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## **Autism Laboratory**

**Thomas Jefferson University, Department of Occupational Therapy**

### **Mission**

To enhance successful and meaningful participation in daily living, educational, social, and leisure activities for individuals with autism spectrum disorder (ASD) and their families by investigating the factors that impact participation, the occupational therapy interventions (OT) which aim to foster participation, and the types of physical and social environmental adaptations which lead to the best outcomes.

### **Current Projects**

**1) Testing Outcomes of Occupational therapy using Ayres Sensory Integration in Comparison to Behavioral Intervention to Improve Functional Skills in Children with Autism** (Drs. Roseann Schaaf, Sophie Molholm, John Foxe, Liz Ridgeway, and Zoe Mailloux; Research Assistant Rachel Dumont)

This research focuses on testing the implementation of an evidence-based program of occupational therapy using sensory integration principles. Outcomes include measures of multisensory integration (via ERP), behavior, activity and participation.

**2) Changes in Brain Function Following Sensory Integration Intervention** (Drs. Roseann Schaaf, Laura Krisa, Andrew Newberg, Feroze Mohammed and Chris Conklin; Research Assistant Kathryn Dent)

This research will test the feasibility of examining neuroplastic changes in connectivity and brain functions via diffusion tensor imaging and fMRI following a 30-minute intervention designed to improve sensory integration. Our hypothesis is that children with autism (ages 5-9) will show improved resting state connectivity (whole brain) and more integrated connectivity in the somatosensory cortex and the salience network; and these will be related to measurable changes in functional skills and individualized goals.

**3) Greater Opportunity for Academic Learning (GOAL<sup>2</sup>)** (Dr. Potvin)

A growing number of young adults with high functioning autism spectrum disorder and other disabilities are attending college. These young adults are often experiencing challenges with the social and academic aspects of college life. The coaching in context approach designed for the EuREKA Project is used with young adults attending college to achieve their own academic and social integration goals.

**4) Sensory Aware and Friendly Environments (SAFE)** (Dr. Mailloux)

We all want to feel comfortable, focused and at ease in all the environments in which we live, work, learn and socialize. Everyone has preferences for the various sensory experiences such as color, sound, scents, texture and the options available for movement and activity. For some individuals, these preferences are more extreme to the point that certain sensations can actually be painful, distracting and confusing. SAFE is a program under development to assist businesses and organizations in making their facilities and services more sensory aware and friendly.

### **5) Expanding Recreational Engagement in Kids with Autism Spectrum Disorder (EuREKA Project) (Dr. Potvin)**

Individuals with autism spectrum disorders (ASD) have restricted patterns of participation in recreational activities. They participate in fewer activities, with a narrower range than other people, and closer to home than their same-aged peers. Thus, participation in recreational activities is often compromised in individuals with ASD and may impact quality of life (QoL). The EuREKA Project investigates the effect of an inter-professional approach that combines parent coaching and context therapy (coaching in context) to increase the recreational participation of children with ASD. This manualized, parent-mediated, culturally responsive intervention draws from current empirical evidence across a number of health professions.

### **6) Innovative Design for Engaged Attention and Learning (IDEAL) (Dr. Mailloux).**

Children are spending more and more time in sedentary activities, with increased hours in front of computer, television and hand-held screens. At the same time, academic expectations are increasing and options for physical activity at parks, playgrounds and recess spaces are diminishing. While these societal trends make it harder for children to engage in the active play their brains and bodies need to grow and develop, we also expect them to sit in stable, 4-legged chairs that are often the wrong size for their bodies. What if they could sit in chairs that adjusted to the correct height and that provided the types of motion and flexibility most adults expect and enjoy in their work furniture? What if classrooms were designed and arranged to support learning needs? Isn't it time that we all aim for classrooms that support basic sensory and ergonomic considerations for children?

## **Planned Projects**

### **1) A Genetic Model of Autism Spectrum Disorder: A study of sensory functions in children with XYY Syndrome**

Research suggests that boys with XYY and ASD demonstrate sensory symptoms that are more like a matched comparison group of individuals with idiopathic ASD than other individuals with XYY. Sensory features may aid in identification of the ASD phenotype and provide clues for genetic markers of ASD leading to earlier differential diagnosis of ASD and implementation of targeted interventions. By evaluating sensory functions in individuals with XYY with and without ASD and comparing them to children with ASD, we may gain more understanding of the underlying sensory differences in ASD.

### **2) The role of auditory change detection in predicting language difficulties in ASD (Dr. Green & Dr. Schaaf)**

Differences in latency of the auditory mismatch negativity have been associated with language impairment in ASD and may be an early biomarker of language impairment in these individuals. This study will use electroencephalography recording methods to explore timing of the mismatch negativity in infants at risk for ASD and explore the relationship between differences in auditory change detection at 6 months and language skills and presence/absence of ASD characteristics in these individuals at the age of three. Such early sensory perception differences could be crucial to identifying infants at risk for

language impairment in ASD years before behavioral methods can be used, thus leading to earlier intervention and improving language outcomes in these individuals.

For more information regarding this lab please visit our website at:

<http://www.jefferson.edu/university/health-professions/departments/occupational-therapy/research.html>

### **Selected Publications**

- May-Benson TA, Roley SS, Mailloux Z, Parham LD, Koomar J, Schaaf RC, Jaarsveld AV, Cohn E. Interrater reliability and discriminative validity of the structural elements of the Ayres Sensory Integration Fidelity Measure. *Amer J Occup Ther.* 2014;68:506-513. DOI: 10.5014/ajot.2014.010652.
- Potvin, M.-C., Prelock, P. A., Snider, L., & Savard, L. (2014). Promoting recreational engagement. In F. Volkmar (Ed), *Encyclopedia of Autism Spectrum Disorders*. New York: Springer.
- Potvin, M.-C., Snider, L., Prelock, P. A., Wood-Dauphinee, S. & Kehayia, E. (2015). Health-related quality of life in children with high functioning autism. *Autism*, 19(1), 14-19. doi: 10.1177/1362361313509730.
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- Potvin, M.-C., Snider, L., Prelock, P. A., Kehayia, E. & Wood-Dauphinee, S. (2013). Recreational participation of children with high functioning autism. *Journal of Autism and Developmental Disorder*, 43(2), 445-457. doi: 10.1007/s10803-012-1589-6
- Potvin, M.-C., Prelock, P. A., & Snider, L. (2008). Collaborating to support meaningful participation in recreational activities of children with autism spectrum disorder. *Topics in Language Disorders*, 28 (4), 365 – 374.
- Schaaf RC, Lane A. Toward a best-practice protocol for assessment of sensory features in ASD. 2015; DOI: 10.1007/s10803-014-2299-z.
- Schaaf RC, Case Smith J. Sensory interventions for children with autism. *J Comparative Effectiveness Res.* 2014;3(3):225-227. doi: 10.2217/cer.14.18 PMID: 24969147.
- Smith Roley S, Parham LD, Schaaf RC, Mailloux Z, Cermak S. Sensory integration and praxis patterns in children with autism. *Amer J Occup Ther.* 2015;69(1), 1-8.
- Schaaf, RC, Leiby B, Benevides T, Hunt J, vanHooydonk E, Faller P, Mailloux Z. 2014; Response from authors to comments on "An intervention for sensory difficulties in children with autism: a randomized trial." *J Autism Dev Disord.* Jun;44(6):1489-1491. doi: 10.1007/s10803-014-2111-0.
- Schaaf RC, Burke JP, Cohn ES, May-Benson TA, Schoen SA, Mailloux Z The issue is: the state of measurement in sensory integration. *Amer J Occup Ther.* 2014;68,e149-e153. Doi:10.5014/ajot.2014.012526.

Schaaf RC. The issue is—creating evidence for practice using Data-Driven Decision Making. *Amer J Occup Ther.* 2014;69:, 6902360010.  
<http://dx.doi.org/10.5014/ajot.2015.010561>

Schaaf RC, Benevides T, Mailloux Z, Leiby B, Kelly D, Faller P, Hunt J, Freeman R, Sandeck J, vanHooydonk E. An intervention for sensory difficulties in children with autism: a randomized trial. *J Autism Dev Disord*, 2014;44(7):1493-1506. DOI: 10.1007/s10803-013-1983-8. PMID: 24214165.  
Schaaf RC, Benevides T, Leiby B, Sandeck J. Autonomic dysregulation during sensory stimulation in children with autism spectrum disorder. *J Autism Dev Disord.* 2013;10.1007/s10803-013-1924-1926.

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### **Collaborators**

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