Online Proceedings

Poster Session 2

Commons West, Easel 19

1:00 PM to 2:30 PM

Maternal Thyroid Dysfunction, Likely Gene Disrupting Mutations and the Impact on ASD Severity

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UW Honors Program
Mentor: Jennifer Gerdts, Psychiatry
Mentor: Raphael Bernier, Psychiatry & Behavioral Sciences

Autism Spectrum Disroder (ASD) occurs in one in every 59 children, yet the causal mechanisms remain widely unknown. Research is advancing through genetic testing as well through speculation of external environmental influences. Recent stuides have examined in greater depth gene by environment interactions and have found an impact on severity symptoms of ASD. This research follows the two-hit model of gene by enviornment effects and investigates the link of auoimmune disorders, specifically thyroid disfunction, Likely Gene Disrupting (LGD) mutations to genes related to ASD, and the relation to IQ and regression. Behavioral and cognitive data are collected using clinician-administered questionnaires and assessments. Those who carry an LGD mutation with exposure to maternal thyroid dysfunction lean towards a trend that show more severe behavioral phenotypes than those without an LGD mutation. These results spotlight the importance of gene by environment contributions in addition to mechanisms involved in the disorder. These findings may help improve future treatment and intervention for those with ASD.

Poster Session 3

Commons West, Easel 25

2:30 PM to 4:00 PM

Irrelevant Stimuli on Performance in Children with Attention Deficit Hyperactivity Disorder

Natalie Mala Maharaj, Senior, Psychology
Mentor: Raphael Bernier, Psychiatry & Behavioral Sciences
Mentor: Anne Arnett, Division of Developmental Medicine, Boston Children's Hospital

Attention deficit hyperactivity disorder (ADHD) is one of the most prevalent neurodevelopmental disorders to date, affecting 5-7% of school-age children. Characterized by inattention, impulsivity, and hyperactivity, those diagnosed with ADHD often have difficulty in navigating multiple tasks, sustaining attention, and inhibiting impulses. Although prior research suggests increased attention to sensory stimuli enhances task performance temporarily when the stimuli are task-related, little is known about the effect of irrelevant stimuli on task performance. The current study evaluates whether irrelevant stimuli decreases response accuracy and speed during computer tasks among children with ADHD. Children between the ages of seven and eleven, with (n=50) and without (n=30) ADHD, are recruited to participate in comprehensive neurocognitive phenotyping, including completion of two computer games varying in difficulty (i.e. easy and hard versions). The tasks involve ignoring irrelevant visual stimuli that are presented alternatively with task-related visual stimuli. Irrelevant stimuli consist of three stimulus types, including standard (60%; white bracket-shaped image), deviant (20%; white bracket in opposite orientation to standards), and novel (20%; white line drawings of animals and vehicles). The current study hypothesizes that compared to non-ADHD children, children with ADHD will have lower accuracy and slower reaction times in response to task stimuli that immediately follow novel irrelevant stimuli, as compared to standard irrelevant stimuli. Preliminary results (n = 23) support this hypothesis through a variance analysis, indicating children with ADHD show worse accuracy following novel, i.e. more distracting, stimuli than standard stimuli compared to typical, non-ADHD children, $F(1, 19) = 5.028$, $p = .037$. Through this study, we will gain a greater understanding of children's needs of attention maintenance. Implications of this study include reduction in classroom distractions could improve task-related accuracy and processing speed among children with ADHD.

Poster Session 4

Commons West, Easel 14

4:00 PM to 6:00 PM

Alpha Power in Autism Spectrum Disorder

Katherine Mira Irene Wadhwani, Senior, Neurobiology, Psychology
Mentor: Raphael Bernier, Psychiatry & Behavioral Sciences
Mentor: Caitlin Hudac, Psychiatry and Behavioral Sciences

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by clinically recognized deficits in so-

cial communication, repetitive behaviors, and restricted interests. While the etiological underpinnings of ASD have yet to be determined, biological indicators of the disorder (e.g. biomarkers) hold promise as valuable diagnostic methods. Neurological biomarker initiatives are particularly essential in their potential to pinpoint the neural activity that gives rise to the disorder's hallmarks. Resting state electroencephalography (EEG) studies suggest altered default signaling associated with ASD, with particular deviations in the power of the alpha frequency band. However, previous work has produced contradictory findings regarding the directionality of these abnormal power patterns, which motivate the need to better understand the implications of certain methodological decisions. In this study, we acquired EEG recordings during resting state paradigms in individuals with ASD and a neurotypical control group. We hypothesized that individuals with ASD would display reduced alpha activity, in comparison. We suspect that activity will be reduced, both when analyzed by peak power and average power over the entire frequency band.

POSTER SESSION 4

Commons West, Easel 15

4:00 PM to 6:00 PM

An Exploration of Behavioral Phenotypes Related to DYRK1A and ADNP Gene Mutations Associated with Autism Spectrum Disorder

Christine Paige Haensli, Senior, Psychology
Aiva C. Petriceks, Junior, Psychology
Mentor: Raphael Bernier, Psychiatry & Behavioral Sciences
Mentor: Eva Kurtz-Nelson, Psychiatry and Behavioral Sciences
Mentor: Heena Panjwani, Psychiatry and Behavior Sciences

Autism spectrum disorder (ASD) is a complex neurodevelopmental disorder that involves challenges in speech and nonverbal communication, social interaction and repetitive behaviors. ASD can manifest in a variety of ways hypothesized to be the result of multiple environmental and genetic factors. Two such genetic factors are disruptive mutations to genes ADNP and DYRK1A, which have been associated with ASD and other developmental problems. While both genes are known to impact neuroplasticity, DYRK1A mutations impair dendritic spine growth and ADNP mutations impact the cytoskeletal system. Little is known about the behavioral phenotypes resulting from DYRK1A and ADNP. The aim of this project is to illuminate phenotypes associated with disruptive variations to both genes by comparing learning, memory, verbal and adaptive skills of people with mutations to these genes to each other. In this study, participants included individuals who have either a disruptive mutation to ADNP (n=9, ages 4-13 years) or to DYRK1A (n=10, ages 4-24 years). The following assessments were administered to each participant: Vineland Adaptive Behavior Scales II (adaptive behaviors), Differential Ability Scales (cognition) and California Verbal Learning Test (speech and learning). These assessments provided a selection of different behavioral phenotypes related to neurological functioning and development. We hypothesize that DYRK1A and ADNP will have differing impacts on phenotype due to their varying contribution to early brain development. This study will contribute to a better understanding of how disruptions to different gene functions can lead to differences in learning, memory, verbal and adaptive skills. In addition, examining these mutations' differing phenotypes will give a better idea of the implications of living with these gene events and may inform treatment recommendations for families and individuals affected by rare mutations.