ASRC), an international group of researchers studying the sensory features of autism. On this project, I lead an integrative data analysis that combines several thousand sensory questionnaires from ten different lab groups in order to investigate the latent structure of sensory features in autistic and non-autistic children and create composite measures of sensory function that combine multiple questionnaires. I am also involved in several other ASRC projects, including a comprehensive review of the literature on sensory differences in autism, an integrative data analysis of tactile psychophysical parameters, and a special issue of the *Journal of Autism and Developmental Disorders* that will showcase work from ASRC investigators.

Role: Collaborator

Scholastic Performance

Vanderbilt University

Medical Doctor/Doctor of Philosophy (MD/PhD), Neuroscience and Hearing & Speech Sciences, Nashville, TN 37212

Years Attended: 2017-present

Current GPA: 3.69 (3.94 when not counting pass/fail medical school classes [converted into grades of B+ when counting for PhD credit])

Yale University

Bachelor of Science (BS) with Distinction, Psychology (Neuroscience Track), CT 06520

Years attended: 2013–2017

GPA: 3.91; Magna Cum Laude; Phi Beta Kappa