ADVANCING RESEARCH, ASSESSMENT, AND TREATMENT IN AUTISM SPECTRUM DISORDER AT PURDUE UNIVERSITY
“At its core, autism is a social disorder, but it is not synonymous with ‘disability.’ It can vary in severity in the way people communicate and interact with others. There is a saying: ‘If you know one individual with autism, you know one individual with autism,’ because everyone is so different. Embracing this diversity is a key element of autism treatment and research.”

A.J. SCHWICHTENBERG, PH.D.
Co-Director, Purdue Autism Cluster
Assistant Professor, Human Development and Family Studies
College of Health and Human Sciences
Autism spectrum disorder (ASD) and autism are both general terms for a group of complex disorders of brain development. These disorders are characterized, in varying degrees, by difficulties in social interaction, verbal and nonverbal communication, and by the occurrence of repetitive behaviors.

ASD can be associated with intellectual disability, difficulties in motor coordination and attention, and physical health issues such as sleep and gastrointestinal disturbances.

According to the Centers for Disease Control and Prevention, 1 in 68 children are affected by ASD (Centers for Disease Control and Prevention, March 2014). ASD is one of the fastest-growing developmental disorders in the United States. Currently there is no medical detection test or cure.

At Purdue University, researchers across campus are working to unlock the mystery of ASD. Here, we present a brief overview of our key ASD research and treatment activities. We also present the core group of individuals working collaboratively to find novel and powerful solutions to the multi-faceted developmental profiles associated with ASD.
THE PURDUE AUTISM CLUSTER

The concept of the Purdue Autism Cluster originated in 2008 when the grandmother of a child with ASD living in the Greater Lafayette area questioned why Purdue’s outstanding researchers were not focusing on a major problem affecting so many children. Her inquiry sparked a group of Purdue clinicians, parents, and researchers to gather on a regular basis to talk about convergences across basic science, behavioral research, and clinical application. The group was known as the Purdue Autism Network. Since that time, Purdue has made a significant investment in support of collaborative ASD research through the Purdue Autism Cluster.

The Purdue Autism Cluster was established to develop an interdisciplinary and highly-coordinated effort to understand, assess, and treat individuals with autism spectrum disorder; our effort spans the basic biological and genetic to the behavioral and applied approaches. Faculty associated with the Purdue Autism Cluster reside in a number of academic units across campus, including the Colleges of Health and Human Sciences (HHS), Science (SCI), Education (EDU), and Veterinary Medicine (VM). Research interests include causes, diagnosis and treatment of autism. The Purdue Autism Cluster is deeply invested in the testing and delivery of newly-discovered clinical interventions for individuals with autism and in generating the basic research that makes these interventions possible. The Purdue Autism Cluster is poised to make significant progress in advancing ASD research and to have a profound impact on improving the lives of individuals diagnosed with ASD, their families, and their communities.
CURRENT ACTIVITIES AND IMMEDIATE GOALS

DISCOVERY

Across the Purdue Autism Cluster, we have developed research partnerships that span disciplines. The inter-disciplinary environment at Purdue provides an ideal context for finding novel solutions to problems, such as integrating animal (mouse) models of autism with behavioral characteristics of attention and communication difficulties observed in young children. To date, the Purdue Autism Cluster has supported over $50,000 in collaborative pilot grants, each with collaborations across colleges. These pilot funds have directly supported larger federal grants with over $2 million awarded from the National Institutes of Health.

The Purdue Autism Cluster was awarded the Building-Community Program grant from the Office of the Provost in fall 2017. These funds will establish an advisory board and the inaugural Purdue Autism Research Conference. Through these efforts, we seek to establish the national visibility of the Purdue Autism Cluster as a center for excellence in autism research by showcasing ongoing faculty research and enhancing partnerships with national and international collaborators. Additionally, we aim to engage in intensive, mentored, community-building activities that will result in a strategic five-year action plan, securing our future as a highly visible, externally-funded core for high-impact interdisciplinary autism research.

Members of the Autism Cluster are developing innovations in the application of Magnetic Resonance Imaging (MRI). The Autism Cluster’s neuroimaging projects aim to determine how differences in brain function contribute to development of ASD and to inform brain and behavioral markers that will facilitate earlier diagnosis as well as the development of more effective interventions. Members of the Purdue Autism Cluster are using Magnetic Resonance Spectroscopy (MRS), a cutting-edge neuroimaging technique, to understand how differences in the chemical makeup of the brain may contribute to these ASD processing strengths. Members of the Purdue Autism Cluster are using EEG to study the electrical activity of the brain of individuals with ASD.

TEACHING

Cluster research labs incorporate undergraduate, graduate and/or postdoctoral trainees. Another point of emphasis is in training clinicians – including teachers, speech-language pathologists, clinical psychologists, teachers, nurses, and physicians. A central objective is to train a new generation of clinicians and researchers (often working together) with broad and inter-disciplinary expertise in autism. Members of the Purdue Autism Cluster teach four ASD-focused courses across colleges. These interdisciplinary courses address multiple areas of autism-related knowledge, including human genetics, cognitive and neurological models, clinical diagnosis, treatment options, and media portrayals. We are also working to provide students with the opportunity to receive a certificate of specialization in the area of ASD.

ASSESSMENT AND INTERVENTION, TRANSLATIONAL AND COMMUNITY IMPACT

A central goal of the Purdue Autism Cluster is to increase the number of families being served, as well as to develop and implement coordinated and integrative research and clinical activities that extend across disciplinary boundaries. Participants in the Cluster are in the process of constructing a shared and cross-disciplinary mechanism for testing large numbers of infants and children and maintaining a database that allows us to follow these children across perceptual, sensory, motor, social, cognitive, and communicative domains. We additionally need to extend our treatment and assessment options for these children, which involves extending our existing collaborations with local autism treatment centers and local schools and increasing our services in the speech and language, psychology, and nursing clinics towards ASD diagnosis and treatment.
“The value that Purdue University places on interdisciplinary collaboration is extraordinary, and the Purdue Autism Cluster is a tangible example of this. The faculty in the Purdue Autism Cluster are conducting interdisciplinary autism research that links basic science with translational and applied diagnosis and treatment, are developing and teaching innovative interdisciplinary courses, and are partnering to offer interdisciplinary local and statewide outreach to families affected by ASD.”

MANDY RISPOLI, PH.D.
Co-Director, Purdue Autism Cluster
Associate Professor, Special Education
College of Education
**FACULTY IN THE PURDUE AUTISM CLUSTER**

**EDWARD BARTLETT, PH.D.**  
Associate Professor  
College of Science (joint appointment)  
College of Engineering (joint appointment)

Edward Bartlett studies auditory processing across the lifespan, starting from birth to auditory maturation, and from young adult to an aged system. He also studies changes in auditory processing in pathological conditions like autism and dyslexia.

Bartlett received his undergraduate degree from Haverford College and his Ph.D. from the University of Wisconsin-Madison.

**ALEXANDER CHUBYKIN, PH.D.**  
Assistant Professor  
College of Science (Biological Sciences)

Alexander Chubykin's research uses in vitro and in vivo electrophysiology, optogenetics, behavior assays in mouse models of autism. The goal of his research is to understand how impairments in synaptic and neural circuit functions lead to changes in sensory perception and learning impairments. Characterizing single gene mutations associated with autism spectrum disorders (ASDs) in genetically modified mice provides a unique opportunity to dissect the biochemical pathways involved and to study the functional impairments both at the level of neural circuits and at the level of an organism. This approach holds promise for development of new biomarkers and for potential discovery of pharmacological therapies, which could target the biochemical pathways altered in ASDs.

Chubykin earned his M.S. degree in applied mathematics and applied physics from the Moscow Institute of Physics and Technology, Moscow, Russia. He received his Ph.D. from the University of Texas Southwestern Medical Center, Dallas, Texas, in neuroscience in 2006. During his graduate training, Chubykin studied how synapses, connections between neurons, are established and stabilized by neuronal activity, and how this process is impaired in autism spectrum disorders. He completed his postdoctoral training at the Massachusetts Institute of Technology, where he studied impairments in synaptic plasticity and neuronal excitability in Fragile X Syndrome, the most common inherited form of autism.
ULRIKE DYDAK, PH.D.
Associate Professor
College of Health and Human Sciences (Health Sciences)

Ulrike Dydak's research is centered on the development of novel magnetic resonance imaging (MRI) and spectroscopy (MRS) techniques and their translation to clinical and life science studies. Using cutting edge MRI and MRS techniques, her group explores changes of the neurotransmitter GABA and other neurochemicals in autism spectrum disorder, Parkinsonian disorders and psychiatric disorders.

Dydk received her M.S. in Physics from the University of Vienna, Austria, and a Ph.D. in medical imaging from the Institute for Biomedical Engineering at the Swiss Federal Institute of Technology (ETH), Zurich, Switzerland, where she also completed her postdoctoral training and then led the MRS group.

UZAY EMIR, PH.D.
Assistant Professor
College of Health and Human Sciences (Health Sciences)

Dr. Emir specializes in developing and implementing new techniques of magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) to investigate brain diseases. He graduated from Ege University in Izmir, Turkey, with B.S. degree in electrical engineering and obtained his Ph.D. in Biomedical Engineering at the Bogazici University, Istanbul. The focus of Dr. Emir’s research aims to establish MRI based biomarkers of various types of neurodegenerative diseases that allow accurate detection of neurological diseases, as well as assessment of their progressions and treatment responses. He has developed techniques to quantify various brain metabolites, including neurotransmitters (y- amino butyric acid, GABA, and glutamate, Glu) in Parkinson’s Disease (PD); antioxidants (glutathione, GSH, and ascorbate, Asc) in aging; and oncometabolites (2 hydroxyglutarate, 2-HG, and lactate, Lac) in patients with glioma.

BRANDON KEEHN, PH.D.
Assistant Professor
College of Health and Human Sciences (Speech, Language, and Hearing Sciences; Psychological Sciences)

Brandon Keehn's Attention and Neurodevelopmental Disorders (AtteND) Lab uses a multimodal (fMRI, EEG, eye-tracking) approach to understanding attentional strengths and weaknesses in individuals at-risk for or diagnosed with autism spectrum disorder (ASD). His research investigates how early deficits in attention may contribute to the development of sociocognitive impairments in children with ASD. Keehn's work also explores areas where individuals with ASD excel relative to their typically-developing peers. These areas of superior performance may provide a unique window onto atypical sensory and cognitive processes associated with ASD and the associated differences in brain organization. Ultimately, the goal of this research is to identify behavioral and biological markers to assist in making an earlier diagnosis of ASD and to determine potential targets for early intervention.

Keehn received his Ph.D. from the San Diego State University / University of California, San Diego Joint Doctoral Program in language and communicative disorders in 2011. He completed a postdoctoral fellowship at Boston Children’s Hospital and Harvard Medical School.
ROSE MASON, PH.D.
Assistant Professor
College of Education (Educational Studies)

Rose Mason is a Board Certified Behavior Analyst-Doctoral level whose research focuses on increasing access to effective interventions for individuals with autism and developmental disabilities by addressing both intervention development and implementation. Utilizing an implementation science framework, ecobehavior assessment methods are utilized to identify barriers to implementation of evidence-based practices through partnerships with schools or service organizations. Information obtained is then utilized to develop and evaluate training methods that address these barriers. For example, Dr. Mason recently utilized single-case methodology to evaluate the impact of a teacher-as-coach model to train paraprofessionals who work with students with autism and developmental disabilities to implement discrete trial training with fidelity. A second and complementary line of research evaluates ways to increase the efficiency of interventions for individuals with autism, including more effective delivery mechanisms. This includes the development of a web-based instructional system for adolescents and adults with ASD, incorporating web-based learning, tele-coaching, and a technology delivered self-management application aimed at enhancing social-communication, problem-solving, and organization skills to improve post-secondary trajectories.

Mason earned her Ph.D. from Texas A&M University in 2012.

CAROLYNN MCCORMICK, PH.D.
Assistant Professor
College of Health and Human Sciences (Human Development and Family Studies)

Dr. McCormick’s research focuses on early developmental trajectories of children with an emphasis on children on the autism spectrum. In addition to describing symptom trajectories over time, she is interested in mechanisms and moderators of changes in behavior. To that effect, her research has included, naturalistic longitudinal work, longitudinal work within the context of clinical trials of early intervention for ASD, and cross-sectional work using multi-modal approaches. Of special interest is the use of multi-modal measurement across different contexts to develop a better understanding of the variability observed in outcomes of children with Autism Spectrum Disorder who receive early intervention services. As part of her program of research, Dr. McCormick is committed to engaging stakeholders at every level of the process. This means working with stakeholders to ensure they not only benefit from research findings but also influence the goals, execution, and dissemination of autism research.

McCormick received her B.A. from Columbia University and her Ph.D. from University of California, Davis.
**Maggie O’Haire, Ph.D.**
Assistant Professor of Human-Animal Interaction  
College of Veterinary Medicine (Center for the Human-Animal Bond);  
College of Health and Human Sciences (Psychological Sciences courtesy appointment)

Marguerite (Maggie) O’Haire’s autism research focuses on the effects of interacting with animals for individuals with autism.

O’Haire earned her undergraduate degree in psychology from Vassar College in New York. She then received a Fulbright Fellowship to travel to Australia to be one of the first psychology researchers to rigorously study animal-assisted intervention for autism. She completed her Ph.D. in psychology at the University of Queensland in Australia. While there she secured funding from the National Institutes of Health to conduct a multi-site trial of a classroom-based, animal-assisted intervention for children with autism spectrum disorder. The results of this work have been published in international outlets and received media attention in more than 250 popular press publications.

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**Mandy Rispoli, Ph.D.**
Co-Director, Purdue Autism Cluster  
Associate Professor  
College of Education (Educational Studies)

Mandy Rispoli’s research pertains to functional behavior assessment and function-based intervention for challenging behavior in children with autism spectrum disorder and developmental disabilities. Through her scholarship Rispoli seeks to elucidate the mechanisms of action responsible for challenging behavior prevention and intervention for young children with autism and developmental disabilities. Operating from a behavior analytic framework, her scholarship is built upon sustained university-community partnerships to improve teachers’ meaningful involvement in behavior assessment and intervention and child behavioral outcomes. Rispoli’s scholarship aims to improve the feasibility and effectiveness of functional behavior assessments and function-based interventions for challenging behavior in educational settings.

Rispoli is a Board Certified Behavior Analyst-Doctoral level. She earned her Ph.D. in special education with a concentration in autism and developmental disabilities from the University of Texas at Austin in 2008. Dr. Rispoli has published over 100 peer-reviewed research articles concerning behavioral interventions for children with autism and developmental disabilities.

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**A.J. Schwichtenberg, Ph.D.**
Co-Director, Purdue Autism Cluster  
Assistant Professor  
College of Health and Human Sciences (Human Development and Family Studies; Psychological Sciences courtesy appointment; Speech, Language, and Hearing Sciences courtesy appointment)

A.J. Schwichtenberg is a developmental researcher with a focus on autism spectrum disorder (ASD) and sleep. She works with families raising children with ASD and their younger siblings. In 1997, Schwichtenberg began her developmental training in ASD as an intervention specialist and continued her training at the University of Wisconsin, Madison where she received her Ph.D. in human development and family studies. Her postdoctoral work was completed at the Medical Investigation of Neurodevelopmental Disorders (MIND) Institute. While at the MIND Institute, Schwichtenberg completed an interdisciplinary autism research training program funded through the National Institute of Mental Health (NIMH). She continues to work with NIMH through an early career award/grant which focuses on sleep and physiological dysregulation in children with ASD and their families.
EMILY STUDEBAKER, M.S., CCC-SLP
Clinical Assistant Professor
College of Health and Human Sciences (Speech, Language, and Hearing Sciences)

Emily Studebaker supervises clinical practicum for graduate students in speech-language pathology within Purdue’s M.D. Steer Audiology and Speech Clinic. Clinical supervision has included the Pragmatic Language Groups, Preschool Language Program, and other pediatric and adult clients, with a focus on treating individuals with Autism Spectrum Disorders.

Studebaker received her undergraduate degree in speech-language pathology and audiology from Miami University (Oxford, Ohio) and her M.S. in speech pathology from the University of North Carolina (Chapel Hill). She holds the Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP) as a member of the American Speech-Language-Hearing Association (ASHA) and maintains professional licensure as a speech-language pathologist in the State of Indiana. Prior to joining Purdue in 2008, Studebaker worked at the Center for Autism and Related Disorders at Kennedy Krieger Institute in Baltimore, Maryland.

BRIDGETTE TONNSEN, PH.D.
Assistant Professor
College of Health and Human Sciences (Psychological Sciences; Courtesy appointment Speech, Language, and Hearing Sciences)

Bridgette Tonnsen’s research examines early behavioral and biological markers of risk and resilience in children with neurodevelopmental disorders. Her primary work investigates infant precursors of clinical conditions such as autism, attention problems, and anxiety through cross-syndrome, longitudinal surveillance. She also studies the intersection of family factors (e.g., maternal psychopathology, genetic risk, parenting stress) and child clinical outcomes in genetic conditions such as fragile X and Angelman syndromes. By integrating gold-standard clinical tools with both experimental and physiological methods, she aims to inform developmental emergence of neurodevelopmental phenotypes and potential points of intervention. Tonnsen’s research is supported by the National Institutes of Health.

Tonnsen received her Ph.D. in school psychology with a concentration in quantitative methods from the University of South Carolina. She completed her pre-doctoral APA clinical psychology internship at the Medical University of South Carolina/Charleston Consortium.
ANCILLARY MEMBERS OF THE PURDUE AUTISM CLUSTER

ELIZABETH AKEY
Clinical Assistant Professor
College of Health and Human Sciences (Psychological Sciences)

Elizabeth Akey is Director of the Purdue Psychology Treatment and Research Clinics (PPTRC). As an ancillary member of the Purdue Autism Cluster, Akey is responsible for training graduate students in the professional practice of clinical psychology. PPTRC frequently provides assessments for children and adults when an ASD diagnosis is suspected and trains parents in behavioral techniques known to assist in home and school management for children with ASD. Akey received her Ph.D. in psychology from Purdue University.

JOHN BURGESS, PH.D.
Associate Professor
College of Health and Human Sciences (Nutrition Science)

John Burgess’ research investigates the role of nutritional status of omega-3 fatty acids and antioxidant nutrients in the development of behavioral symptoms in children. Burgess uses animal models and cell studies to elucidate the relationship between dietary intake of essential nutrients and the factors contributing to altered cellular levels of key omega-3 fatty acids in the brain, and other tissues. Burgess received his Ph.D. in nutritional biochemistry from Pennsylvania State University in 1988.

LAURA CLAXTON, PH.D.
Associate Professor
College of Health and Human Sciences (Health and Kinesiology)

Laura Claxton’s research investigates the integrative cognitive and motor processes underlying the development of infant posture. Claxton uses motor control measures to help identify the differences of balance abilities in infants at low-and high-risk of ASD and investigates the functional implications of these differences. Claxton received her Ph.D. from the University of Massachusetts at Amherst in developmental psychology in 2007.

REBECCA MCNALLY KEEHN, PH.D., HSPP
Clinical Psychologist, Riley Child Development Center
Riley Hospital for Children at IU Health
Assistant Professor of Clinical Pediatrics
Indiana University School of Medicine

Rebecca McNally Keehn provides diagnostic consultation, psychological evaluation, and short-term treatment services to children with neurodevelopmental and related disorders. Clinical interests include assessment and treatment of neurodevelopmental disabilities including ASD, intellectual disability, and developmental disorders; early childhood mental health; anxiety disorders; disruptive behaviors; and parent-child relationships. Her research interests are focused on improving evidence-based diagnostic and intervention practices for children with ASD and other neurodevelopmental disabilities.

McNally Keehn received her Ph.D. in clinical psychology from California School of Professional Psychology at Alliant International University. She completed her pre-doctoral APA clinical psychology internship at UMass Memorial Community Healthlink and a post-doctoral fellowship at the Developmental Medicine Center at Children’s Hospital Boston/Harvard Medical School.
INVESTING IN ASD RESEARCH AND TREATMENT

ASD affects 1 in 68 children and is one of the fastest-growing developmental disorders in the U.S. If left untreated, ASD can profoundly influence a child’s ability to communicate and to engage in meaningful ways with his or her environment. Early treatment and life-long support are crucial to promote social skills, language development, academic success, and ultimately meaningful employment, independent living, and financial security.

The Purdue Autism Cluster uniquely positions Purdue University to study ASD from a multi-disciplinary approach. While Purdue has made a significant investment in collaborative ASD research, additional funding is needed. By investing in Purdue’s vision to establish a nationally-recognized center for ASD, you will provide life-changing research, training, and resources for individuals, families, caregivers, teachers, healthcare providers and interventionist for years to come.

Purdue Autism Cluster Funding Priorities:

- **Unrestricted Gifts:** Unrestricted gifts provide vital support in areas such as student enrichment; seminar series; training; social groups in autism; a research registry specific to autism; databases; and website development.

- **Seed Grants:** Seed grants are critical for moving ground-breaking research projects forward by acquiring the data that positions projects for funding from institutions like NIH, NSF, private foundations, and others.

- **On the Spectrum Student Experience Fund:** This fund supports Purdue students with ASD to work with researchers and clinical faculty in the Purdue Autism Cluster.

- **Naming Opportunities:** Named Professorships play an important role in recruiting top ASD researchers to Purdue. A Named Directorship provides sustainable leadership through permanent staffing thereby accelerating the impactful work of the Cluster. A Named Autism Center offers the opportunity to make a leadership gift that will deliver sustainable funding to ensure the future of the ASD Center.

To learn more about our funding priorities or to discuss other options for supporting the Purdue Autism Cluster, please contact the College of Health and Human Sciences Office of Advancement at (765) 494-7890 or (800) 535-7303.

To make an unrestricted gift today, visit giving.purdue.edu. Or, mail a check payable to Purdue Foundation (and “Autism Gift Fund” on the memo line) to: HHS Office of Advancement, Stone Hall, Room 106, 700 West State Street, West Lafayette, IN 47907-2059.
To learn more about ASD research and treatment initiatives at Purdue University, visit [www.purdue.edu/autism](http://www.purdue.edu/autism) or e-mail [autism@purdue.edu](mailto:autism@purdue.edu).