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.” Early intervention is key in effective treatment and progress.”

A.J. SCHWICTENBERG, PH.D.
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 42 boys and 1 in 189 girls are affected by autism spectrum disorder (Centers for Disease Control and Prevention, March 2014). Autism 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 key ASD research and treatment activities and goals, and the core group of individuals working collaboratively to find novel and powerful solutions to the multi-faceted developmental profile associated with ASD.
The concept of the Purdue Autism Cluster originated in 2008, when the grandmother of a child with autism 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 and researchers to gather on a regular basis to talk about convergences across basic science, behavioral research, and clinical application levels of enquiry. The group was known as the Purdue Autism Network (PAN). Since that time, Purdue has made a significant investment in support of collaborative autism spectrum disorder 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 disorders; our effort spans basic biological and genetic to 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), and 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 to children 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 making discoveries that 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. All projects include a substantive research endeavor with significant implications for understanding and treating autism. These projects set the stage for large federal grant submissions.

Presently, a search is underway for a neuroimaging researcher focused on autism. This faculty position will reside in the College of Health and Human Sciences (Health Sciences).

TEACHING
Cluster research labs incorporate undergraduate, graduate and/or postdoctoral trainees. Another point of emphasis is in training clinicians – including Speech-Language Pathologists, clinical psychologists, teachers, nurses, and MDs. A central objective is to train a new generation of clinicians and researchers (often working together) with broad and interdisciplinary expertise in autism. We are also developing a series of courses with the aim of providing students with the opportunity to receive a certificate of specialization in the area of autism.
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 Autism 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 increasing our services in the speech and language, psychology, and nursing clinics towards early autism diagnosis and treatment.

INFRASTRUCTURE

We intend to establish a Purdue Autism Cluster website and a cross-disciplinary research database in collaboration with the Indiana University Medical Center/Riley Children’s Hospital. A component of this will be to conduct gene sequencing and to investigate genetic mutations in individuals with ASD and their families. In addition, a centralized seminar series is being developed to contribute to a vibrant clinical and research community. We also seek a facility for centralized administration, one which would include a family resource center and areas in which to conduct collaborative research and clinical activities and grant submissions.
“We have been fortunate to attract outstanding early career faculty who are already collaborating to develop novel approaches to ASD that extend across disciplinary boundaries. Because of the unique academic environment at Purdue, we are poised to bridge the gap from basic science—such as animal models of autism and physiological and neuroimaging approaches—to application to state-of-the-art clinical diagnosis and treatment.”

LISA GOFFMAN, PH.D.
Chair of Purdue Autism Cluster
Lisa Goffman, Ph.D.
Chair of the Purdue Autism Cluster
Professor
College of Health and Human Sciences (Speech, Language, and Hearing Sciences)

Lisa Goffman studies language and motor learning in children with typical and atypical development. Children with language disorders and those with autism show co-occurring language and motor deficits. Goffman investigates language processing and production. She also incorporates movement capture techniques into her research by recording and analyzing speech and hand movements while children learn words, sentences, gestures, and musical sequences. The aim of her research program is to develop interventions that integrate common components of language and motor learning to effectively treat children with language impairment and autism. Her research is supported by the National Institutes of Health.

Goffman was a clinical Speech-Language Pathologist who transitioned to a research and teaching career and received her doctorate from Purdue University.
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.
MATTHEW BRODHEAD, PH.D.
Assistant Professor
College of Education (Educational Studies)

Matthew T. Brodhead is a Board Certified Behavior Analyst (Doctoral Level) who specializes in Applied Behavior Analysis and Single Subject Research. His specific research interests include developing and evaluating strategies to increase social and academic outcomes of individuals with autism. He is also interested in research and conceptual issues relating to the ethical and professional behaviors of practicing behavior analysts. Through workshops and consultation, he has established multiple school-based programs for autistic children, and he has provided training to teachers, related service providers, and behavior analysts throughout the United States.

Brodhead received his undergraduate and master’s degree from Western Michigan University and his Ph.D. from Utah State University.
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 MS 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, TX in Neuroscience. 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.
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 autism spectrum disorder (ASD) and investigates the functional implications of these differences.

Claxton received her Ph.D. from the University of Massachusetts at Amherst in Developmental Psychology.
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.
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 sociocommunicative 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. He completed a postdoctoral fellowship at Boston Children’s Hospital and Harvard Medical School.
A.J. Schwichtenberg, Ph.D.
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. 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 as early markers of ASD.
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. Her work in this area explores motivational variables influencing challenging behavior as well as innovations in professional development for special education teachers.

Rispoli is a Board Certified Behavior Analyst-Doctoral level. Dr. Rispoli has published over 90 peer-reviewed research articles and book chapters concerning behavioral interventions for children with autism and developmental disabilities. Operating from a behavior analytic framework, Dr. Rispoli’s scholarship explores the role of variables which may alter motivation to engage in challenging behavior. Her work also evaluates methods to increase teacher involvement in challenging behavior assessment and intervention with children with autism and developmental disabilities.

Rispoli earned her Ph.D. from the University of Texas at Austin.
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, OH) 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, Studebaker worked at the Center for Autism and Related Disorders at Kennedy Krieger Institute in Baltimore, MD.
BRIDGETTE TONNSEN, PH.D.
Assistant Professor
College of Health and Human Sciences (Psychological 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 Syndrome. By integrating gold-standard clinical tools with both experimental and physiological methods, her work aims to inform developmental emergence of neurodevelopmental phenotypes and potential points of intervention.

Tonnsen received her undergraduate degree from Furman University and her Ph.D. from the University of South Carolina.
Oliver Wendt’s research investigates the efficacy of augmentative and alternative communication (AAC) strategies including graphic symbols, mobile technologies, and speech-generating devices for individuals on the autism spectrum that present with little or no functional speech. He specializes in single-subject experimental designs and meta-analyses of these studies. In 2013, Dr. Wendt received the Purdue Focus Award for outstanding contributions to disability accessibility.

In addition, Dr. Wendt is co-founder of SPEAK MODalities LLC, an augmentative and alternative communication (AAC) software company dedicated to providing the best evidence-based AAC solutions for developing communication, speech, and language skills in individuals with autism and/or severe communication disorders.

Wendt earned a Bachelor of Science degree from the University of Cologne, Germany. He holds MA and MS degrees from the University of Nebraska-Lincoln and the University of Cologne, Germany, respectively. He earned his Ph.D. from Purdue University.
Elizabeth Akey is Director of the Purdue Psychology Treatment and Research Clinics (PPTRC). While not part 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 autism diagnosis (ADS) is suspected and trains parents in behavioral techniques known to assist in home and school management for children with ASDs.
INVESTING IN ASD RESEARCH AND TREATMENT

The impact of autism spectrum disorder is far-reaching and long-term. ASD not only affects the autistic individual, it touches families, caregivers, schools, medical providers and the larger community—if left untreated the symptoms of autism profoundly influence children's ability to communicate and to engage in meaningful ways with people and objects in their environment. Such skills are crucial in order to make friends, interact successfully in social situations, perform academically in school, and eventually become adults who can hold jobs, maintain relationships, and achieve financial security. Currently, autism affects 1 in 68 children, and autism is one of the fastest-growing developmental disorders in the U.S. The need for ASD research and treatment initiatives is greater than ever.

While Purdue has made a significant investment in collaborative ASD research, additional funding is needed to support the current activities and immediate goals of the Purdue Autism Cluster. Your financial support of ASD research at Purdue can make a remarkable impact on the lives of thousands of autistic children, as well as the lives of the families, friends, and caregivers with whom they interact. If you have an interest in financially supporting Purdue ASD research and treatment activities, please contact Judy Schumaker, Director of Advancement, College of Health and Human Sciences, at (765) 494-7987 or jdschumaker@prf.org.

For further information about ASD research and treatment initiatives at Purdue University, please contact Dr. Lisa Goffman, Chair of the Purdue Autism Cluster; and Professor of Speech, Language, and Hearing Sciences, at (765) 496-1826 or goffman@purdue.edu.