

# Abstracts of Posters, Platform Sessions, and Poster Symposiums

## Accepted for Presentation at the 2019 Annual Meeting of the Society for Developmental and Behavioral Pediatrics

### Poster Session I - Abstracts

#### **Abstract 2: Predictors of Clinically-Significant Anxiety Symptoms in Typically Developing Siblings of Children with Autism Spectrum Disorders**

*Jack Dempsey, PhD; Lindsey DeVries, PhD, University of Colorado School of Medicine, Aurora, CO*

**Purpose:** The purpose of this study is to identify predictors of clinically significant anxiety symptoms in typically developing siblings of children with ASD.

**Methods:** Data from the Simons Simplex Collection (SSC) was used to identify 53 typically-developing children with clinically significant anxiety scores on the CBCL that had a sibling with ASD. A comparison sample of typically developing children who also had a sibling with ASD but did not display clinically significant anxiety (CBCL T score  $\leq 59$ ) was created based on matching of age ( $\pm 1$  year), sibling FSIQ ( $\pm 10$  points), household income, race, ethnicity, and sex. Univariate logistic regression was used to test the significance between these groups of potential predictor variables from the mother and sibling with ASD. Variables with likelihood p values  $< 5\%$  were then included in a mutually-adjusted stepwise logistic regression analysis was used to determine the most parsimonious model.

**Results:** Some aspects of repetitive and externalizing behaviors in the sibling with ASD had a weak influence on anxiety status; however, the presence of a maternal anxiety disorder was by far the strongest predictor (OR 17.9,  $p < .001$ ; 95% CI, 3.07-88.50). The large CI results from quasi-complete separation as maternal anxiety almost perfectly predicted child anxiety. The strength of maternal anxiety relative to other variables was then confirmed using an alternative algorithm (decision tree analysis). Follow-up analyses showed teachers rated the clinically anxious children ( $M = 58.7$ ,  $SD = 4.6$ ) as significantly more anxious than their unaffected peers ( $M = 52.5$ ,  $SD = 9.5$ ;  $t(56) = 3.11$ ,  $p = .003$ ) indicating maternal report on CBCL was not unduly influenced by the presence of parental anxiety.

**Conclusions:** Results indicate that maternal anxiety is a strong predictor of clinical anxiety symptoms in typically developing siblings of children with ASD. While some aspects of repetitive and externalizing behaviors in the child with ASD were somewhat contributory to sibling anxiety symptoms, overall child characteristics in those with ASD did not predict clinically significant anxiety symptoms in siblings without ASD. In addition to providing further evidence to the resiliency of typically developing siblings of children with ASD, the results also suggest that the presence of an anxiety disorder in mothers of children with ASD potentially has far-reaching implications for the entire family.

#### **Abstract 3: Long Term Safety of Extended-Release Methylphenidate Hydrochloride for Treatment of ADHD in Preschool Age Children**

*Ann Childress, MD, Center for Psychiatry and Behavioral Medicine, Inc., Las Vegas, NV; Henry Foehl, PhD, Foehl Statistics & Analytics LLC, Glenmoore, PA; Jeffery Newcorn, MD, Icahn School of Medicine at Mount Sinai, New York, NY; Benjamin Levinson, MD; Akwete Adjei, PhD, Rhodes Pharmaceuticals L.P., Coventry, RI*

**Purpose:** ADHD in children often begins during preschool years; pharmacologic treatment may be initiated following, or in addition to, behavior modification training. Prior to this study, no long-term safety data were extant for extended-release stimulant use in children under 6. This FDA-mandated study examined the long-term safety of extended-release methylphenidate hydrochloride (MPH-MLR; Aptensio XR®) treatment in preschool children.

**Methods:** Eligible subjects were children 4 to less than 6 years of age enrolled from a prior pharmacokinetic study (9 subjects) or efficacy study (81 subjects, treated with MPH-MLR following unsuccessful behavior training). Subjects received an optimized dose of MPH-MLR (open label) for up to 52 weeks and were monitored for safety, tolerance, and sustained efficacy (ADHD Rating Scale, Version IV [ADHD-RS-IV] total score) at 4-week intervals.

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**Results:** Of 90 enrolled subjects, 89 received at least one dose of study drug (range: 10-60 mg/day; mode: 40 mg); 44 subjects completed all 52 weeks of treatment. A total 287 treatment emergent adverse events (TEAEs) were reported in 65 (73.0%) subjects. The majority of TEAEs were mild to moderate in severity. The most common TEAEs (n[%] subjects) probably or possibly related to study treatment were decreased weight (15 [16.8%]), decreased appetite (13 [14.6%]), insomnia (6 [6.7%]), hypertension (6 [6.7%]), irritability (5 [5.6%]), affect lability (4 [4.5%]) and abdominal upper gastrointestinal pain (3 [3.4%]). For 81 subjects enrolled from the prior efficacy study, the mean (SD) ADHD-RS-IV total score at the visit prior to initial treatment with MPH-MLR was 45.0 (6.92) and the mean (SD) total score at the last on-study visit of the safety study was 25.5 (13.35), demonstrating clinical improvement. The mean ADHD-RS-IV total score for all subjects at each week across the 52 weeks was approximately 20, indicating sustained efficacy.

**Conclusions:** Aptensio XR® is safe and well-tolerated when administered once daily for treatment of ADHD in preschool age children; the safety profile does not differ from that observed in school age children. Significant reduction in ADHD symptoms is maintained with tolerable side effects, but patients should be closely monitored for decreased weight, insomnia, and hypertension.

### **Abstract 4: Current State of Developmental Screening Practices Using the Modified Checklist for Autism in Toddlers, Revised with Follow-up (M-CHAT-R/F) within Primary Care Pediatric (PCP) Practices in the United States (U.S.)**

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**Purpose:** The purpose of this study was to 1) Assess the rate of utilization of the M-CHAT-R/F, specifically the Follow-Up Interview, at 18 and 24-month well-child visits at PCP practices across the U.S. 2) Examine the barriers and facilitators in screening with the M-CHAT-R/F.

**Methods:** A novel survey was sent via Research Electronic Data Capture to 2,500 U.S. pediatricians (50 per state), who were randomly selected from the American Academy of Pediatrics' (AAP) member directory using a geographically stratified sampling approach. To target primary care pediatricians, those in AAP Committees, Sections, or Councils were excluded. The survey assessed 1) frequency of use of the M-CHAT-R/F within PCP practices; 2) provider's level of comfort with interpreting and following up on results of the M-CHAT-R/F; and 3) perceived barriers and facilitators to using the M-CHAT-R/F.

**Results:** 190 PCP providers from 49 states (PA unrepresented) responded to the survey. 96% of respondents use a version of the M-CHAT. Of these, 20% use the M-CHAT, 68% the M-CHAT-R/F and 12% were unsure which version they use. 71% of those who use the M-CHAT-R/F conduct a follow-up interview for medium-risk results and 42% for high-risk results. Of those who conduct the interview, 46% rarely or never use the validated follow-up items designed by the authors of the M-CHAT-R/F, while 15% and 39% use these items sometimes and most of the time, respectively. 95% of providers reported feeling comfortable with interpreting and following up on the results of the M-CHAT-R/F, including conducting the follow-up interview. Although 74% received prior training in the use of the M-CHAT or M-CHAT-R/F, 88% reported that they would benefit from more training, with 61% preferring online courses. Time constraint (50%) and insufficient reimbursement (41%) were the most common reported barriers to using the M-CHAT-R/F.

**Conclusions:** The M-CHAT and M-CHAT-R/F are widely used in PCP offices. Although the follow-up interview is routinely conducted for medium-risk results, the validated follow-up interview items are utilized infrequently, which may affect the reliability of these follow-up procedures. Many providers unnecessarily conduct the follow-up interview for high-risk results, and could save time by using it as indicated by the authors of the M-CHAT-R/F. Further

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training of providers in the use of the M-CHAT-R/F via an online course, such as the Autism Case Training program designed by the Centers for Disease Control and Prevention, may be beneficial.

### **Abstract 7: Keystones of Development Online Residency Curriculum: Weaving Attachment, Autonomy, and Executive Function into Well-Child Visits, Birth to Age 5**

*Blair Hammond, MD; Aliza Pressman, PhD; Mariel Benjamin, LCSW; Carrie Quinn, MD, Mount Sinai Hospital, New York, NY*

**Purpose:** Research has identified specific parenting behaviors that promote children's cognitive, social and emotional health. Per the AAP, pediatricians are supposed to counsel on these behaviors in primary care, but they may be less likely to do so without formal training during residency. An e-learning parenting curriculum would allow easy dissemination to multiple residency programs with little demand on faculty while providing a flexible learning experience for residents. To assess the effectiveness and likeability of an online, animated curriculum which teaches residents to promote positive parenting behaviors that foster optimal child development during well-child visits.

**Methods:** Pediatric residents at 8 institutions completed the *Keystones of Development*, an online 13-module curriculum, in their behavior and development rotation during our pilot study year. We used a single-arm pre-posttest study design to assess intervention effect of self-reported behavioral outcomes (discussing, modeling, and praising positive parenting practices) and predictors of behavior (knowledge, perceived barriers and attitudes; and self-efficacy which was assessed retrospectively) with paired t-tests. Likeability and use were assessed at posttest.

**Results:** 46 pediatric residents (mean age=29 yrs; 80% female) participated. Within a one-month post-intervention, there was a statistically significant increase in behaviors that promote positive parenting ( $p<0.01$ ;  $d=0.75$ ), specifically through discussion ( $p<0.01$ ;  $d=0.82$ ); changes in modeling ( $0.15$ ;  $d=0.32$ ) and praise ( $p=0.36$ ;  $d=0.17$ ) were seen in the desired direction, but changes were not statistically significant. Significant changes in the predictors, perceived barriers, ( $p<0.01$ ), knowledge ( $<0.01$ ), and attitudes ( $0.02$ ), were seen. Self-efficacy to perform each respective behavior increased significantly ( $p<0.01$ ). Residents liked the curriculum (4.3/5) and found it useful in practice (4.4/5).

**Conclusions:** The *Keystones of Development* online curriculum was well received by pediatric residents and resulted in increased positive parenting behaviors during well-child visits. This study yields promising results that suggest benefit of a free, online curriculum to the field through wider dissemination, use, and adaptations for other subgroups and contexts. Additional evaluation of the curriculum will include qualitative analysis of post-curriculum interviews.

### **Abstract 10: Intelligence and Adaptive Function Trajectories in Children with Chromosome 22q11.2 Deletion Syndrome**

*Veena Do, BS, University of California, Davis, Sacramento, CA; Kathleen Angkustsiri, MD, MAS, University of California, Davis Medical Center, Sacramento, CA; Tony Simon, PhD, University of California, Davis MIND Institute, Sacramento, CA*

**Purpose:** Individuals with Chromosome 22q11.2 Deletion Syndrome (22q) have lower IQ and adaptive functioning (AF) than the general population. IQ and AF are positively associated in adults with 22q and IQ decreases with age in this population. We have documented no relations between IQ and AF in childhood, and few studies have examined IQ and AF longitudinally in childhood. This study investigates IQ and AF trajectories from childhood to adolescence.

**Methods:** Children ages 6-14 participated in two separate studies of neurocognition and behavior in 22q. Thirty-four participated in both studies, with 2<sup>nd</sup> visits that occurred within 2 to 10 years of the first. Intelligence scales were administered during each visit (Wechsler Intelligence Scale for Children: WISC IV and Wechsler Abbreviated Scale of Intelligence: WASI II). Parents also completed a questionnaire about their child's adaptive functioning (ABAS-II):

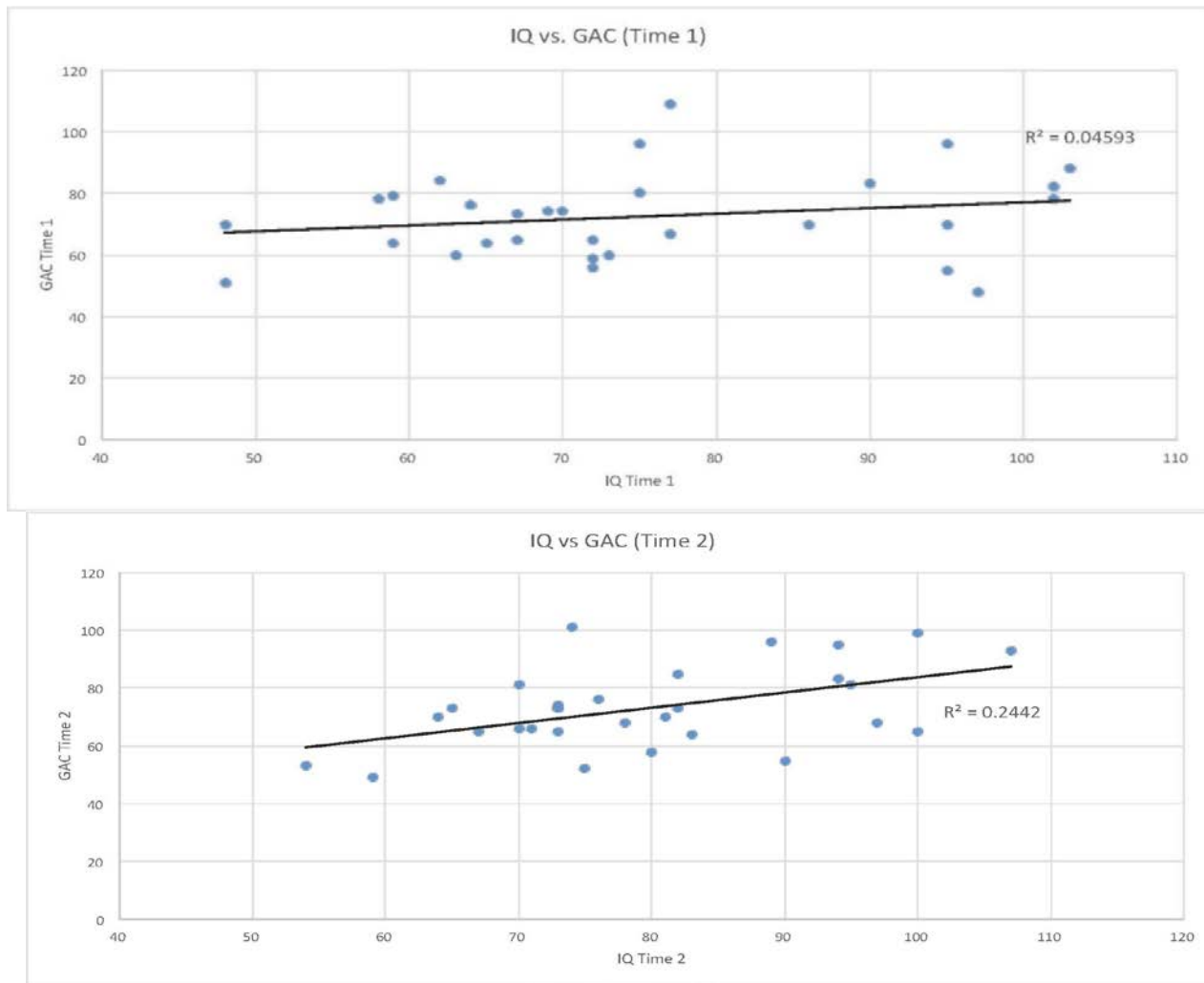
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Adaptive Behavior Assessment System, 2nd ed.). IQ and the ABAS-II General Adaptive Composite (GAC) changes were annualized over time. Two-tailed student's t-tests were used to compare group means for continuous variables, such as age, Full-Scale IQ (FSIQ), and GAC. Linear regression was used to observe the relations between FSIQ and AF.

**Results:** The mean age was 9.6 years (range: 6-14) for the first time point (T1) and 14.5 years (range: 9-18) for the second time point (T2). The mean time between visits was 4.7 years (range: 2-10) and 59% of the participants were male. FSIQ at T1 ranged from 48 to 103 with a mean baseline of 77. Overall, FSIQ increased by 0.95 points per year. 68% of the sample showed an increase in FSIQ at T2. Mean GAC at T1 was 72.5 (range: 51 to 109) and remained stable with a mean increase of 0.18 per year, although GAC increased in 57% of the sample. There were no significant relations between FSIQ and AF at T1. However, FSIQ and AF showed a positive trend at T2 ( $r = 0.49$ ,  $p = 0.054$ ). There were no other significant relations between age, FSIQ, and adaptive function.

**Conclusions:** Congruent with prior work, this study shows no relations between IQ and AF in childhood, although a positive trend may be present in adolescents. Unlike adults with 22q, most children do not demonstrate a decline in IQ. These findings may inform future research in age-related factors affecting IQ and adaptive function.



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### **Abstract 12: Factors Contributing to Successful Completion of an Evaluation Following Referral to Early Intervention Services**

*George Chan, MD; John Leventhal, MD; Ada Fenick, MD, Yale University School of Medicine, New Haven, CT; Julie Gaither, PhD, Yale University, New Haven, CT; Caitlin Leary, MS, Yale New Haven Hospital, New Haven, CT*

**Purpose:** Early Intervention services, are underutilized as 60-80% of referred children do not complete an evaluation, despite potential eligibility for services. Previous studies have identified possible risk factors for underutilization of Early Intervention (EI) as being of lower socioeconomic class, young maternal age, and African-American, but have been limited by omitting children who have been referred but do not make contact. Our study used a cohort of children referred for EI evaluation and examined demographic, clinical, and psychosocial characteristics that affected the likelihood of completing an evaluation.

**Methods:** Subjects were children referred from the Yale Pediatric Primary Care Center (PCC) for EI evaluation between 3/2015 and 4/2016. We excluded those who were <3 years old at the time of our medical record review, had no history of continuity of care at the PCC, or only had a referral to B23 from the birth hospitalization. Information was extracted from a PCC quality assurance database on all referrals to EI and from the child's medical record to determine whether the child had a completed EI evaluation and the following independent variables: demographic (eg, gender, race), clinical (eg, history of chronic illness, number of missed PCC appointments), and psychosocial (eg, social worker note, depression). Descriptive statistics were used to characterize the sample, and differences in demographic, clinical, and psychosocial characteristics according to receipt of an EI evaluation were analyzed using *t* and  $\chi^2$  tests (unadjusted odds ratios (ORs) are reported).

**Results:** Of 196 children who met inclusion criteria, 58% were males, 14% white, 58% Hispanic, and 62% English-speaking; 127 (65%) children completed an evaluation, and 69 (35%) did not. A completed evaluation was associated with younger age at initial referral (17.2 months vs. 20.7 months,  $p < .01$ ) and the child having a chronic medical illness (OR=2.59, CI: 1.37-4.88,  $p < .01$ ). Factors that were not significant included being non-English speaking (OR=1.87, CI: 1.00-3.51,  $p < .03$ ), white race (OR=2.1, CI: 0.80-5.45,  $p < .07$ ) and history of maternal depression at birth (OR=1.63, CI: 0.78-3.40,  $p < .10$ ).

**Conclusions:** Families that completed EI evaluations included being a younger age at referral, or children with a chronic medical illness. These factors suggest that more vulnerable children or families are more likely to complete an evaluation for Early Intervention services.

### **Abstract 14: Preschool Expulsion among Children with ADHD: An Early Indicator of Later Risks**

*Angelika H. Claussen, PhD; Sara Beth Wolicki, MPH, CPH; Melissa L. Danielson, MSPH, CDC, Atlanta, GA*

**Purpose:** Preschool expulsion is related to adverse outcomes across child development, health, and education. Young children with ADHD symptoms are at risk for expulsion. However, most studies on children with ADHD assess expulsion in grades K–12. We examined preschool expulsion in relation to demographic factors, ADHD diagnosis and treatment, and child functioning.

**Methods:** We analyzed data from the cross-sectional 2014 National Survey of the Diagnosis and Treatment of ADHD and Tourette Syndrome (NS-DATA) on 2,947 children aged 6–17 years ever diagnosed with ADHD. Parents reported on whether their child was expelled from preschool and on ADHD symptoms, diagnosis, treatment, and functioning. Weighted analyses using SUDAAN included calculations of estimated medians, proportions, and prevalence ratios (PR).

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**Results:** Overall, 4.4% of children ever diagnosed with ADHD experienced preschool expulsion, compared to population estimates of 0.7% (Gilliam 2005). Expulsion disproportionately affected males (PR=3.9) and children in families with higher education (PR=2.5) compared to peers. Compared to non-Hispanic whites, expulsion was lower among Hispanic/Other children (PR=0.3), but not significantly different for non-Hispanic black children. Expelled children had lower median ages at first concern about behavior, attention, or performance (2.1 vs 4.7 years), ADHD diagnosis (4.7 vs 6.2 years), and initiation of ADHD medication (5.0 vs 6.8 years) than children not expelled. Expelled children had a higher prevalence of severe ADHD (PR=4.9) and a diagnosed co-occurring disorder, including behavior disorders (PR=2.9), mood disorders (PR=2.8), and developmental disorders (PR=2.3). Expelled children were also more likely to have any impairment related to school performance (PR=1.9), participation in organized activities (PR=2.6), writing skills (PR=2.1) and handwriting (PR=2.2) but not impairment related to grades, math, reading, or social relationships. Expelled children had higher rates of receiving behavioral classroom management or social skills training, but not other education services, cognitive behavioral therapy, or parent training.

**Conclusions:** Children with ADHD expelled from preschool were more likely reported to have early onset of ADHD symptoms, more severe ADHD, earlier initiation of ADHD medication, and more comorbidity than other children with ADHD. Healthcare providers can use expulsion as a marker of risk for children with ADHD and connect families to effective treatments such as parent training.

### **Abstract 16: Preliminary Validation of the PROMIS® Pediatric Parent-Proxy Anxiety Measure in Children with Autism Spectrum Disorder**

*Samantha Dunn, DO; Nathan Blum, MD; Judith Miller, PhD; Ramkrishna Makani, MD, Children's Hospital of Philadelphia, Philadelphia, PA*

**Purpose:** To assess the validity of the PROMIS® pediatric parent-proxy Anxiety Short Form 8a (Anxiety-8a) measure in 5-17-year-olds with autism spectrum disorder (ASD).

**Methods:** Parents or guardians of 87 children aged 5-17 years with a clinical or research diagnosis of ASD completed the PROMIS® pediatric parent-proxy Anxiety-8a measure online using REDCap. Parents also completed the Social Responsiveness Scale, Second Edition (SRS-2), the Screen for Child Anxiety Related Emotional Disorders (SCARED), and a demographic form.

**Results:** The children in the sample were primarily male (82%) and ranged in age from 5-17 years with a mean (SD) of 8.9 (3.4) years. The parents were predominantly highly educated with 67.5% having graduated from high school. The mean T score (SD) on the Anxiety-8a measure was 54 (12). The Anxiety-8a measure demonstrated a moderate correlation with the SCARED (n=85,  $r=0.669$ ,  $p<0.001$ ) with highest correlation with the generalized anxiety subscale of the SCARED ( $r=0.656$ ,  $p<0.001$ ). A T score of 60 or higher on the parent-proxy Anxiety 8-a had a sensitivity of 74%, and specificity of 80% for identifying anxiety based on a positive score on the SCARED (total score > 25).

**Conclusions:** The PROMIS® pediatric parent-proxy Anxiety-8a measure may be an efficient and valid measure of anxiety for 5-17-year-old children with ASD.

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### **Abstract 17: Additional Child Mental Health Concerns and Maternal Mental and Physical Health: The Role of Perceptions of Care**

*A. Dawn Greathouse, MA, BCBA; Jessica VanOrmer, M.A.; Kimberly Zlomke, PhD, BCBA-D, University of South Alabama, Mobile, AL*

**Purpose:** Maternal health concerns are linked to increased risks for child mental health through to adulthood, which leads to increased medical and mental health costs. Children with ADHD are at higher risk for other mental health concerns than their typically developing peers. Research has not yet been conducted evaluating the relationship that parent's perceptions of family centered care has on child and maternal health in an ADHD population.

**Methods:** Participants included 3,425 youth (82% White, 68.9% male) between the ages of 6 and 17 years of age ( $X = 12.52$ ). Mothers ranged from 18 to 45 years of age ( $M = 29.15$ ). Parents who indicated that their child was currently diagnosed with ADHD were selected from the 2016 National Survey of Children's Health. A total score of additional child mental health concerns was calculated. Maternal physical health and maternal mental health were scored separately on a three-point scale. Structural equation modeling (SEM) was utilized to create the latent factor of perceptions of care.

**Results:** SEM using Mplus Version 8.0 was performed to assess the relationship between additional child mental health concerns and maternal mental and physical health concerns, as well as the mediating effects of perceptions of family centered care. Results indicated that increases in additional childhood mental health concerns was associated with increases in maternal physical and mental health concerns. Furthermore, additional child mental health concerns were associated with decreases in perceptions of family centered care. Perceptions of family centered care were negatively correlated with maternal mental and physical health concerns suggesting that better perceptions of family-centered care predicted less maternal mental and physical health concerns. Indirect bootstrap mediation models suggest that additional child mental health concerns decrease perceptions of care, which results in higher levels of maternal physical and mental health concerns among parents of youth with ADHD.

**Conclusions:** The results indicate that additional mental health concerns for children with ADHD increases their mother's mental health and physical health concerns. The relationship between child mental health and maternal health is mediated by parent perceptions of family centered care. Increases in a parent's perceptions of family centered care reduces maternal physical and mental health concerns; thus, reducing further mental health risks for children with ADHD.

### **Abstract 20: The Impact of Stressful Climate on Provider Perceptions of Integrated Behavioral Health Services in Pediatric Primary Care: An Exploratory Study**

*Kimberly Hsiung, BS, University of Pittsburgh School of Medicine, Pittsburgh, PA; Jonathan Hart, MS, Western Psychiatric Hospital, Pittsburgh, PA; Kelly Kelleher, MD, MPH, Nationwide Children's Hospital, Columbus, OH; David Kolko, PhD, University of Pittsburgh School of Medicine, Pittsburgh, PA*

**Purpose:** Pediatric primary care providers (PCPs) work in stressful environments and are increasingly called to implement complex interventions, such as behavioral health (BH) service integration. We explore how stressful climates 1) change over time in, and 2) influence provider perceptions of, collaborative care versus Enhanced Usual Care (EUC), two models of integrated BH care.

**Methods:** Secondary exploratory analysis using hierarchical linear modeling was performed on an 18-month cluster-randomized trial of eight pediatric primary care practices randomized to collaborative care (Doctor-Office Collaborative Care, DOCC) or EUC, where an on-site care manager delivered BH services with PCP involvement or facilitated referrals to a local BH provider, respectively. Various indicators of PCP perceptions of BH services, including satisfaction with practice, burdens and beliefs regarding psychosocial problems, and effectiveness in

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treating behavioral problems were assessed as outcomes. Moderators were two domains of stressful climate, role conflict and role overload.

**Results:** Role conflict and role overload stayed stable in both conditions. Role conflict strengthened the positive effect of DOCC on PCP perceived effectiveness in treating behavioral problems ( $\beta$  [SE], 0.04 [0.02];  $p = 0.04$ ) and improvement in managing oppositional/aggressive behavior (0.02 [0.01];  $p = 0.02$ ). Role overload strengthened the positive effect of DOCC on PCP perceived improvement in managing ADHD (0.03 [0.01];  $p = 0.01$ ). Stressful climate did not influence perceptions for EUC providers.

**Conclusions:** Providers experiencing more stressful practice climates developed more positive perceptions of collaborative care. This may encourage stressed providers to make effective practice changes and promote practice integration of BH services.

### Abstract 21: A Pediatric Primary Care Quality Improvement Project Focusing on Literacy Promotion for Parents and their Newborns

*Pamela C. High, MD, MS, Hasbro Children's/Rhode Island Hospital, Providence, RI; Priya Hirway, ScM, Alpert Medical School of Brown University, Hasbro Children's Hospital, Providence, RI; Dinusha Dietrich, MD, Alpert Medical School at Brown University, Providence, RI; Natalia Golova, MD, Alpert Medical School of Brown University, Hasbro Children's Hospital, Providence, RI; Diane DerMarderosian, MD, Alpert Medical School of Brown University, Hasbro Children's Hospital, Providence, RI*

**Purpose:** In 2014 the American Academy of Pediatrics stated that literacy promotion is an essential component of pediatric primary care and should begin as early as possible. This quality improvement project aimed to determine if providing new books and guidance around shared reading at the first office visit, rather than waiting until the 6-month visit would demonstrably enhance literacy outcomes.

**Methods:** Fifty-one consecutive families completed online surveys at 1-, 6- and 12-month visits for their newborns in this 3-provider pediatric private practice. Following well-established office procedures, new children's books and literacy guidance promoting shared reading began at their 6-month visit. This constituted the COMP group. Beginning 6 months later the EARLY group, 50 additional consecutive families with newborns, completed similar surveys, however, new books and guidance promoting shared reading began at their newborn visit. Data was collected in CHADIS and analyzed in STATA ver. 15. Chi square was used to compare baseline demographics between groups; ANOVA evaluated literacy related outcomes over the child's first year of life and between groups.

**Results:** COMP versus EARLY groups were well matched: 87% v 92% white, 98% v 93% only spoke English, 88% v 94% moms, 84% v 94% >high school education, 84% v 95% married, 56% v 53% first child, 39% v 23% Medicaid (all  $p = n.s.$ ). Both groups had similar developmental increases over the year in reading together as being 1 of parent's and baby's favorite activities, in hrs/d reading together (all  $p < .001$ ) and in mothers reading with their infants ( $p = .03$ ). At 6 months and sustained at 12 months, EARLY families reported more d/wk shared reading ( $p = .05$ ) and more fathers ( $\geq 90\%$ ) reading with babies ( $p = .02$ ) than did COMP families.

**Conclusions:** Beginning promoting literacy in the newborn period, in this relatively advantaged pediatric practice, resulted in more frequent parent-child reading and increased father engagement in shared reading throughout these infants' first year, compared with the traditional model of initiating this guidance when children are 6 months old. Providing families with knowledge regarding the joys and benefits of reading with their infants and the tools to begin this practice has potential to improve the lives all young children by fostering nurturing relationships from the start and encouraging early language development and literacy.

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### Abstract 22: Effects of Developmental-Behavioral Advice on Early Childhood Obesity

Martin A. Geertsma, MD, Community Health Center, Inc/Weitzman Institute, West Hartford, CT; Bruce A. Bernstein, PhD, Drexel University School of Medicine, Mansfield Center, CT

**Purpose:** Most early childhood obesity intervention studies have focused on advice about what to feed but not how to approach or understand young children's feeding behaviors and developmental processes behind them. The Brazelton Touchpoints model provides a potential means of intervening with feeding decisions based on behavioral and developmental processes. The purpose of our broader study was to determine if a developmentally and behaviorally based Well Child visit feeding advice curriculum could affect evolving feeding patterns and resultant overweight/obesity in an inner-city Medicaid clinic population. We report here on the effects of the feeding curriculum on early overweight/obesity.

**Methods:** Feeding pattern questionnaires were prospectively administered to parents of 159 Medicaid insured children at each of the 12 "Well-Child" visits from 2 months through 4 years of age. By the end of the 4 year study period, data from 91 allowed analysis of evolving overweight/obesity and specific feeding patterns. 37 of the 91 received a behavior-development focused feeding advice intervention at each well-child visit based on Brazelton Touchpoints concepts. The remaining 54, the "control" group, received no such advice.

Weight/height % 0-18 months, BMI % 2-4 years, were recorded at the same time as the Well Child visit feeding questionnaires and noted to be mid-range overweight (>90%), obese (>95%) or non-overweight/obese (<90%). Intervention and control group obesity patterns over time were analyzed and compared.

**Results:** No differences in the evolution of overweight/obesity were noted between the groups up through 18 months of age. However, starting at 18 months a total of 11 subjects with sustained weight/height or BMI measures > 90% displayed persistent measure decreases ranging from 13.1%-43.9%, with none of 11 reverting to >89%. While there was no difference in the degree of decrease between the intervention and control groups (table 1), 8 decrease subjects were in the intervention group and 3 in the control group, and modeling of likely success of the intervention in decreasing weight/height and BMI after 18 months was significant,  $p = 0.026$  (table 2).

**Conclusions:** Our limited data suggests a development-behavior based intervention model can affect the evolution of early childhood obesity from at least 18 months up to age 4. It remains unclear and a potential area of further research as to why the curriculum did not prevent earlier evolution of obesity.

Table 1. Weight/Height- % BMI Decrease

|                    | Intervention Group | Control Group |                        |                                 |
|--------------------|--------------------|---------------|------------------------|---------------------------------|
| Means              | 31.21              | 21.23         | +                      | 1.2014                          |
| Variance           | 114.4              | 164.1         | Degrees of Freedom     | 3                               |
| Standard Deviation | 10.69              | 12.81         | Critical Value         | 2.353                           |
| n                  | 8                  | 3             | <b>Not Significant</b> | <b><math>p &lt; 0.05</math></b> |

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Table 2. Model – Intervention Success Later Early Childhood Weight/Height- BMI Reduction

|                                                                                                            |
|------------------------------------------------------------------------------------------------------------|
| $p1\text{-hat} = \text{sample proportion 1, (received intervention)/(remained obese)} = 9/24 = 0.375$      |
| $p2\text{-hat} = \text{sample proportion 2, (received intervention)/(did not remain obese)} = 8/11 = .727$ |
| $H0: p1 - p2 = 0$ (no difference in proportions)                                                           |
| $H_a: p1 - p2 < 0$ (There should be a higher proportion of interventions among those who "lost obesity")   |
| $z\text{-test} = -1.936$                                                                                   |
| $p = 0.026 \implies \text{reject null at } p < 0.05$                                                       |

### Abstract 24: Autism Severity and Parental Aggravation: The Role of Additional Child Mental Health Concerns and Perceptions of Care

Jessica VanOrmer, MA; Ashley Greathouse, MA; Kimberly Zlomke, Ph.D, BCBA-D, University of South Alabama, Mobile, AL

**Purpose:** The severity of autism spectrum disorder (ASD) is associated with an increased risk for mental health concerns, higher levels of parental aggravation/stress, and perceiving less family-centered care. Family centered care is linked to decreases in parental aggravation; however, little research shows how additional child mental health concerns and family centered care impact the relationship between ASD severity and parental aggravation.

**Methods:** Participants included 1,142 youth (77.1% White, 81.1% male) between the ages of <1year to 17 years ( $M = 11.06$  years). Parents who indicated that their child was currently diagnosed with ASD and filled out a question asking about ASD severity were selected from the 2016 National Survey of Children's Health. All survey questions were completed by a parent/guardian. A total score of additional child mental health concerns was calculated. Structural equation modeling (SEM) was utilized to create the latent factors of perceptions of care and parental aggravation.

**Results:** SEM using Mplus Version 8.2 was performed to assess the relationship between ASD severity and parental aggravation, as well as the mediating effects of additional mental health concerns and perceptions of care. Results indicated that increases in ASD severity was associated with increases in additional mental health concerns and parental aggravation, as well as perceiving less family centered care. Additional mental health concerns were negatively correlated with perceptions of care and positively correlated with parental aggravation, suggesting that more mental health concerns predicted less family-centered care and more parental aggravation. Lastly, higher perceptions of care predicted less parental aggravation. Indirect bootstrap mediation models suggest that ASD severity increases additional mental health concerns and, in turn, decreases perceptions of care, which results in higher levels of parental aggravation among parents of youth with more severe presentations of ASD.

**Conclusions:** These results demonstrate how ASD severity increases additional child mental health concerns, and in turn impacts parents' perceptions of family-centered care. Ultimately, this predicts higher levels of parental aggravation. This is troubling as parental aggravation has been associated with a range of negative outcomes (e.g., poor parental mental health, non-adherence to treatment). Present findings highlight the need to enhance a parent's perception of medical care among families of youth with more severe presentations of ASD.

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Table 1.

*Unstandardized and Standardized Direct Effects and Indirect Effects from the Structural Model*

| Predictor                          | Mediator(s)                                                 | Criterion                         | B    | SE  | $\beta$ | 95% BaCI       |
|------------------------------------|-------------------------------------------------------------|-----------------------------------|------|-----|---------|----------------|
| ASD Severity→                      | .....                                                       | Additional Mental Health Concerns | .85  | .07 | .33**   | (.703, .994)   |
| ASD Severity→                      | .....                                                       | Family Centered Care              | -.11 | .03 | -.12**  | (-.174, -.050) |
| ASD Severity→                      | .....                                                       | Parental Aggravation              | .20  | .05 | .07*    | (.001, .206)   |
| Additional Mental Health Concerns→ | .....                                                       | Family Centered Care              | -.04 | .01 | -.12*   | (-.066, -.018) |
| Additional Mental Health Concerns→ | .....                                                       | Parental Aggravation              | .17  | .02 | .32**   | (.124, .208)   |
| Family Centered Care→              | .....                                                       | Parental Aggravation              | -.24 | .06 | -.16**  | (-.357, -.145) |
| ASD Severity→                      | Additional Mental Health Concerns→                          | Family Centered Care              | -.04 | .01 | -.04*   | (-.059, -.016) |
| ASD Severity→                      | Additional Mental Health Concerns→                          | Parental Aggravation              | .14  | .02 | .10**   | (.101, .194)   |
| ASD Severity→                      | Family Centered Care→                                       | Parental Aggravation              | .03  | .01 | .02*    | (.010, .051)   |
| Additional Mental Health Concerns→ | Family Centered Care→                                       | Parental Aggravation              | .01  | .00 | .02*    | (.004, .020)   |
| ASD Severity→                      | Additional Mental Health Concerns→<br>Family Centered Care→ | Parental Aggravation              | .01  | .00 | .01*    | (.003, .018)   |

Note.  $N = 1142$ . B = unstandardized direct or indirect effect; SE = Standard error of the unstandardized direct or indirect effect;  $\beta$  = standardized direct or indirect effect; 95% BaCI = 2.5% low and high bootstrap confidence interval of the unstandardized effects; \*  $p < .05$ , \*\*  $p < .001$

### Abstract 25: Parent Perception of Psychosocial Disclosures and Satisfaction with Physician Communication

Kara Monnin, M.A., Kent State University, Kent, OH; Diane Langkamp, MD, MPH, Akron Children's Hospital, Akron, OH; Nichole Slick, PhD, Kent State University, Kent, OH

**Purpose:** While quality physician-patient communication is essential to patient satisfaction, there is a lack of data on the relationship between parent perception of pediatrician-parent communication and parent satisfaction, especially with regard to behavioral and emotional concerns. The present study assessed parent satisfaction with physician communication concerning either an externalizing or an internalizing behavior problem with three levels of pediatrician engagement with the parent concerning behavioral/emotional concerns.

**Methods:** Using a 3 (level of physician engagement) x 2 (internalizing or externalizing problem) design, 125 parents of 2-10-year-old children rated their satisfaction with the physician in a transcript of a simulated well-child visit for a 5 year old. Levels of physician response to the parent's concerns were: minimal physician response, moderate physician response, and thorough physician response. Satisfaction was assessed using the Princess Margaret Hospital Satisfaction with Doctor Questionnaire (Loblaw, Bejak, & Bunston, 1999).

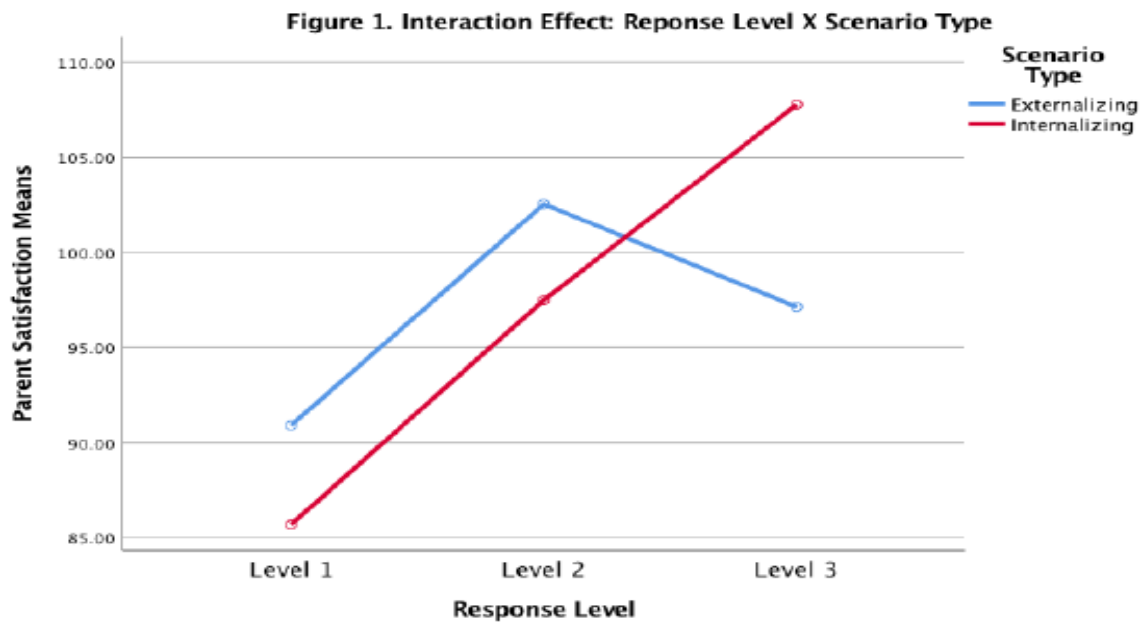
**Results:** A 2 x 3 ANOVA yielded a statistically significant difference for level of physician response, [ $F(2,119) = 8.12$ ,  $p = .000$ ,  $\eta^2 = 0.121$ ]. Post hoc comparisons indicated the mean scores for the Thorough Physician Response ( $p = .000$ ) and the Moderate Physician Response ( $p = .013$ ) were significantly higher than for the Minimal Physician Response. There was a significant interaction between the problem type and level of physician response, [ $F(2,119) = 3.11$ ,  $p =$

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.05,  $\eta^2 = 0.05$ ], with parent reported satisfaction higher for externalizing than internalizing problems for minimal and moderate physician response. However, satisfaction was significantly lower for externalizing problems compared to internalizing for thorough physician response.

**Conclusions:** Findings support that physician communication with parents concerning behavioral and emotional disclosures is related to parent satisfaction and that more time and discussion is not always needed to improve satisfaction. Findings suggest the need for more research on specific physician communication behaviors related to satisfaction and the need to evaluate the relationship between communication and likelihood of parents seeking intervention, adhering to advice, and outcomes for children.



### Abstract 27: Validation of the ASIEP-3 Interaction Assessment at a Measure of Social Functioning in Fragile X Syndrome (FXS)

Nicole Tartaglia, MD, MS, Children's Hospital Colorado/University of Colorado Anschutz Medical Campus, Aurora, CO; Lisa Cordeiro, MS, University of Colorado, Aurora, CO; Elizabeth Coan, PsyD, Children's Hospital Colorado, Aurora, CO; Marcia Braden, PhD, Marcia Braden, PhD, PC, Colorado Springs, CO

**Purpose:** Differences in social development and ASDs are core parts of the FXS phenotype. Identification of an efficient measure that directly evaluates social interaction and can monitor change over time across age ranges is needed for FXS research and clinical care. The ASIEP-3 Interaction measure quantifies spontaneous social responses, reactions to requests, and the individual's social interactions under different conditions. This project aims to assess the feasibility and validity of the ASIEP-3 as a potential outcome measure in FXS.

**Methods:** Males (n=21) and females (n=15) with FXS age 2-46 completed the Stanford-Binet 5 and Aberrant Behavior Checklist. Standard ASIEP-3 administration protocol was followed with adaptations to play materials in older ages. ASIEP-3 video sessions were coded by 2 or more raters, with timed responses scored as interaction, independent play, no response, or aggressive.

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**Results:** *Feasibility:* The ASIEP-3 was successfully completed by 34/36 participants (age mean  $15.4 \pm 10.9$ , 2-46y) across a range of cognitive abilities (IQ mean  $60.34 \pm 18.77$ ), behavior symptoms (ABC Total  $33.54 \pm 26.12$ , and clinical autism diagnosis (ASD  $N=18/34$ ). *Score Range:* There was a range of scores in ¾ domains without floor or ceiling effects. Coded behaviors were highest for interaction (40.91%), followed by constructive independent play (36.93%) and no response (21.53%). Aggressive behavior accounted for <1% of scores. *Validity:* No Response scores significantly correlated with ABC Social Avoidance ( $\rho = .455$ ,  $p = .017$ ) and clinical ASD diagnosis. *Administration:* After training, reliable administration was accomplished for all team members (bachelor level research assistants to PhD). *Interrater Reliability:* ICCs range 0.79-0.93 for Master's level and above; scoring reliability could not be established with RAs.

**Conclusions:** The ASIEP-3 was feasibly administered to individuals with FXS across a wide range of ages, abilities, autism symptoms and behavior ratings by examiners with various levels of education, although training in child development is needed for reliable scoring. The lack of relationship between ASIEP scores and factors such as age and IQ suggest that the measure is appropriate for most, if not all, individuals with FXS, and scores correlated with clinical measures of ASD. Future directions include further evaluation of clinical validity compared to the ADOS-2, and test-retest effects. The ASIEP-3 shows promise as a measure that may fill a significant gap in the ability to reliably index longitudinal social development in FXS.

### Abstract 28: Retrospective Review of Children's Diagnostic Assessments for Autism Spectrum Disorder (ASD) in British Columbia: Are We Identifying Co-occurring Motor Deficits?

Elizabeth CR Mickelson, MD, BSc(PT), University of British Columbia, Vancouver, BC, Canada; Isobel Fishman, Student, BC Children's Hospital Research Institute, Vancouver, BC, Canada; Whitney Weikum, PhD; Jill G Zwicker, PhD, OT, Occupational Science & Occupational Therapy, University of British Columbia, Vancouver, BC, Canada

**Purpose:** To examine the prevalence of motor difficulties in a retrospective cohort of children assessed in a standardized, diagnostic, provincial program for ASD and to determine how many children with ASD were also diagnosed with Developmental Coordination Disorder (DCD).

**Methods:** Following ethics approval, we reviewed the de-identified database of 4173 children assessed for ASD in the BC Autism Assessment Network between 2010-2014. Data included clinician documented information about the child's motor findings.

**Results:** ASD was diagnosed in 53% of children assessed during this time frame and 34% (753/2227) also had motor difficulties. After excluding children with explanations for their motor difficulties (visual impairments, other medical, neurological or genetic causes as per DSM-5 DCD Criterion D), 521 children with ASD had motor findings not otherwise explained (69%). However, DCD was only considered in 31% (163/521) of these children (either diagnosed or requiring further assessment).

**Conclusions:** Results indicate that motor deficits are under-identified in our retrospective cohort compared to the literature, which reports that 59%-79% of children with ASD have motor challenges. Under 1/3 of children with ASD in BC were considered for a DCD diagnosis when one was likely. As DSM-5 now allows for dual ASD and DCD diagnoses, one should consider a DCD diagnosis in children with ASD struggling to perform and learn motor skills. A DCD diagnosis would highlight needing to address motor deficits in therapy, to make school accommodations and help to guide recreational activities. The DCD Questionnaire – a brief parent screen for functional motor problems – may be useful to include as a standard part of the ASD assessment.

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### Abstract 29: Thinking Outside the Box: Executive Functions in Neonatal Intensive Care Unit Graduates

Kerry Miller, PhD; Holly Roberts, PhD, University of Nebraska Medical Center -Munroe Meyer Institute, Omaha, NE; Howard Needelman, MD, University of Nebraska Medical Center, Omaha, NE; Carol McMorris, MS, UNMC- Munroe Meyer Institute, Omaha, NE

**Purpose:** The purpose of the study was to examine the relationship between medical and sociodemographic risk factors, and cognitive and language skills of Neonatal Intensive Care Unit (NICU) graduates and their executive function (EF) skills at 24 months adjusted age.

**Methods:** The data for this retrospective study were obtained from one state's NICU follow-up program. All participants were examined using The Bayley Scales of Infant and Toddler Development, third edition (Bayley III) to assess their cognitive and language skills and the Minnesota Executive Function Scale (MEFS; Carlson & Zekazim, 2014). This study included 42 children with a NICU experience who were at moderate to high risk at discharge and who participated in a 24-month adjusted age developmental assessment follow-up clinic visit. Of the 42 children, 31 completed the MEFS and 11 children were unable to complete the adequate number of items on the MEFS to obtain a score. Medical and socioeconomic factors, and cognitive and language outcomes of participants are presented in Table 1.

**Results:** A binary logistic regression analysis revealed a significant association between the child's language scores ( $\beta = 0.84$ ,  $OR = 2.32$   $p = .04$ ) and the child's MEFS scores. A test of the full model against a constant only model was significant ( $\chi^2(4) = 32.99$ ,  $p < .001$ ) indicating that the predictors, as a set, reliably predicted the MEFS scores. Nagelkerke's pseudo  $R^2$  of .82 indicated a moderate relationship between prediction and the MEFS scores. An unexpected finding of the study was that over one-quarter of the children were unable to complete the MEFS assessment despite documented reliability of the assessment. Descriptive statistics for each group and the sample are presented in Table 1. Comparison analyses were conducted to examine differences in the sociodemographic and medical factors between the groups. Continuous variables were analyzed utilizing independent  $t$ -test analyses and categorical variables were analyzed using the chi-square test for independence analyses. Results of the independent  $t$ -test analyses revealed significant differences and large effect sizes between the groups for cognitive ( $p = .002$ ,  $d = 1.22$ ) and language ( $p < .001$ ,  $d = 1.61$ ) scores.

**Conclusions:** Results provide supportive evidence that language and EF skills have a reciprocal relationship (Bialystok, Barac, Blaye, & Poulin-Dubois, 2010) as well as the need for developmental screening of both language and EF skills in this high-risk population.

**Table 1. Medical, Sociodemographic, and Child Outcome Descriptive Statistics and Comparison Analyses**

|                            | Completed MEFS<br>n= 31 | Not Completed MEFS<br>n=11 | All Children<br>n= 42 |
|----------------------------|-------------------------|----------------------------|-----------------------|
| Gestational Age (months)   | 29.45                   | 31.82                      | 30.07                 |
| Length of NICU Stay (days) | 60.42                   | 61.45                      | 29.64                 |
| Birthweight (kg)           | 1.37                    | 1.67                       | 1.48                  |
| Maternal Age               | 29.10                   | 31.18                      | 29.64                 |
| Language Composite *       | 98.84                   | 80.80                      | 94.44                 |
| Cognitive Composite *      | 96.61                   | 83.00                      | 93.29                 |
| Multiple Gestation         | 14 (45.7%)              | 1 (9.0%)                   | 15 (35.7%)            |
| Male                       | 13 (41.9%)              | 4 (36.3%)                  | 17 (40.5%)            |
| Private Insurance          | 28 (90.3%)              | 8 (72.7%)                  | 36 (85.7%)            |
| Caucasian                  | 28 (87.0%)              | 9 (81.8%)                  | 37 (88.1%)            |

\*  $p < .01$

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### Abstract 30: The Home Literacy Environment in NICU Follow-Up

Kendell German, MD, University of Washington, Seattle, WA; Emily Myers, MD, Seattle Children's Hospital, Seattle, WA; Phuong T Vu, MS, University of Washington, Seattle, WA; Kathleen Lehman, PhD, University of Washington/Center on Human Development and Disability, Seattle, WA; Sandra E Juul, MD, PhD, University of Washington, Seattle, WA

**Purpose:** We aimed to evaluate the home literacy environment in NICU follow-up clinic patients and evaluate the correlation between the home literacy environment and developmental outcomes.

**Methods:** This is a prospective survey study conducted at the NICU follow-up clinics at the Center on Human Development and Disability. All families of children who presented for care at the clinic between August 29, 2018 and April 17, 2019 were given questionnaires assessing their home literacy environment through questions adapted from Needlman et al (2005) and the StimQ Read Home Literacy Survey. We evaluated the association between survey results and available scores on the Bayley Scales of Infant Development (BSID) II, BSID III or the Clinical Adaptive Test/Clinical Linguistic and Auditory Milestones Scale, Developmental Quotient (CAT/CLAMS DQ) using linear regressions with robust standard errors, adjusted for potential confounders.

**Results:** Families of 225 infants completed questionnaires. Demographic information is summarized in the table. The mean home literacy score (HLS) was 3.76 (SD 1.63). The mean HLS was higher in families who had private insurance (private=3.92; public=3.39;  $p=0.02$ ) and higher parent education (had some or graduated high school=2.79; had some or graduated college=3.77; graduate degree=4.19;  $p<0.01$ ) but did not vary by gestational age (<28 weeks at birth=3.65;  $\geq 28$  weeks=3.78;  $p=0.61$ ) or sex (female=3.81; male=3.71;  $p=0.64$ ).

178 infants had HLS and BSID II, BSID III or CAT/CLAMS DQ scores available for analysis. Adjusted for gestational age at birth, corrected gestational age at time of assessment, sex, parent education, and insurance, the associations between HLS and BSID II motor score (estimated effect size of 2.43,  $p=0.01$ ), as well as between HLS and BSID III motor score (estimated effect size of 2.76,  $p=0.02$ ), were statistically significant. Adjusted for potential confounders, there was not enough evidence for statistically significant associations between HLS and other scores.

**Conclusions:** The home literacy environment is associated with parental education and primary insurance. There is some suggestion that the home literacy environment in former NICU infants is correlated with developmental outcomes, however further studies are needed. This suggests that while much of neonatal outcomes research is focused on gestational age, birthweight and the NICU environment, socioeconomic determinants of health can be critical in this population.

Table: Demographic characteristics of children and questionnaire respondents

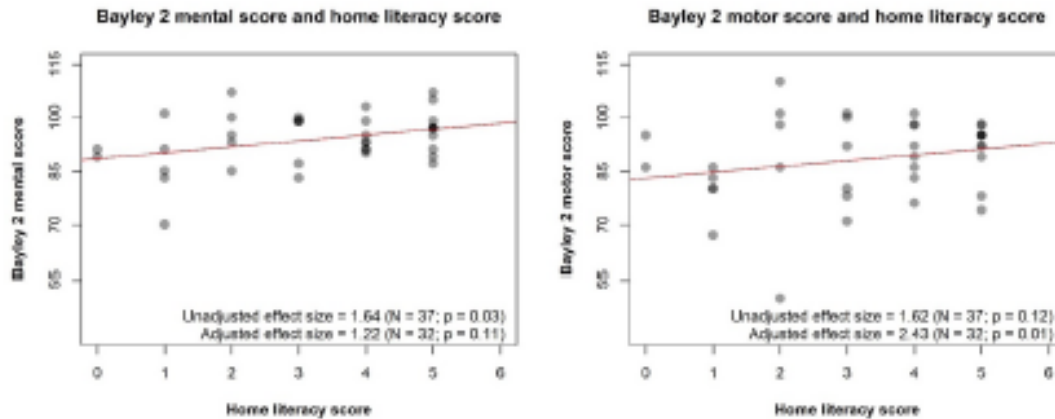
|                                                 |             |
|-------------------------------------------------|-------------|
| Male – no. (%)                                  | 120 (53.3%) |
| Gestational age at birth (weeks) – mean (SD)    | 32.0 (4.2)  |
| Less than 28 weeks gestation at birth – no. (%) | 46 (20.4%)  |
| Birth weight (kg) – mean (SD)                   | 1.75 (0.89) |
| Respondent's relation to subject – no. (%)      |             |
| Mother                                          | 164 (72.9%) |
| Father                                          | 21 (9.3%)   |
| Mother/Father                                   | 17 (7.6%)   |
| Other                                           | 11 (4.9%)   |
| First baby of respondent – no. (%)              | 125 (55.6%) |
| Respondent's maximum schooling – no. (%)        |             |
| Did not finish high school                      | 10 (4.4%)   |
| Graduated high school/GED                       | 23 (10.2%)  |
| Did some college                                | 39 (17.3%)  |
| Graduated college                               | 66 (29.3%)  |
| Graduate degree                                 | 67 (29.8%)  |
| Spoken language at home – no. (%)               |             |
| English                                         | 186 (82.7%) |
| Spanish                                         | 30 (13.3%)  |
| Other                                           | 57 (25.3%)  |
| Insurance – no. (%)                             |             |
| Private insurance                               | 135 (60.0%) |
| Public insurance                                | 71 (31.6%)  |
| No insurance                                    | 1 (0.4%)    |

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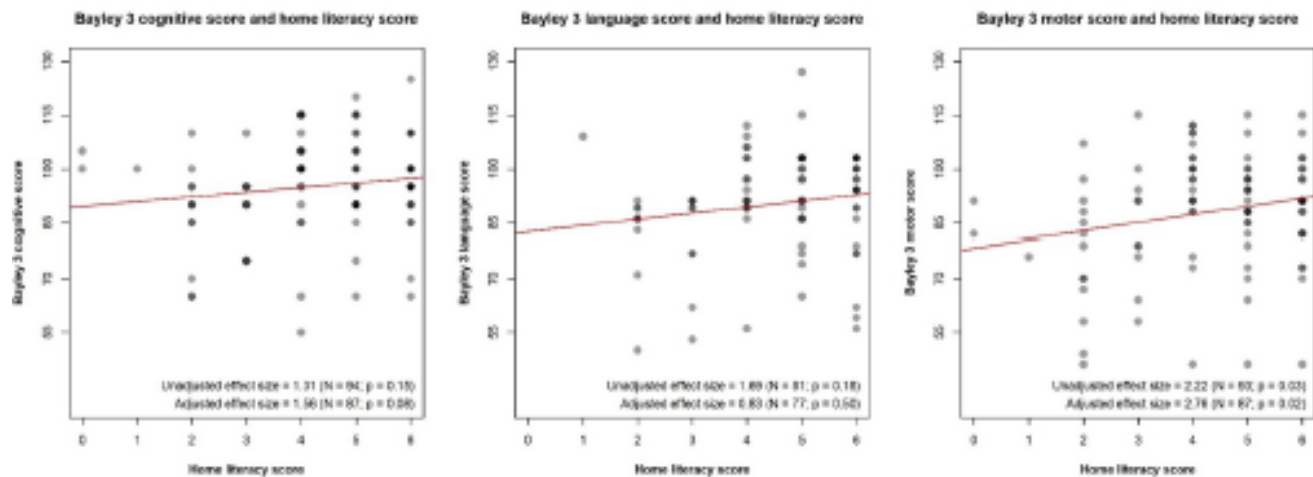
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Figure: Correlation between standardized developmental test scores and home literacy score

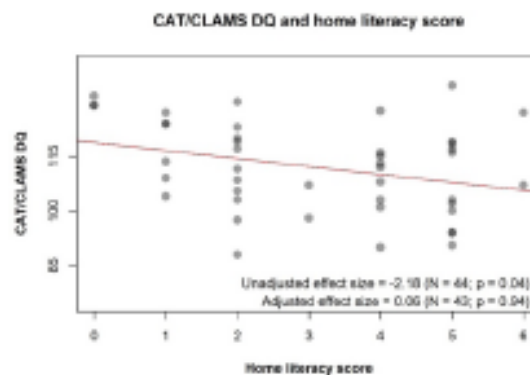
### Bayley 2:



### Bayley 3:



### CAT/CLAMS DQ:



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### **Abstract 36: Language, screen exposure and peer relation problems in preschool children**

*Xirui Ma, Bachelor; Yiwen Zhang, Master, Shanghai Children's Medical Center, Shanghai, China*

**Purpose:** Media exposure offers both benefits and risks to the language development of children today. Children with language impairment always find it difficult to communicate with peers and experience peer rejection in preschool. We aimed to explore potential risk factors for peer relation development in children with and without language impairment.

**Methods:** We retrospectively collected language impairment cases and no language impairment cases in Developmental & Behavioral Pediatric Department, Shanghai Children's Medical Center from September to December 2014. Forty-three language impairment cases (boy=34, girl=9, mean age $\pm$ SD=50.86 $\pm$ 9.680 months) and seventy-one no language impairment cases (boy=43, girl=28, mean age $\pm$ SD=52.25 $\pm$ 10.879 months) ended up consisting of the sample. Language measures was used by the Diagnostic Receptive and Expressive Assessment of Mandarin (DREAM). Logistic regression model measured the association between peer relation problems and potential risk factors, such as screen exposure and demographic factors, in both language impairment and no language impairment groups.

**Results:** In preschool children, those who have language impairment are 5.105 times more likely to have peer relation problems than language normal peers. In children with language impairment the abnormal peer relation rate was 67.44%; 30.99% of children with typical language scored abnormally. When demographic factors were controlled for, language-impaired children whose media use increasing by one hour in weekdays would heighten the risk of peer relation problems by 2.753 times (OR=2.753, 95%CI 1.021-7.425,  $P=0.045$ ). Family social-economic status had little impact on the association between screen time and development of peer relation in language-impaired children.

**Conclusions:** Language impairment plays a negative role on the peer relationship development in preschool children. Long time exposure on screens was especially harmful to peer relation development in children with language impairment. Screen time must be strictly limited to children with language impairment, and time spending on home interactive play should be increased, which both decrease preschool children's risk for peer relation problems.

### **Abstract 39: Rapid Prototyping Design Methods in Resident Education on Relational Health**

*David O'Banion, MD, Emory University School of Medicine, Pediatrics Institute, Atlanta, GA; Judy Austin, PhD, Mailman School of Public Health, Columbia University,, New York, NY; Diana Litsas, BS; Martha Welch, MD, Nurturing Science Program, Columbia University Irving Medical Center, New York, NY*

**Purpose:** By adapting the Welch Emotional Connection Screen (WECS)<sup>1</sup> into a relational health education experience that could be taught to pediatric interns during their DBP rotation, we sought to develop and refine to a novel product that would be used to improve resident assessment of mother-infant interactions.

**Methods:** Rapid Prototyping (RP) uses ongoing consumer [resident] feedback until final design is optimized<sup>2</sup>. RP prioritizes formative over summative evaluation and is helpful in early design when efficacy is unclear.

We began with a demo set of lecture slides and pre-coded dyad videos, then solicited and recorded purposeful, immediate resident feedback as we taught and improved the education product. These improvement "cycles" led to modified text, charts, and videos that were then used to teach the following cohort of residents. While challenging, leading ongoing cycles across resident rotations was a robust method that incorporated various learners' frames of reference, and ultimately enhanced the training.

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**Results:** After 4 cycles (rotations), the prototype education intervention produced statistically significant pre/post improvements in accuracy when scoring videoed dyads (mean error improvement pre/post intervention  $t=5.42$ ,  $df=34$ ,  $p<.01$ ). Feedback challenged the educator's assumptions about resident needs and led to teaching *more* about autonomic co-regulation<sup>3</sup>, Perry Preschool Project analysis<sup>4</sup>, toxic stress<sup>5</sup>, and typical vocal/relational developmental trajectories. The intervention underwent 3 more cycles based on qualitative feedback rather than score improvement to encourage residents to observe videos with *less attention* to minutiae and more attention to their instincts. RP ended once formative evaluations indicated no need for remarkable changes, and there was no group effect of timing of the training on resident improvement.

**Conclusions:** Monthly aggregate score variation was insignificant during cycles. Adjusting the intervention based on qualitative data avoided summative evaluations and hastened module improvements. More frequent cycles allowed for measured, deliberate modifications to the training. Following formative comments *on the intervention and by the learner*, we achieved an educational product delivering improvements in resident skill in 4 cycles. RP should be considered by the educator interested in improving or developing an intervention for scholarly pursuits, as RP may shorten the design timeline in education as it proposes to do in product development.

### Abstract 40: Relational Health Education Intervention Improves Resident Ratings of Emotional Connection in Mother/Infant Dyads

David O'Banion, MD, Emory University School of Medicine, Pediatrics Institute, Atlanta, GA; Judy Austin, PhD, Mailman School of Public Health, Columbia University, New York, NY; Diana Litsas, BS; Martha Welch, MD, Nurturing Science Program, Columbia University Irving Medical Center, New York, NY

**Purpose:** We developed and implemented a relational health (RH) training for the Developmental Behavioral Peds rotation. We measured the education intervention's effect on pediatric interns' accuracy using an expanded version of the Welch Emotional Connection Screen (WECS).<sup>1</sup> Interns assessed RH on precoded<sup>2</sup> video interactions between mothers and 4-month old infants pre & post intervention.

**Methods:** Demographics: age, gender, educational experience, career goals, life & work experience in childcare

Pre/Post Rotation Survey: Attitudes, Self-Efficacy & Perceived Professional Norms (PPN) survey adapted from an obesity resident ed intervention<sup>3</sup>

Pediatric interns from 2 regional programs caring for underserved urban populations participated in a didactic multimedia presentation during orientation to the DBP rotation.  $n=0$  opt outs. Using the expanded WECS, interns rated 3 videos of mother/infant dyads (Set A) pre-intervention and 3 new videos (Set B) post-intervention. We compared interns' ratings to a master set, with deviations representing inaccuracy. WECS domains of Attraction (ATT) & Facial Communication (FC) each had 4 items, max deviation (incorrect) score=12. Vocal Communication (VC) & Sensitivity/Reciprocity (S/R) each had 3 items, max deviation score=9

**Results:** 35 of 40 available pediatric interns enrolled and completed sets A&B. None opted out

66% female, median age 28

childcare experience: personal, none=89%; professional, none=42%

Inaccurate scores of RH improved significantly post-education; paired t-tests by domain ( $df=34$ ): ATT  $t=-8.1$ ,  $p<.001$ ; FC  $t=-3.75$ ,  $p<.001$ ; VC  $t=-3.48$ ,  $p<.001$ ; S/R  $t=-4.02$ ,  $p<.001$

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We observed a positive change in attitudes ( $t=2.39$ ,  $df=21$ ,  $p=.026$ ) and self-efficacy ( $t=9.57$ ,  $df=21$ ,  $p<.001$ ) but not PPN ( $t=1.45$ ,  $df=21$ ,  $p=.161$ ) for the  $n=22$  with an end-of-rotation PPN

No demographic factor predicted skill improvement for this homogenous sample

More seasoned interns scored **no** better on Set A or B. Also, there was no group effect on the improvements between the A&B

**Conclusions:** Set A (baseline skill) trends did not improve over the academic year suggesting RH training is not otherwise covered in their programs. Any intern seems capable of learning such an abstract skill. Pediatric interns can learn to score videos of mother/infant dyads on a RH tool, but the effect of the training on use of the published, condensed tool (WECS) and long term skill maintenance requires further study. Their ability to measure and treat RH problems in clinic warrants future study.



### Abstract 42: Neural Markers of Hyperactivity in Fragile X Syndrome

Carol Wilkinson, MD, PhD; Charles Nelson, PhD, Boston Children's Hospital, Boston, MA

**Purpose:** Fragile X Syndrome (FXS) is the most common inherited form of intellectual disability. In addition to cognitive deficits, children with FXS often struggle with significant behavioral challenges, including inattention, hyperactivity, anxiety, autism, and aggression. Clinical trials for FXS have commonly utilized the Aberrant Behavior Checklist (ABC, a parent-report measure) as a primary outcome measure to evaluate improvements in irritability, hyperactivity and social avoidance. Unfortunately, such parent-report measures are plagued by placebo effects, expectancy biases, and parental response variability, and clinical trials in FXS have yet to be successful. Reliable biomarkers, reflective of underlying neurobiology, are needed for use in clinical trials as an objective measure of targeted outcomes. Here we present preliminary data from a study in 2 to 7-year-old boys with FXS aimed at

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identifying EEG based biomarkers of cognitive and behavioral challenges. We specifically present data related to hyperactivity, as this is one of the most common comorbidities in FXS.

**Methods:** EEG and behavioral data from 7 FXS and 8 typically developing age-matched boys were collected and analyzed. As previous studies in children with Attention Deficit Hyperactivity Disorder have most consistently observed increases theta power, we hypothesized that theta power would be associated with increased hyperactivity in children with FXS. Theta power was measured from frontal, central, and temporal electrodes, and then linear regression models were used to determine whether theta power was associated with scores on the ABC Hyperactivity and Irritability subscales.

**Results:** As expected FXS participants had significantly lower verbal and nonverbal abilities (Mann-Whitney,  $P < 0.0001$ ); however they only had marginally significantly higher scores on the ABC Hyperactivity ( $3.4 \pm 3.3$  vs  $7.7 \pm 6.6$ ;  $p = 0.054$ ) and Irritability subscales ( $6.4 \pm 5.4$  vs  $15.3 \pm 11.9$ ;  $p = 0.11$ ). No significant differences were observed in mean theta power over frontal, central, or temporal regions. A significant positive relationship was observed between theta power and scores on both the hyperactivity and irritability subscales of the ABC within the FXS group when controlling for age (Adjusted  $R^2 = 0.523$ ,  $P < 0.001$ ; Adjusted  $R^2 = 0.460$ ,  $P = 0.001$  respectively). In addition, this relationship was significantly different from the control group ( $P = 0.003$ ).

**Conclusions:** Theta power may be a useful biomarker for hyperactivity and irritability in children with Fragile X Syndrome.

### Abstract 44: The home environment of children under 3 years old in Shanghai

*Mingyu Xu, Doctor; Fang Ren, Master; Lixiao Shen, Doctor; Fei Li, Doctor, Xinhua Hospital affiliated to Shanghai Jiaotong University School of Medicine, Shanghai, N/A, China*

**Purpose:** To evaluate the home environment of children under 3 years old in Shanghai, China, and assess how children's behavior may be influenced by factors such as caring style. We performed a cross-sectional population-based study, involving 8500 families.

**Methods:** Every family was asked to complete specially-designed questionnaires covering 20 items including demographic information, family socioeconomic status, caregivers' greatest concerns in bringing up children, the children's interactions with parents or caregivers, and children's self-help skills.

**Results:** In total, 7459 questionnaires were returned, a response rate of 87.8%. The majority of families were three-generational in structure. In total, 9.2% of parents and 15.5% of grandparents were most concerned about children's weight, 5.3% and 5.5% with height, 33.6% and 23.0% with psychological development, and 51.9% and 56.0% with somatic disease. Children had around 1–2 hours of screen exposure per day, increasing with age. In total, 31.1% children under 18 months old had been exposed to a screen. Most of the children over 2 years old needed help with feeding and getting dressed: 40% of the children were fed by their caregivers, and 68.5% of children were dressed by their parents.

**Conclusions:** The most common family structure in China is three-generational, and most children are reared by their grandparents. Most grandparents care more about children's physical condition than their social and emotional development, which indicates an ongoing need for information and education for primary caregivers and parents about caring skill, supporting self-help behaviors and limiting screen use.

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**Table 1** Demographic background of the study population

| Item               | category                | n    | %    |
|--------------------|-------------------------|------|------|
| gender of children | boy                     | 3648 | 49.5 |
|                    | girl                    | 3729 | 50.5 |
| race of children   | Han                     | 6707 | 89.9 |
|                    | others                  | 113  | 1.5  |
| Family structure   | nuclear family          | 2305 | 31.4 |
|                    | Three-generation family | 4863 | 66.2 |
|                    | Single parent family    | 54   | 0.7  |
|                    | Reconstituted family    | 25   | 0.3  |
| Income of family   | ≤\$299                  | 209  | 2.8  |
|                    | \$300–\$746             | 1708 | 22.9 |
|                    | \$747–\$1,493           | 2971 | 39.8 |
|                    | \$1,494–\$2,985         | 1765 | 23.7 |
|                    | ≥\$2,986                | 556  | 7.5  |
| mather's education | master degree or above  | 369  | 4.9  |
|                    | bachelor degree         | 3267 | 43.8 |
|                    | junior college diploma  | 2308 | 31.0 |
|                    | senior middle school    | 1029 | 13.8 |
|                    | Junior middle school    | 416  | 5.6  |
| father's education | master degree or above  | 525  | 7.0  |
|                    | bachelor degree         | 3268 | 43.8 |
|                    | junior college diploma  | 2195 | 29.4 |
|                    | senior middle school    | 1079 | 14.5 |
|                    | Junior middle school    | 318  | 4.3  |

**Table 2** Comparison of the main developmental concerns of parents and grandparents

| concern | Parents (%) |        |                           |                  | Grandparents (%) |        |                           |                  | $\chi^2$ | P value |
|---------|-------------|--------|---------------------------|------------------|------------------|--------|---------------------------|------------------|----------|---------|
|         | weight      | height | psychological development | Physical disease | weight           | height | psychological development | Physical disease |          |         |
| First   | 9.2         | 5.3    | 33.6                      | 51.9             | 15.5             | 5.5    | 23.0                      | 56.0             | 108.65   | <0.01   |
| Second  | 12.2        | 15.7   | 44.1                      | 27.9             | 18.4             | 22.3   | 37.9                      | 21.4             | 41.11    | <0.01   |
| Third   | 29.9        | 52.9   | 11.4                      | 5.8              | 26.8             | 50.2   | 13.9                      | 9.1              | 235.02   | <0.01   |
| Forth   | 48.8        | 26.1   | 11.4                      | 13.8             | 39.7             | 22.2   | 25.3                      | 12.7             | 48.15    | <0.01   |

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Table 3 Amounts of caregiver-child interaction

| Age    | Primary caregiver-child interaction |      | Parent-child interaction |      |
|--------|-------------------------------------|------|--------------------------|------|
|        | Mean (h)                            | SD   | Mean (h)                 | SD   |
| 0-6m   | 3.13                                | 1.23 | 3.02                     | 1.17 |
| 6-12m  | 3.42                                | 1.2  | 3.13                     | 1.03 |
| 12-18m | 3.51                                | 1.1  | 3.17                     | 0.98 |
| 18-24m | 3.48                                | 1.07 | 3.13                     | 0.95 |
| 24-30m | 3.45                                | 1.08 | 3.13                     | 0.96 |
| 30-36m | 3.39                                | 1.05 | 3.09                     | 0.96 |

### Abstract 45: Referring ADHD: Gaining Perspective From Primary Care

Brian Harris, MD; Noelle Huntington, PhD; Eugenia Chan, MD, MPH, Boston Children's Hospital, Boston, MA

**Purpose:** The American Academy of Pediatrics guidelines and diagnostic toolkits for primary care diagnosis and management of children with ADHD were published in 2000-2001 and updated in 2011. Yet, many patients with straightforward ADHD continue to be referred for subspecialty evaluation. Meanwhile, increasing numbers of Advanced Practice Providers are joining the pediatric primary care workforce. It is unknown to what extent these clinicians diagnose and manage patients with ADHD within primary practice or refer for subspecialty care.

**Methods:** We conducted a cross-sectional electronic survey of pediatric primary care APPs using the member lists of the National Association of Pediatric Nurse Practitioners and Society for Physician Assistants in Pediatrics. Survey domains addressed provider demographics, comfort with diagnosis and management of ADHD, practice resources, family preferences, patient demographics, concern for co-existing conditions, and treatment response. Items were rated on a Likert scale from 1 (less comfortable) to 4 (more comfortable) or from 1 (more likely to refer) to 10 (less likely to refer). We conducted T-tests and Chi-square analysis to identify group differences.

**Results:** 198/275 respondents were eligible and completed the survey. Most respondents rated themselves as comfortable diagnosing and managing ADHD (Mean = 3.05 +/- 0.72). We stratified respondents by level of comfort (high v. low) and likelihood to refer (more likely v. less likely). We found no significant difference between groups based on comfort level or likelihood to refer on practice region, practice type, years in practice, level of autonomy, or ability to prescribe controlled substances. APPs working in suburban settings report significantly lower levels of comfort ( $X^2 = 6.420$ ;  $p = 0.04$ ). Respondents who endorsed being designated as the practice's primary provider for behavioral/mental health concerns had significantly higher levels of comfort ( $X^2 = 10.884$ ;  $p = 0.001$ ) and were less likely to refer ( $X^2 = 6.381$ ;  $p = 0.12$ ).

**Conclusions:** We found that most primary care-based APP clinicians felt comfortable diagnosing and managing ADHD, but those who were the designated mental/behavioral health provider for their practice were more comfortable and more likely to manage patients within the practice. Activities to identify and ameliorate gaps in ADHD knowledge and care need to consider this growing part of the primary care pediatric workforce.

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### **Abstract 46: CrossFit KAMP: An Intervention to Improve Social Skills in Children with Autism**

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**Purpose:** Peer relationships and social skills (SS) are core challenges for those with autism spectrum disorders (ASD). Limited research suggests that exercise programs such as karate, have shown positive effects on SS. CrossFit Kids provides a scalable structured exercise program in a group training atmosphere that incorporates combinations of core functional and strength exercises. CrossFit Kids could potentially promote SS development; however it has not been previously studied in children with ASD.

**Methods:** CrossFit KAMP is a wait-list randomized controlled study for children with ASD ages 8-11 years old. The intervention is a 14 week (twice weekly) CrossFit Kids exercise program with specific aims of improving SS, self-esteem, and behavioral symptoms. Parent and participant self-esteem, social and behavioral rating scales were administered at baseline, after the 14-week intervention period, and 8 weeks post-intervention. Assessment of treatment effects was evaluated by Wilcoxon signed rank test for group 1 pre-post data and by Wilcoxon rank sum test for between group data.

**Results:** Both groups had similar attendance rates (group 1(n=10): 85% & group 2(n=5):81%). Group 1 demonstrated significant improvements in social behaviors as measured by the PROMIS Parent-Proxy Peer Relationship Measure (PPPRM) ( $p=0.004$ ) and SRS Communication subscale t-score ( $p=0.03$ ). Improvements in the SRS Social Communication Index t-score and SRS Restricted and Repetitive Behaviors (RRB) t-score also trended towards significance ( $p=0.06$ ). Compared to the group 2 waitlist, group 1 had better parent and child rated PROMIS Peer Relationship Measures (PPRM:  $p=0.05$  & PPPRM:  $p=0.04$ ) at the end of the first 14 weeks. After 8 weeks follow up, group 1 continued to show improvements in SRS total t-score ( $p=0.04$ ) and SRS RRB t-score ( $p=0.02$ ). Qualitatively, 11/15 participants wanted to do another exercise group like KAMP and 12/15 made a friend. Parent report shows 12/15 children verbally conveyed enjoyment in KAMP, and 11/15 made a friend.

**Conclusions:** Results of this pilot study demonstrate that CrossFit KAMP is feasible, can help improve peer relationships and SS, and possibly reduces RRBs. Qualitatively, both participants and parents reported enjoyment in participating, wanting to continue exercising in a group like KAMP, along with making a friend. CF KAMP may be a promising intervention to help improve peer relationships, SS, and RRBs for children with ASD while also providing improved health through exercise.

### **Abstract 50: Co-Sleeping: Predictors and Correlates among Low-Income School-Age Children**

*Kimberley Levitt, MD, University of Michigan Medical School, Ann Arbor, MI; Alison Miller, PhD, University of Michigan, Ann Arbor, MI; Katherine Rosenblum, PhD; Barbara Felt, MD, University of Michigan Medical School, Ann Arbor, MI; Harlan McCaffery, MS, University of Michigan, Ann Arbor, MI; Julie Lumeng, MD, University of Michigan Medical School, Ann Arbor, MI*

**Purpose:** To identify the parenting, child temperament, and psychosocial stressors that predict co-sleeping among low-income school-age children.

**Methods:** Participants recruited from Head Start participated in a study of eating behaviors at T1: age  $M=4.2$  ( $SD=0.5$ ) years with follow up at T2:  $M=5.9$  ( $SD=0.7$ ) and T3:  $M=7.9$  ( $SD=0.7$ ). Co-sleeping was evaluated by 4 questions (3 = Usually; 2= Sometimes; 1= Rarely) from the Children's Sleep Habits Questionnaire (T3) (falling asleep in own bed, falling asleep in parent's or sibling's bed, needs parent in room to fall asleep, and moves to someone else's bed during the night). Parents reported on parenting (Parenting Scale Laxness and Overreactivity Subscales (T3) and

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Working Model of the Child Interview representations that predict maternal-child attachment (T2)), child temperament (T1) (Child Behavior Questionnaire (CBQ) subscales activity, surgency, inhibition, impulsivity, attentional control, effortful control, shyness, intensity, anger), psychosocial stressors (T3) (Perceived Stress Scale, CHAOS Scale, Life Events Checklist, Family Climate, and Center for Epidemiologic Studies-Depression Scale), and demographics. A multivariate ordinal logistic regression model was created for each of the 4 co-sleeping outcomes, including all predictors associated in unadjusted models, and sex, race/ethnicity, age and maternal education.

**Results:** The sample (n=253) was 50% male, 54% non-Hispanic white. In multivariate models, not falling sleep in own bed (29%  $\geq$  sometimes) was predicted by Parenting Scale Laxness (OR 1.44 (95% CI 1.10-1.90)), female sex (OR 1.83 (95% CI 1.06-3.22)) and Hispanic or not white race/ethnicity (OR 1.79 (95% CI 1.04-3.12)); falling asleep in parent's or sibling's bed (37%  $\geq$  sometimes) was predicted by CBQ activity subscale (OR 0.61 (95% CI 0.41-0.90)) and Hispanic or not white race/ethnicity (OR 2.41 (95% CI 1.42-4.14)); needs parent in room to fall asleep (17%  $\geq$  sometimes) was predicted by Parenting Scale Laxness (OR 1.70 (95% CI 1.20-2.42)); and moves to someone else's bed during the night (30%  $\geq$  sometimes) was predicted by Hispanic or not white race/ethnicity (OR 1.76 (95% CI 1.02-3.06)).

**Conclusions:** Parenting laxness predicts co-sleeping among low-income school-age children, while psychosocial stress, child temperament and maternal-child attachment do not, suggesting an important role for parenting supports focused on authoritative parenting for addressing co-sleeping.

## Poster Session II - Abstracts

### **Abstract 51: Medication Used for Initial ADHD Medication Treatment of Preschoolers Seen within DBPNet Centers**

*Elizabeth Harstad, MD, MPH; William Barbaresi, MD, Boston Children's Hospital, Boston, MA; Ami Bax, MD, Oklahoma University Medicine, Oklahoma City, OK; Alexis Deavenport-Saman, DrPH, MPH, Keck School of Medicine, University of Southern California/ Children's Hospital Los Angeles, Los Angeles, CA; Sandra Friedman, MD, Children's Hospital Colorado, Aurora, CO; Nathan Blum, MD, Children's Hospital of Philadelphia, Philadelphia, PA*

**Purpose:** 1. To compare the frequency with which stimulants and alpha-2 agonists (A2As) are prescribed by DBPs for initial ADHD medication treatment in preschool aged children, and 2. To determine if age and co-morbidity are associated with the initial medication prescribed.

**Methods:** We reviewed electronic health records at 6 outpatient DBP practices within the Developmental and Behavioral Pediatrics Research Network. Subjects were children ages 0-72 months treated by DBPs with a medication for ADHD from 1/1/2013 through 7/1/2017. We abstracted data about the age at initial medication treatment, diagnoses, and type of medication prescribed. For this analysis, we focused on initial medication treatment. We used chi-square analyses to determine if age and co-morbidity status (both number and type of co-morbidity) were associated with type of ADHD medication prescribed.

**Results:** We abstracted data from records of 261 preschoolers with ADHD who were treated with medication. Mean age of subjects was 59.7 months at initial ADHD treatment and most (88.5%) had at least one co-morbidity. Stimulants were the initial medication prescribed to 68.2% of subjects (of these 89.9% were methylphenidates and 9.0% were amphetamines; 1.1% unknown) and A2As were the initial medication prescribed to 31.8% of subjects (of these 90.8% were guanfacine and 9.2% were clonidine). Most common co-morbidities were Language/Communication/Speech Disorder (40.2%), Sleep Disorder (24.5%), Motor Disorder (21.1%), Disruptive Behavior Disorder (19.2%), and Autism Spectrum Disorder (16.1%). Subjects prescribed A2A were younger than subjects prescribed stimulants (mean age 55.8 months versus 61.5 months; p-value < 0.01). Subjects with more co-morbidities were more likely to be prescribed A2A versus stimulants (chi-square p-value < 0.01). The overall rate of

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initial treatment with A2A was 31.8%, but receipt of A2A was higher for those with the following co-morbidities: Co-morbid Sleep Disorder (46.9%); Disruptive Behavior Disorder (50.0%); and Autism Spectrum Disorder (50.0%; chi square p-values 0.003; 0.002; 0.006, respectively).

**Conclusions:** While stimulants are prescribed more often than A2As by DBPs for initial medical ADHD treatment in preschoolers, A2As are also frequently prescribed. Younger age and presence of co-morbidities are each associated with increased likelihood of A2A versus stimulant use. Future research is needed to compare the efficacy of stimulants versus A2As in preschoolers with ADHD.

### **Abstract 52: A pilot study exploring the demographic and social correlates of parenting mindset**

*Mei Elansary, MD, Boston Children's Hospital, Boston, MA; Dana Charles McCoy, PhD, Harvard University, Cambridge, MA; Lara Pierce, PhD, Boston Children's Hospital, Boston, MA; Barry Zuckerman, MD, Boston Medical Center, Boston, MA; Charles Nelson, PhD, Boston Children's Hospital, Boston, MA*

**Purpose:** The role of a child's growth versus fixed mindset (belief about whether intelligence is malleable or fixed, respectively) on school achievement is well established, particularly for low-income children. There is now preliminary evidence that parent mindset can shape parenting behaviors. For example, parents with growth mindsets report engaging in more reading and math activities with their children compared to those with a fixed mindset. Parent mindset is an important area of future inquiry, yet little is known about the demographic and social factors associated with fixed mindsets. The objective of the current study was to determine the extent to which income, education, perceived stress, depression, and exposure to adversity predict parental mindset during the child's first year.

**Methods:** The present study recruited English and Spanish-speaking adult mothers of full-term children 2-12 months old receiving care at an urban primary care clinic serving predominately publicly insured children. Maternal factors included exposure to adversity as ascertained by the Recent Life Events Questionnaire (RLEQ) (e.g. unemployment, community violence, and housing difficulties), the Perceived Stress Scale (PSS), the Edinburgh Postnatal Depression Scale (EPDS), and self-reported education and income completed when the child was 2 months old. Between 6-12 months, parental mindsets were measured with Dweck's Theories of Intelligence (TOI) scale, which consists of 8 self-reported questions on a 6-point scale. Items were averaged to calculate participants' final TOI scores, with higher scores consistent with a fixed mindset.

**Results:** 41 mothers (mean age 27.9 years; SD 5.64) were included in the analysis. 39% reported family income  $\leq$  \$35,000, 44% reported their highest education level as high school/GED, 12% reported some high school or less, 59% were single mothers. The TOI scale showed good internal consistency ( $\alpha = .90$ ). The mean TOI score was 2.55 (SD=1.00; range 1-5.38). There was a significant correlation between fixed mindset and maternal perceived stress. Correlations between fixed mindset and adversity, depression, income, and education were not significant but these relationships were trending in the expected direction (Table 1).

**Conclusions:** This pilot data demonstrates a significant association between maternal stress and fixed mindset. These findings inform future studies including the potential for mindset parenting interventions targeting vulnerable parents.

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Table 1: Correlations with Parental Fixed Mindset

|                                      |                     |                   |
|--------------------------------------|---------------------|-------------------|
| Maternal Education                   | Pearson Correlation | -.061             |
|                                      | Sig. (2-tailed)     | .707              |
| Family Income                        | Pearson Correlation | -.077             |
|                                      | Sig. (2-tailed)     | .630              |
| Perceived Stress                     | Pearson Correlation | .317 <sup>*</sup> |
|                                      | Sig. (2-tailed)     | .047              |
| Recent Life Events                   | Pearson Correlation | .108              |
|                                      | Sig. (2-tailed)     | .507              |
| Edinburgh Postnatal Depression Scale | Pearson Correlation | .210              |
|                                      | Sig. (2-tailed)     | .193              |

### Abstract 56: Clinical Correlates of Sinistrality in U.S. Children: Data from the National Collaborative Perinatal Project

Devyn Riggsby, BA, Yale University, New Haven, CT; Sarah Keim, MA, MS, PhD, The Research Institute at Nationwide Children's Hospital, Columbus, OH; Andrew Adesman, MD, Cohen Children's Medical Center of NY, Lake Success, NY; Nancy Lu, MD, Yale University, New Haven, CT

**Purpose:** Previous researchers have documented increased frequency of left-handed children among the intellectually gifted and among males born in March - July. Furthermore, prior studies have found that left-handed children are more likely to exhibit symptoms of Attention-Deficit/Hyperactivity Disorder (ADHD). However, these studies have suffered from small sample sizes, cross-sectional versus longitudinal designs, and reliance on parent or teacher reports of handedness.

**Methods:** Data from the 1959-1973 National Collaborative Perinatal Project (CPP) were analyzed. At age 7, a psychologist assessed participants' lateral preference and IQ on the Wechsler Intelligence Scale for Children (WISC). A separate neurological exam was conducted, which also assessed laterality and identified neurological abnormalities. Children with obstetric/perinatal risk factors or abnormal neurological exams were excluded (Figure 1). Respondents (N=25,385) were categorized by hand/eye preference, WISC IQ score, and birth month. Respondents were also rated on a five-point scale for short attention span, high level of activity, and impulsive nature of activity. Odds ratios (aORs), obtained from logistic regressions and adjusted for sex, race, and socioeconomic status, were calculated to determine associations between lateral preference and giftedness, season of birth, or ADHD symptoms.

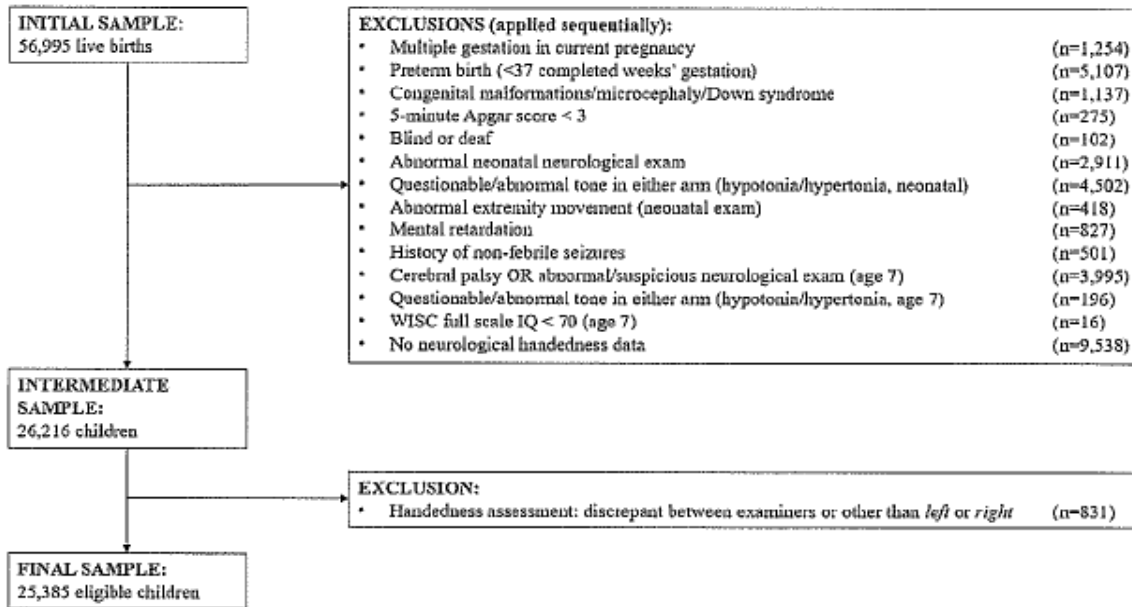
**Results:** 25,385 children met criteria for inclusion (Table 1). Those with left eye/left hand preference had lower full scale IQs and performance IQs compared to the right hand/right eye group (Table 2), but no association was found between sinistrality and giftedness (Table 3). No association was found between sinistrality and birth season (Table 4). For children of mixed or left hand/eye laterality, the odds of exhibiting ADHD symptoms were not greater than those of children with right hand/eye laterality in 17 of 18 models examined (Table 5). Children with right hand/left eye laterality had greater odds of exhibiting hyperactivity (aOR: 1.15 (95% CI: (1.04 – 1.28))).

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**Conclusions:** In this large, longitudinal sample, sinistrality in children is not associated with giftedness and season of birth. Modest associations were observed between hand/eye preference and IQ and hyperactivity only.

**Figure 1: Participant Flow Diagram with Cohort Exclusionary Criteria from the National Collaborative Perinatal Project Dataset, 1959-1973**



### Abstract 59: "Keep calm and use context clues": An investigation into Interoceptive Awareness (IA) in autistic teens

Christy Lucas, BS, Penn State College of Medicine, Hershey, PA; Kelly Mahler, MS, OTR/L, Elizabethtown College, Elizabethtown, PA; Eric Schaefer, MS, Penn State Hershey Medical Center, Hershey, PA; Cheryl Tierney-Aves, MD, MPH, Penn State Children's Hospital, Hershey, PA

**Purpose:** Interoceptive Awareness (IA) shapes our emotional experience and underlies the ability to clearly interpret emotions like anger, calmness, distractibility, and fear (i.e., specific affective emotions) as well as hunger, thirst, and body temperature (i.e., homeostatic emotions). Teens with autism spectrum disorder (ASD) are often reported to have difficulty with emotional regulation, and it is possible that IA is a key factor. We hypothesize teens with ASD will report differences in IA compared to neurotypical controls.

**Methods:** A novel 55-item Likert Scale survey was administered to teens with and without ASD, gauging general IA (12 items), homeostatic emotions (14 items), and specific affective emotions (19 items). Possible responses were never, sometimes, and frequently/always. Items were compared between groups using a Fisher's Exact Test. Bonferroni correction determined only p-values

**Results:** Our study included 143 teens, 59 teens (41%) with ASD and 84 teens (79%) without. Autistic teens had a mean age of 14.5 years, and 75% were male. Controls had a mean age of 13.2 years, and 46% were male. Ten of the 12 items assessing general IA (83%), 4 of the 24 (17%) assessing homeostatic emotions, and 6 of the 19 (32%) items assessing specific affective emotions were significantly different between the groups. Responses to questions assessing general IA were more likely to significantly differ between groups. For example, for the item, "Figuring out how I feel can be tricky," 39% of teens with ASD endorsed "frequently/always" compared to 6% of teens without ASD ( $p<0.0001$ ). Responses to items assessing homeostatic and specific affective emotions were less likely to significantly

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differ between groups. To illustrate, there were no significant differences between responses for the two items: (1) “I can wear shorts or no jacket outside for a long time on a chilly winter day and not feel cold” ( $p=0.070$ ), i.e., assessing temperature and (2) “I can feel changes in my muscles when I am angry” ( $p=0.347$ ), i.e., assessing anger. Open-ended, abstract questions appear challenging for teens with ASD to interpret compared to more specific, detailed, concrete questions.

**Conclusions:** Autistic teens may benefit from targeting the skills necessary to scaffold concrete details from their daily interoceptive experiences onto more abstract emotional concepts, where inference and subtextual analysis are required.

### **Abstract 60: Taking the Autism Spectrum Ambassador Program (ASAP) to the ED, STAT!**

*Christy Lucas, BS; Himadri Patel, BS & BA; Amalia Brawley, BS, Penn State College of Medicine, Hershey, PA; Cheryl Tierney-Aves, MD, MPH; Robert Olympia, MD, Penn State Children's Hospital, Hershey, PA*

**Purpose:** Children with Autism Spectrum Disorder (ASD) often face negative experiences when accessing healthcare, and autism care plans have been shown to improve patient outcomes. The Autism Spectrum Ambassador Program (ASAP) aims to improve the healthcare experience for children with ASD and their families by providing a trained Medical Student Ambassador (MSA) and Accommodation Plan to facilitate patient-centered care, meeting the child's unique needs in the Emergency Department (ED). The purpose of this study was to assess and evaluate the utility of this novel program in the ED through patient and provider experiences.

**Methods:** Program materials were created by study personnel to teach volunteer medical students about ASD and ASAP. ASAP was initially implemented in the same-day surgery center at Penn State Hershey Children's Hospital, but several barriers limited its success. Thus, multiple Plan, Do, Study, Act (PDSA) cycles were implemented to identify barriers and propose improvements.

**Results:** PDSA cycles highlighted two main barriers: an inefficient consent process and limited availability of medical students to serve as MSAs, leading to fewer accommodation plans for healthcare providers. Therefore, we moved the ASAP program to the ED, where there was equal, if not greater need. Upon check-in, children with ASD were identified. Parents were given the option to participate in ASAP. Parents filled out the consent and Accommodation Plan on an iPad provided in the waiting room, and this data was then relayed to the necessary members of the care team (e.g., nurses, physicians, radiologists). The Accommodation Plan assisted the care team in understanding an autistic child's unique needs in performing necessary tasks like physical exams, x-rays, and phlebotomy in a more enlightened and personalized manner.

**Conclusions:** Although this program is in its infancy in the ED and data collection is ongoing, we anticipate continued positive feedback regarding provider and patient/family satisfaction. ASAP continues to work toward improving the healthcare experience for pediatric patients with ASD and their families, breaking down barriers that have prevented high-quality patient-centered care through education and advocacy. We hope ASAP will inspire other providers and healthcare systems to advocate for individuals with ASD and consider implementing similar programs.

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### **Abstract 61: Innovative Program Development: A Culturally-Adapted Pediatric Weight Management Program for Latino Children**

*Claire Niehaus, MA; Robyn Mehlenbeck, PhD; Margaret Jones, PhD; Sina Gallo, PhD, George Mason University, Fairfax, VA*

**Purpose:** Latino children are disproportionately affected by obesity, yet evidence-based treatment guidelines for this population are limited. Thus, we describe the development and initial acceptability of a multidisciplinary group pilot intervention to address pediatric obesity in Latino families, based on evidence-based treatments available in the literature.

**Methods:** Initially, 16 Latino children, aged 4- to 9-years, who are overweight/obese (BMI-for-age  $\geq 85$ th percentile) and their families were recruited through community sites to participate in a 10-week program that addressed diet, exercise, and behavioral health administered by a multidisciplinary team. In particular, we describe the adaption of the evidence based behavioral health portion of this intervention, which was delivered to the child's parents and other family members in a group setting.

**Results:** Results detail the content of the program and cultural adaptations made to meet the needs of this population. Some cultural adaptations include providing recipes based on traditional Latino cuisine, providing childcare to families, having bilingual delivery of the program, and inviting extended family members to attend the intervention sessions. Initial acceptability of the program based on parent interviews showed that 56% of families attended at least 70% of sessions and all families reported feeling more confident in making healthier food choices.

**Conclusions:** This culturally adapted group intervention for Latino families was well accepted and improved self-efficacy among parents. Challenges and further adaptations moving forward are discussed. Since this pilot study, an additional 69 families have participated in the program. Results suggest promise for the utility of culturally adapted family-based pediatric obesity intervention in Latino populations and may inform the development future interventions in this population.

### **Abstract 67: Guilt-Proneness in Siblings Motivates Pro-Social Behaviors Towards The Brother Or Sister With Autism Spectrum Disorder**

*Kirin Noelle Suri, MD; Michael Lewis, PhD, Rutgers RWJMS, New Brunswick, NJ*

**Purpose:** Typically developing (TD) siblings of children with disabilities like Autism Spectrum Disorder (ASD) may experience a range of emotions. One such emotion is the powerful negative self-conscious emotion of guilt; siblings of children with ASD may experience guilt as they wonder if they might have caused their brother or sister's disability and why the disability did not happen to them. While guilt-proneness may motivate pro-social behaviors (Tangney et al., 1991), little is known about whether feelings of guilt in siblings of children with ASD can lead to pro-social behaviors towards the disabled brother or sister.

#### Research Questions:

1. Is the guilt experienced by siblings of children with ASD related to pro-social behaviors towards the brother or sister with ASD?
2. Does the age of the sibling play a role in the development of guilt-proneness and pro-social attitudes towards their brother or sister with ASD?

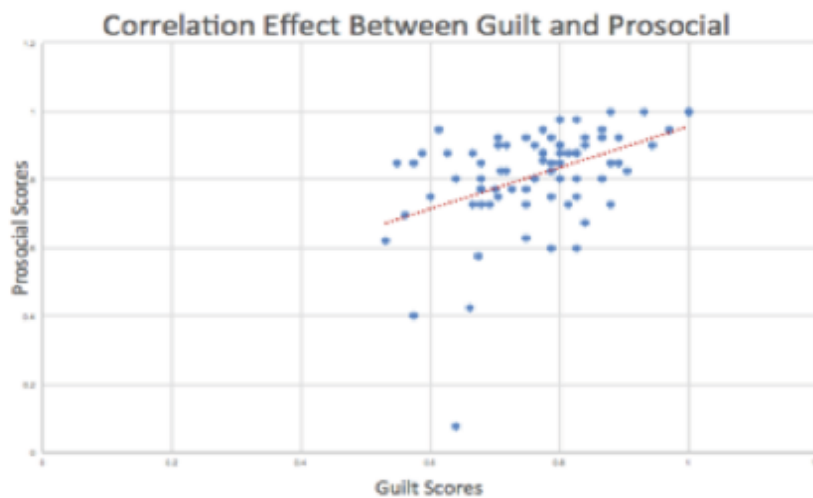
**Methods:** Study participants included 75 TD siblings of children with ASD between 8 and 16 years of age. Male sibling age range was 8-14 years (mean 11.23 years) and female sibling age range was 8-16 years (mean 10.31 years). Fifty-

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one siblings were older than the child with ASD, 18 siblings were younger than the child with ASD, and 6 siblings were twins. Sibling guilt-proneness was measured using the Test Of Self-Conscious Affect for Adolescents aged 12-20 years (TOSCA-A; Tangney et al., 1991) and the Test Of Self-Conscious Affect for Children aged 8-12 years (TOSCA-C; Tangney et al., 1990). Sibling pro-social behaviors were measured using the Sibling Perception Scale (Bennett, 2000).

**Results:** We found a significant correlation between guilt-proneness in siblings and their pro-social behaviors towards the brother or sister with ASD (mean guilt score=0.76; mean pro-social behavior score= 0.81;  $r=0.45$ ;  $p=0.02$ ;  $SD= \pm 0.035$ ). There was no correlation between age of the sibling and guilt-proneness, or age of the sibling and pro-social behaviors.

**Conclusions:** Guilt-proneness in siblings of children with ASD is associated with pro-social behaviors such as altruism and helpfulness towards the brother or sister with ASD. Age of the sibling does not play a role in the development of feelings of guilt or pro-social behaviors towards the child with ASD.



**Figure: Correlation Effect (Pearson's r) Between Guilt-Proneness and Pro-Social Scores in Siblings of Children With ASD;  $r=0.45$ ;  $SD= \pm 0.035$ ;  $p=0.02$**

### **Abstract 68: Face Memory Skills In Children With Autism Spectrum Disorder And Attention Deficit Hyperactivity Disorder**

*Kirin Noelle Suri, MD; Michael Lewis, PhD, Rutgers RWJMS, New Brunswick, NJ*

**Purpose:** Research on face recognition in children with Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD) is limited and equivocal, and focuses on simultaneous face matching and eye tracking skills that do not rely on memory abilities. Face memory recall in ASD and ADHD is important given the variable deficits in executive functioning, working memory, and social cognition in these conditions.

We examined whether children with ASD and ADHD, relative to typically developing (TD) children, differ in memory for faces and whether memory for faces can be improved by increasing exposure time to faces.

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**Methods:** Data from 113 children aged 6-17 years were evaluated, including those with primary ASD (ASD/ASD + co-morbidities), primary ADHD (ADHD/ADHD + co-morbidities), and TD children. Children with ASD and ADHD had secondary diagnoses but none in the ADHD category had ASD.

The Cambridge Face Memory Test (CFMT; Croydon et al., 2014; Duchaine & Nakayama, 2006) computer program was used. Children in the 3 diagnostic categories were randomly assigned to one of two groups based on exposure time to faces such that there were 6 groups in total. During the learning phase, children in each group were shown cropped faces one at a time; those in group 1 could look for as little or as long as they wished (usually from 1-5 sec) while children in group 2 were instructed to look at each face for at least 15 seconds before advancing to the next. During the testing phase, children were shown double the number of faces and had to indicate whether they recalled seeing each presented face previously during the learning phase.

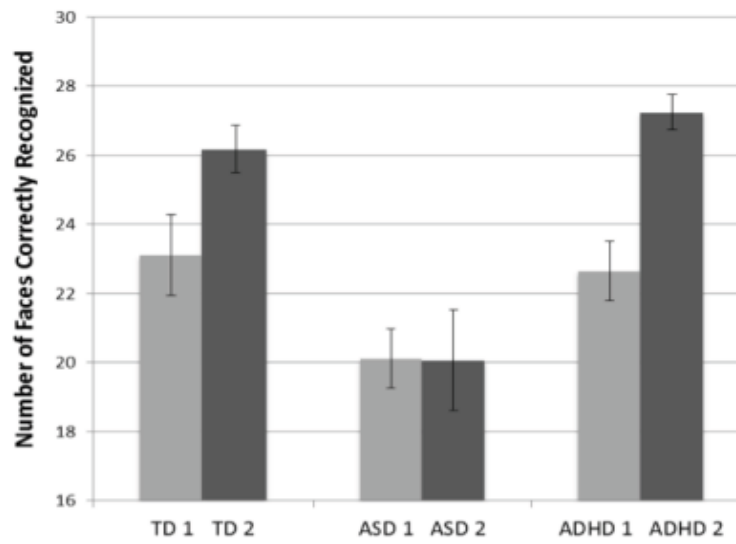
**Results:** A 3x2 ANOVA showed poorer face recognition scores overall in children with ASD compared to ADHD and TD children.  $F(2, 107) = 15.95, p < .001, \eta_p^2 = .23$  confirmed by Tukey's *post hoc* tests ( $p < .05$ ). There were no differences between ADHD and TD children. An interaction effect between diagnosis and exposure time showed that ADHD and TD children in group 2 did better than those in group 1 but children with ASD did not improve in face memory accuracy with increased exposure time to faces.  $F(2, 107) = 3.262, p = .042, \eta_p^2 = .04$ , confirmed by Tukey's *post hoc* tests ( $p < .05$ ) (see figure).

**Conclusions:** Children with ASD have poorer face memory skills when compared to children with ADHD and TD children. Face memory skills in children with ASD do not improve with more exposure time to faces suggesting a unique face memory deficit in these children.

|                         | <i>Typically Developing</i> |                       | <i>ASD</i>            |                       | <i>ADHD</i>              |                       |
|-------------------------|-----------------------------|-----------------------|-----------------------|-----------------------|--------------------------|-----------------------|
|                         | <i>Group 1</i>              | <i>Group 2</i>        | <i>Group 1</i>        | <i>Group 2</i>        | <i>Group 1</i>           | <i>Group 2</i>        |
| Total N                 | 18                          | 17                    | 18                    | 12                    | 24                       | 24                    |
| Mean Age                | 10.11                       | 9.82                  | 9.55                  | 11.50                 | 10.33                    | 11.00                 |
| Age Range               | 6 – 15                      | 6 – 12                | 6 – 16                | 6 – 17                | 6 – 15                   | 8 – 17                |
| % Males                 | 59%                         | 57%                   | 72%                   | 92%                   | 70%                      | 60%                   |
| <u>SES</u><br>Insurance | Private                     | Private               | Private               | Private               | 22 Private<br>2 Medicaid | Private               |
| Parental<br>Education   | 33% HS<br>67% College       | 53% HS<br>47% College | 39% HS<br>61% College | 30% HS<br>70% College | 50% HS<br>50% College    | 50% HS<br>50% College |
| <u>Cognitive</u><br>IQ  | $\bar{X} = 105$             | $\bar{X} = 96$        | $\bar{X} = 96$        | $\bar{X} = 102$       | $\bar{X} = 89$           | $\bar{X} = 98$        |

**Table:** Total N, Mean Age, Age Range, Percent Males, Socio-economic Status, Parental Education & Mean IQ Broken Down By Diagnostic Categories & Groups Based On Exposure Time (Time Spent Looking At Faces) During Learning Phase. *There Were No Differences Between Groups In IQ Or Demographic Factors Except For Male Sex But There Was No Sex X Diagnosis Interaction Noted.*

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**Figure:** Graph Depicting Face Memory Accuracy During the Testing Phase In Groups TD 1, ASD 1, & ADHD 1 (Exposure Time Of Any Duration During The Learning Phase) & In Groups TD 2, ASD 2 & ADHD 2 (Exposure Time Of At Least 15 Seconds During the Learning Phase). *ASD Children showed Overall Poorer Face Memory Accuracy Compared To TD & ADHD Children. ASD Children Did Not Show Improvement In Face Memory Accuracy With Increased Exposure Time.*

## Abstract 72: Growth Mindset in Relation to Intelligence, Executive Function, and Attention in Preschoolers

Irene Loe, MD, Stanford University School of Medicine, San Francisco, CA; Kara Wright, MD, MPH, Bay Area Women's and Children's Center, San Francisco, CA; Nicole Heller, BA, University of Oregon, Eugene, OR; Barbara Berman, PhD, San Francisco Unified School District, San Francisco, CA; Midge Wilson, MDiv, Bay Area Women's and Children's Center, San Francisco, CA; Claudia Mueller, MD PhD, Stanford University, Stanford, CA

**Purpose:** Research in educational psychology has shown that having a “growth” rather than a “fixed” mindset of intelligence (INT) is associated with better academic outcomes for children. We hypothesize that parents also have growth vs fixed views of their children’s executive function (EF) and attention (ATT) that correlate with their mindsets of intelligence. We also examine how these mindsets differ in parents of children with preterm birth (PT) or ADHD, conditions that influence learning.

**Methods:** Parents (N=65) completed mindset rating scales on INT (control condition), EF, and ATT. Children (mean age 59 mo) were drawn from an EF intervention study of (1) full term (FT), (2) PT, and (3) FT-ADHD preschoolers. For INT, parents rated themselves and children; for EF and ATT, children were rated. In each domain, 3 statements were rated on a 6-point likert scale. Mean scores  $\geq 4$  on each scale were categorized as growth. Correlations evaluated associations between parent and child INT mindset scores and among child scores. Descriptives included % with growth vs fixed mindset in the whole group. In subgroups,  $\chi^2$  evaluated proportions with growth vs fixed mindset.

**Results:** Parent and child INT mindset scores were highly correlated,  $r=.82$ ,  $p<.001$ ; child scores were also correlated. In the whole group, parent rated mindset scores showed greater % with growth vs fixed mindset for INT (69 vs 31) and EF (59 vs 41), but not ATT (46 vs 54). For the 3 child groups, % with growth mindset differed for INT and ATT, but not EF. PT had highest % rated with INT growth and ADHD had the lowest % rated with ATT growth mindset.

**Conclusions:** We were able to demonstrate that parents do have mindsets of ATT and EF that may relate to, but are not the same as, their views of INT. Furthermore, children’s medical history may influence how parents view their intellectual potential. More parents of PT children had growth mindset than did parents of children with ADHD. In the

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ADHD group, ATT was viewed as less malleable than INT or EF, perhaps reflecting symptom severity. High rates of growth mindset were found for EF across groups and may reflect belief in malleability at young ages or messages from professionals to cope with children's learning difficulties; thus, EF may serve as a target for growth mindset interventions. The consequences of parental mindsets in the domains of EF and ATT, and how they relate to INT, are yet to be studied. Future work will evaluate these different domains and how to promote growth mindsets for young children and their parents.

Table 1

|              | Correlations Across Domains (r) |       |           |
|--------------|---------------------------------|-------|-----------|
|              | Intelligence                    | EF    | Attention |
| Intelligence | --                              |       |           |
| EF           | .41**                           | --    |           |
| Attention    | .32*                            | .72** | --        |

Significant at  $p < .01$ ; \*\* $p \leq .001$

Table 2

|                           | Growth Mindset (Percent) |            |              | $\chi^2$ | $p$   |
|---------------------------|--------------------------|------------|--------------|----------|-------|
|                           | FT<br>n=24               | PT<br>n=24 | ADHD<br>n=17 |          |       |
| Intelligence <sup>1</sup> | 42                       | 92         | 77           | 14.7     | .001* |
| EF                        | 58                       | 67         | 47           | 1.6      | .46   |
| Attention <sup>2</sup>    | 50                       | 63         | 18           | 8.3      | .016* |

<sup>1</sup>Post-hoc: PT differed from FT. <sup>2</sup>Post-hoc: PT differed from ADHD.

### Abstract 73: Hope and Executive Functioning as Correlates of Health Outcomes in Adolescents with Type 1 Diabetes

Melissa Rafferty, MA, Case Western Reserve University, Cleveland Heights, OH; Sarah MacLeish, DO; Rebecca Hazen, PhD, UH Rainbow Babies and Children's Hospital, Cleveland, OH

**Purpose:** The purpose of this study was to investigate hope and executive functioning as they related to adherence and glycemic control in youth with type 1 diabetes mellitus (T1DM). It was predicted that the interaction of hope and executive functioning would predict a significant portion of the variance in adherence and glycemic control.

**Methods:** Youth (n=75) ages 11-17 with T1DM were recruited from pediatric endocrinology clinics at an urban children's hospital. Children completed the Child and Adolescent Scales of Hope to assess one's ability to make plans toward a goal and belief in their ability to achieve that goal, as well as the Self Care Inventory to assess adherence to diabetes care. Parents completed the Delis Rating of Executive Functions to assess their child's executive functioning, with higher scores indicating higher levels of executive dysfunction. Hemoglobin A1c (HbA1c) and frequency of blood glucose monitoring were gathered from medical charts as indicators of glycemic control and adherence, respectively.

**Results:** The interaction of hope and executive functioning predicted a significant amount of the variance in self-reported adherence ( $b = .30$ ,  $p = .004$ ), with hope as a main effect ( $b = .43$ ,  $p \leq .01$ ). Results of simple slope analyses indicated that hope was only significant in predicting adherence for those with higher executive functioning. The combination of higher hope with higher executive functioning predicted better adherence, whereas lower hope with higher executive functioning predicted worse adherence. The interaction of hope and executive functioning did not predict a significant portion of the variance in frequency of blood glucose monitoring ( $b = -.17$ ,  $p = .145$ ) or glycemic control ( $b = .06$ ,  $p = .58$ ).

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**Conclusions:** Results suggest that hope may be important in understanding the relationship between executive functioning and adherence. Future research should investigate hope as a target for improving adherence in those youth with higher levels of executive functioning.

### **Abstract 74: Reading abilities in relation to quantitative T1 MRI metrics for assessing myelin content in 8-year old children born preterm**

*Katherine Travis, PhD, Stanford School of Medicine, Stanford, CA; Sarah Dubner, MD, Stanford University, Stanford, CA; Heidi Feldman, MD, PhD, Stanford School of Medicine, Stanford, CA*

**Purpose:** Adverse neurocognitive outcomes in children born preterm (PT) have been attributed to the susceptibility of myelin precursor cells (pre-oligodendrocytes) to complications of PT birth, leading to white matter injury and dysmaturity. Diffusion MRI (dMRI) studies have demonstrated different patterns of associations between white matter microstructure metrics, such as fractional anisotropy (FA), and reading in PT versus full term children. FA is a summary measure influenced by many tissue properties, including myelin content, number of crossing fibers, axonal diameter, and axonal density. To determine if myelin content specifically is associated with individual variations in reading abilities requires use of additional MRI techniques with high specificity to myelin content. The quantitative T1 MRI (qT1) metric, R1, is a measure of the longitudinal relaxation rate of water and is directly related to myelin content. In the present study, we examined the strength of associations among FA, R1, and reading abilities in children born PT to determine if individual differences could be explained by variations in myelin content.

**Methods:** We obtained dMRI (30 directions,  $b = 1,000$  s/mm) and qT1 scans in sample of 8-year old children born PT (N=29). qT1 scans were acquired using a spoiled gradient echo sequence with multiple flip angles and an inversion-recovery sequence with multiple inversion times. We identified white matter pathways using whole brain deterministic tractography and quantified FA and R1 values along the trajectory of dorsal and ventral white matter tracts associated with reading. We assessed reading abilities using the Gray Oral Reading Test-5. Associations between reading abilities and FA or R1 were examined using Pearson correlations.

**Results:** No significant correlations were detected between reading scores and FA from any tract. Reading abilities were significantly positively correlated with R1 from one dorsal tract (left superior longitudinal fasciculus) and several ventral tracts (left inferior fronto-occipital fasciculus, left inferior longitudinal fasciculus and left and right uncinate fasciculus).

**Conclusions:** Though FA was not associated with reading in this PT sample, a measure of myelin content within several white matter tracts of the brain was positively associated with reading abilities. qT1 may be a useful tool in understanding the neural bases of reading and other cognitive outcomes in children born PT.

### **Abstract 75: Patient navigation for improving outcomes in child and youth development and mental health: A prospective cohort study of patients who did not receive navigator services after program referral**

*Valerie Steckle, BSc, St. Michael's Hospital, Toronto, ON, Canada; Wid Yaseen, MD (IP), University of Toronto, Toronto, ON, Canada; Dorjana Vojvoda, BSW; Michael Sgro, MD; Tony Barozzino, MD; Shazeen Suleman, MD, MPH, St. Michael's Hospital, Toronto, ON, Canada*

**Purpose:** The purpose of this study was to examine characteristics of patients who were referred but did not partake in a pediatric patient navigation program (PPNP) in order to assess potential barriers to participation after an appropriate program referral. Our primary objective was to identify patient variables that are associated with lack of administrative contact to schedule a program appointment (ie. "no contact") and not attending a scheduled appointment (ie. "no-show").

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**Methods:** This was a prospective cohort study of all patients who were referred to a Canadian PPNP from October 1, 2017 - October 31, 2018 but did not receive navigation services (N=114). Data was collected from referral forms that were designed prospectively. Statistical analyses were completed using SPSS Statistics 23 software. Proportional distribution of categorical variables was compared by one-sample t-test. Comparisons between no-show and no-contact groups used independent t-test for continuous variables, and Chi-square independence test for categorical variables. A binomial logistic regression model examined the extent to which patient barriers predicted odds of no-contact and no-show.

**Results:** Of all referred patients, 114 (21.1%) did not connect with the PPNP. Of these, 46 were no-shows and 46 were no-contact (80.7%). There were no differences in mean age, or in the proportional distribution of sex, diagnosis, or recency of diagnosis between no-show and no-contact groups. Binomial logistic regression showed that language barriers were significantly associated with no-contact (95% CI=1.08-13.31; p=0.037), and parental mental health was almost significantly associated with no-show (95% CI=0.96-19.63; p=0.056) after controlling for all other barriers. Although there was a significant difference in the proportion of reported language barriers, there was no significant difference in the proportion of patients identified as needing interpreter services (8.7% of no-shows vs 13.0% of no-contact; p=0.797).

**Conclusions:** In conclusion, language barriers are a key factor contributing to no-contact, while parental mental health may be a key barrier contributing to no-show. Minimizing the discordance between indicated need for interpreter services and indicated language barriers may represent an opportunity for program quality improvement, as it may lead to decreased no-contact rates.

### Abstract 77: National and State-Level Prevalence of ADHD Treatment Approaches in School-Aged Children in the United States

*Eli Rapoport, BS, Steven & Alexandra Cohen Children's Medical Center, New Hyde Park, NY; Andrew Adelman, MD, Cohen Children's Medical Center, Lake Success, NY*

**Purpose:** This study explored national and state-level rates of ADHD treatment approaches in school-aged children. Associations between severity of ADHD and treatment type were also examined.

**Methods:** A secondary analysis of the 2016-2017 National Survey of Children's Health, a nationally representative parent-proxy survey of US children, was performed for children ages 6 to 17 with a current diagnosis of ADHD (n=5,932). Children were considered to have a current ADHD diagnosis if a health care provider had ever told their parent that they have ADD or ADHD and their parent reported that the child currently has the condition. Parents were also asked if their child currently uses medication to treat their ADHD and if their child has received behavioral treatment in the past 12 months to treat their ADHD. National and state-specific weighted prevalence estimates were calculated for treatment approaches: medication-only, behavioral therapy-only, combined medication and behavioral therapy, and no treatment. These estimates were sorted into quartiles to highlight state-level disparities. Associations between recent treatments and ADHD severity were evaluated using logistic regressions, controlling for demographic factors and using the medication-only group as a reference. All calculations and analyses accounted for the complex survey design.

**Results:** State-level prevalence estimates varied considerably for different treatment approaches: medication-only (13.4% to 43.5%), behavioral therapy-only (1.9% to 28.9%), combined treatment (20.2% to 46.2%), and neither treatment (7.2% to 42.4%) (Figure 1). National prevalence estimates for these treatment approaches were 31.5%, 12.4%, 32.5%, and 23.2%, respectively. Receiving neither treatment was associated with mild ADHD (aOR, 3.65; 95% CI, 2.68-4.97) and was negatively associated with moderate ADHD (aOR, 0.44; 95% CI, 0.32-0.60) and severe ADHD (aOR, 0.16; 95% CI, 0.08-0.32). Receiving both treatments was associated with severe ADHD (aOR, 2.27; 95% CI, 1.48-

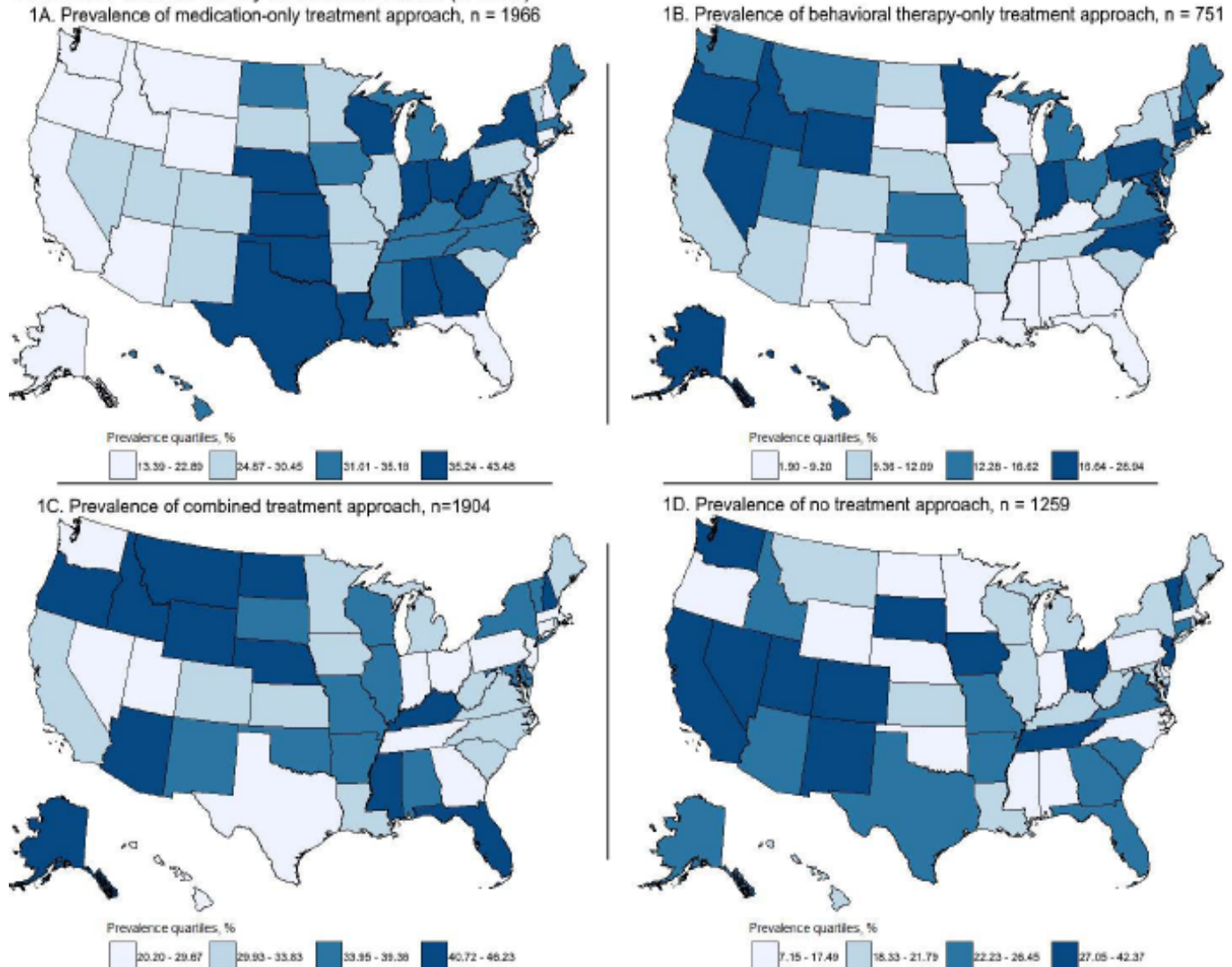
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3.48) and negatively associated with mild ADHD (aOR, 0.43; 95% CI, 0.32-0.58). Significant associations between ADHD severity and receiving behavioral treatment-only were not found (Table 1).

**Conclusions:** This study highlights state-level disparities in ADHD treatment. Additionally, significant associations were noted between ADHD severity and treatment approaches. Public health initiatives should be pursued to encourage the use of both medication and behavioral therapy, reducing state-level disparities.

Figure 1. State-level Prevalence of ADHD Treatment Approaches in Children Ages 6 to 17, 2016-2017 National Survey of Children's Health (n=5932)



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**Table 1. Associations between ADHD Severity and ADHD Treatment Approaches in Children ages 6 to 17 in the United States, 2016-2017 National Survey of Children's Health (n=5932)<sup>a</sup>**

| Treatment                | aOR <sup>b,c</sup> (95% CI) |       |                   |       |                   |       |
|--------------------------|-----------------------------|-------|-------------------|-------|-------------------|-------|
|                          | Mild ADHD                   |       | Moderate ADHD     |       | Severe ADHD       |       |
| Medicine-only            | 1                           | [Ref] | 1                 | [Ref] | 1                 | [Ref] |
| Behavioral therapy-only  | 1.23 (0.89, 1.72)           |       | 0.87 (0.61, 1.24) |       | 0.90 (0.49, 1.65) |       |
| Both treatment options   | 0.43 (0.32, 0.58)           |       | 1.25 (0.96, 1.63) |       | 2.27 (1.48, 3.48) |       |
| Neither treatment option | 3.65 (2.68, 4.97)           |       | 0.44 (0.32, 0.60) |       | 0.16 (0.08, 0.32) |       |

<sup>a</sup> Of 5932 subjects ages 6 to 17, 52 were missing treatment data.

<sup>b</sup> Odds ratios adjusted for insurance type, insurance status, medical home status, child sex, child age, family income, child race, and highest education level of adult in child's household.

<sup>c</sup> Children with medicine-only treatment option are the reference group.

### **Abstract 78: Preliminary Psychometric Evaluation of the Youth Outcome Questionnaire (Y-OQ) in a Pediatric Sample with Chronic Medical Conditions**

*Tanya Oken, PhD; Carlos Konishi, PhD; Wendy Gray, PhD; Adrienne Alpern, PhD, Children's Hospital of Orange County, Orange, CA*

**Purpose:** Healthcare providers depend on psychological assessment tools as efficient methods to inform diagnostic and treatment decisions. Psychological assessment tools are frequently used to evaluate mental health symptoms in individuals with chronic illnesses without establishing the reliability or validity of the measures in these populations. Emerging research has found psychometric concerns in commonly used measures when applied to pediatric populations, most notably regarding somatic symptoms. The Youth Outcome Questionnaire (Y-OQ) is one of the most widely used measures of emotional distress in children and adolescents. To date there are no studies evaluating the psychometric properties of this measure in a sample of children and adolescents with chronic illness.

**Methods:** Y-OQ measures were completed in English by children or caretakers as part of routine care in a community mental health clinic over a fiscal year. There are two versions of the measure, a self-report for adolescents and a caretaker report. There are 6 subscales that include Intrapersonal Distress (ID), Somatic (S), Interpersonal Relations (IR), Social Problems (SP), Behavioral Dysfunction (BD), and Critical Items (CI). To assess internal consistency reliability, Cronbach's alpha was calculated for the ID, S, IR, SP, and BD subscales of the caretaker and self-report versions of the Y-OQ. Pearson correlations examined associations between the somatic subscale and the subscales assessing emotional and behavioral impairment.

**Results:** Children and adolescents (n=97) were primarily female (69.1%) with a mean age of 15.44 (SD=2.44). Caretakers (n=52) reported on children/adolescents who were primarily female (59.6%) with a mean age of 12.56 (SD=3.72). Internal consistency ranged from .54-.93 on self-report, and .69-.93 for caretaker report. 4 caretaker and 3 self-report subscales demonstrated internal consistency reliability above 0.7. The subscale with the poorest internal consistency was the SP subscale. The S subscale was associated with the ID ( $r=.63$ ) and BD ( $r=.60$ ) on youth self-report. It was also associated with ID ( $r=.68$ ) and BD ( $r=.58$ ) on caregiver report.

**Conclusions:** The OQ scales were generally reliable, with good internal consistency with the exception of the SP subscale for self and caretaker report, and the IR self-report subscale. The somatic subscale was associated with internalizing and externalizing subscales on this measure. Additional research is needed to examine validity in larger samples and stratified by specific medical conditions.

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### **Abstract 79: Developmental Outcomes In A Cohort Of Infants Born With Congenital ZIKA Syndrome**

*Marcio Leyser, MD, MSc, PhD, University of Iowa, Iowa City, IA; Fernanda Marques, MD, MSc, The SARAH Network of Rehabilitation Hospitals, Rio de Janeiro, Brazil; Claret Amarante, PsyD; Marco Aurelio Elias, PT; Renata Klein, PT, The SARAH Network of Rehabilitation Hospitals, Rio de Janeiro, Brazil; Osvaldo JM Nascimento, MD, PhD, Fluminense Federal University, Niteroi, Brazil*

**Purpose:** To prospectively analyze the development of infants born with CZS admitted in a rehabilitation center located in Rio de Janeiro, Brazil.

**Methods:** 35 infants born with CZS were evaluated for their development with the Bayley III Scales at 12 and 24 months of age

**Results:** The scores of cognitive and motor domains measured at 12 and 24 months remained unchanged (Pearson X2 test  $P < .001$ ). Cognitive scores remained at the same range in 32 (91.4%) infants. Two (5.7%) infants progressed from extremely low to borderline whereas another (2.9%), from borderline to low average range. Regarding the motor domain, 33 (94.2%) infants had no improvement; While one (2.9%) increased from borderline to low average, another (2.9%) decreased from borderline to extremely low range.

In terms of communication, the scores did not change in twenty-eight (80%) from one point in time to the next. In four (11.4%), scores worsened from borderline to extremely low for average whereas in one (2.9%), from below average to borderline and in two (5.7%), from average to below average.

Expressive communication displayed significant temporal decrease (Pearson X2 test  $P < .001$ ). As the scaled score represents child's performance relative to his/her same-age peers, an increased discrepancy was observed between the two points in time in infants with CZS compared to their typically developing age-matched peers. Receptive communication remained essentially the same.

Even within the small range of infants who progressed over time, deviation from normal worsened compared to what would be expected for their age-matched, typically developing, peers. Developmentally, overall, only two (5.7%) infants attained independent walking, whereas five infants (14.3%) demonstrated understanding of relational playing, while one infant (2.8%) was able to learn how to say a two-word utterance with different concepts at 24 months of age.

**Conclusions:** CZS causes severe developmental delays. Despite early intervention, significant impairment in the development of cognitive, motor and communication domains were found during the second year of life. Gross motor skills were remarkably affected when compared to normal developing population.

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|                                    | 12 months  | 24 months  |
|------------------------------------|------------|------------|
| attain head balance                | 8 (22.9%)  | 10 (28.6%) |
| rolls from back to sides           | 4 (11.4%)  | 5 (14.3%)  |
| crawl                              | 2 (5.7%)   | 5 (14.3%)  |
| sit without support                | 3 (8.6%)   | 5 (14.3%)  |
| reciprocal creeping                | 2 (5.7%)   | 5 (14.3%)  |
| stand with support                 | 2 (5.7%)   | 5 (14.3%)  |
| walk                               | 0          | 2 (5.7%)   |
| regard object for 3 seconds        | 19 (54.3%) | 21 (60.0%) |
| eyes-follow                        | 15 (42.9%) | 17 (48.6%) |
| react to sounds in the environment | 31 (88.6%) | 34 (97.1%) |
| finds hidden object                | 1 (2.9%)   | 5 (14.3%)  |
| two vowel sounds                   | 25 (42.9%) | 22 (62.9%) |
| responds to name                   | 11 (31.4%) | 15 (42.9%) |
| directs attention of other         | 4 (11.4%)  | 6 (8.6%)   |
| uses one-word approximations       | 3 (8.6%)   | 5 (14.3%)  |
| social smile                       | 24 (68.6%) | 34 (97.1%) |
| demonstration of relational play   | ----       | 5 (14.3%)  |
| use a two-word utterance           | ----       | 1 (2.9%)   |

Table 1. Developmental milestones based on the results of the Bayley III scales. Only two (5.7%) infants walked independently at 24 months. Five (14.3%) infants demonstrated understanding of relational playing, and one (2.9%) infant produced at least two-word utterance with different concepts.

### Abstract 80: Clinical And Brain-Related Anatomico-Physiological Findings In A Cohort Of Infants Born With Congenital ZIKA Syndrome

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**Purpose:** The purpose of this study is to analyze the correlation between neuroanatomical and neurophysiological findings in CZS and describe the frequency and severity of cerebral palsy in this population, including the correspondent distribution of the GMFCS.

**Methods:** Eighty-nine infants with CZS underwent video-electroencephalogram (vEEG) and magnetic resonance imaging (MRI) of the brain routinely performed during spontaneous sleep. The GMFCS was applied in this population at two years of chronological age.

**Results:** Abnormal vEEG findings were observed in 88 (98.9%) infants. One (1.1%) presented with normal background activity. Sixty-six (74.2%) had epileptic discharges; the most common electric pattern was focal spikes (73.0%), followed by multifocal (36.0%), generalized (27.0%) and hypsarrhythmia (11.2%). Different combinations of epileptiform tracing were found in 34 (51.5%) out of 66 infants with epileptic discharges. Epilepsy findings were identified at a mean age of 7.32 months (range from 1 to 12 months).

Malformations of cortical development secondary to lack or abnormal cellular migration were observed in the brain MRIs of all 89 (100%) infants. Mixed and simplified gyral pattern was the most common feature. Other frequent abnormalities were cerebral atrophy (96.6%), ventriculomegaly (95.5%), corpus callosum malformations (94.4%) and encephalic calcifications, especially in the subcortical gray white matter (84.3%) and basal ganglia (65.2%) region. A direct relationship between severe forms of cortical malformations caused by CZS and the occurrence of epilepsy was

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observed (Pearson X2 test  $P < .001$ ). Infants with simplified gyral and mixed pattern brain malformations significantly displayed more epileptic discharges (83.3% and 84.8% respectively) than infants with the polymicrogyria-pachygyria pattern (46.2%).

Also, after two years of follow up, 58 infants ended up receiving the diagnosis of cerebral palsy. Based on the GMFCS, one infant (1.7%) was classified as level I; three (5.1%) were classified as level II; five (8.6%) as level IV and 49 (84.5%) as level V.

**Conclusions:** In CZS, abnormal sulcation of the brain cortex is significantly associated with higher rates of epilepsy. The simplified and mixed gyral pattern is more epileptogenic than the polymicrogyria one. Also, cerebral palsy in its most complex form (GMFCS V) was frequently observed in this population, reflecting the severity of the neurological and clinical findings encompassing the spectrum of CZS.

|                              |                           |            | vEEG findings                                             |                                                        | Total  |
|------------------------------|---------------------------|------------|-----------------------------------------------------------|--------------------------------------------------------|--------|
|                              |                           |            | Abnormal background activity with no epileptic discharges | Abnormal background activity with epileptic discharges |        |
| Cortical Migration Disorders | Simplified gyral pattern  | n          | 5                                                         | 25                                                     | 30     |
|                              |                           | percentage | 16.7%                                                     | 83.3%                                                  | 100.0% |
|                              | Mixed pattern             | n          | 5                                                         | 28                                                     | 33     |
|                              |                           | percentage | 15.2%                                                     | 84.8%                                                  | 100.0% |
|                              | Polimicrogyria/Pachygyria | n          | 14                                                        | 12                                                     | 26     |
|                              |                           | percentage | 53.8%                                                     | 46.2%                                                  | 100.0% |
| Total                        |                           | n          | 24                                                        | 65                                                     | 89     |
|                              |                           | percentage | 27.0%                                                     | 73.0%                                                  | 100.0% |

*Table 1: classification of disorders of cortical migration and the presence of epileptic discharges; epileptic findings were directly related to abnormalities of the cerebral cortex in infants born with CZS ( $P < 0.001$ ).*

### Abstract 81: Investigating differences in explicit memory using the visual paired-comparison (VPC) task in preschool-to-early school age neurotypical children and those diagnosed with fetal alcohol syndrome (FAS)

Julia Mattson, MD, PhD, Seattle Children's/University of Washington, Seattle, WA; Sara Kover, PhD, University of Washington, Seattle, WA

**Purpose:** Explicit memory – or recollection of a specific event or experience – is a form of memory that is thought to be particularly error-prone in children until early school age. However, previous studies using the VPC task – thought to be a reliable measure of explicit memory – have been limited to infants and young toddlers, where a novelty preference has been demonstrated. It is unclear whether this novelty preference extends to preschool-to-early school age children, or whether children with neurodevelopmental disorders such as FAS demonstrate a similar novelty preference.

**Methods:** The VPC task was administered to 11 TD subjects and 11 FAS subjects (ages 3-9). During each trial of the VPC task, paired items were first presented in an initial 'exposure phase'. An old item from the preceding exposure phase was paired with a new item in a following 'test phase'. Task difficulty was manipulated such that an 'easy' condition (different color old and new items) session and 'hard' condition (same color old and new items) session were presented to each subject in a randomized order. Eye-gaze recordings were used to code frames during each test phase in which the subject looked at the new item versus the old. A 'novelty score' (NS) for each test phase was

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calculated using the following formula:  $(\text{time spent looking at new item}) / [(\text{time spent looking at old item}) + (\text{time spent looking at new item})]$ . Average novelty scores for easy and hard conditions were compared using paired t-tests for TD subjects and FAS subjects.

**Results:** A novelty preference for new versus old items was demonstrated in both TD (NS(easy) = 0.64) and FAS subjects (NS(easy) = 0.62) during the easy condition. For TD subjects, there was a significant reduction in novelty preference during the hard condition compared to the easy condition (NS(hard) = 0.56;  $p < 0.05$ , two-tailed). In FAS subjects there was no significant difference in novelty scores between hard and easy conditions (NS(hard) = 0.62;  $p = 0.49$ ).

**Conclusions:** To the best of our knowledge, our study is the first to demonstrate a novelty preference using the VPC task in preschool-to-early school age TD children and the first to utilize the VPC task in children with FAS. The results of our study suggest that VPC task performance is affected by perceptual similarity of stimulus features in TD subjects, but not in FAS subjects. Our study suggests that verbal encoding deficits previously demonstrated in children with FAS do not extend to the encoding of specific non-verbal items.

### Abstract 82: Rett Syndrome; Describing Congenital Hypotonia as a First Early Sign

*Amelia Roth, MD, OHSU, Eugene, OR*

**Purpose:** The objective of this study is to describe congenital hypotonia as an under-recognized earliest presenting sign of Rett Syndrome, as emerging research suggests that potentially life changing treatments for Rett Syndrome are on the horizon, highlighting the importance of a broader index of suspicion for MeCP2 testing to ensure that even atypical cases are diagnosed expediently.

**Methods:** This is a retrospective, descriptive study utilizing sequential chart review of females presenting to the OHSU Rett Syndrome Clinic in Portland, OR over a period of 18 months. Charts were reviewed in depth to determine a number of details regarding these patients' presenting signs and symptoms, as well as studies done during their diagnostic evaluations, to determine what percentage of them had features suggestive of congenital hypotonia as a first presenting sign. In this study, a suggestion of congenital hypotonia was assigned to patients when medical records contained descriptions including "reduced resistance to passive range of motion", "decreased ability to sustain postural control and movement against gravity", "delayed motor skills", and "weakness". (Peredo & Hannibal, 2009).

**Results:** Collected chart data suggests that 52% of the reviewed patients with Rett Syndrome diagnoses and an MeCP2 mutation and 44% of those with Rett Syndrome diagnoses without an MeCP2 mutation did have some element of congenital hypotonia as a first presenting sign. 75% of these patients with an MeCP2 mutation underwent a brain MRI prior to Rett Syndrome diagnosis, and 1 underwent EMG analysis. Of those without an MeCP2 mutation, 58% underwent brain MRI.

**Conclusions:** Late Rett Syndrome diagnoses typically result in a higher number of extraneous medical tests, some invasive such as muscle biopsy, and some with inherent risks, such as sedated brain MRI's, which inevitably incur greater financial, physical, and emotional challenges for patients, families, and health systems. Early diagnosis of atypical cases of Rett Syndrome, such as those presenting with congenital hypotonia, resulting from increasing awareness of the broadening spectrum of clinical symptoms, would decrease the burden of unnecessary medical tests and appointments, while also identifying patients eligible for burgeoning new treatments as they become available. Due to the nature of this being a retrospective chart review, the designation of a presentation suggestive of

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congenital hypotonia was determined based on the definition provided and close review of medical documentation.

### **Abstract 83: Knowledge is Power: Optimizing Education in Children with Spina Bifida and Cerebral Palsy**

*Michael Smith, MD; Mattie Wolf, MD; Joan Jasien, MD, Duke University, Durham, NC*

**Purpose:** Learning difficulties and cognitive delays permeate the lives of many children with Spina Bifida (SB) and Cerebral Palsy (CP). Though a spectrum of disease, many commonalities have arisen in the particular educational impedances of these two unique patient populations. Through utilizing a paradigm of school teacher education, the unique scholastic demands of students with SB and CP can be more quickly identified and more fully addressed.

**Methods:** Educational strategies were created for SB and CP that provided background information on both disease processes in addition to specific guidelines on aiding children with SB and CP in a multimodal approach to education stratified by age (ages 5-12 and 13-17). These strategies were adapted from recent updates from the Spina Bifida Associations Guidelines and an extensive literature review of educational studies involving children with CP. Educational strategies were provided to families with a survey denoting the school system's baseline knowledge of children's educational needs and the utility of educational strategies for improving children's overall educational experience. Families were instructed to make a parent/teacher meeting in the next month to review strategies with primary teacher. Investigators contacted parents in the following two months to quantify the effects of teacher instruction on global educational experience for children with SB and CP.

**Results:** Initial utility effects of optimizing educator instruction were quantified using an NPS paradigm indicating consumer satisfaction. For patients with SB, the NPS index was 77% (% promoters - % detractors) indicating "highest utility." Similarly, the NPS index for patients with CP was 79%. A paired-samples t-test was done to compare parental views on their child's education before and after using the educational strategies. There was a significant difference in educational experience before ( $M=6.7$ ,  $SD=3.4$ ) and after ( $M=7.8$ ,  $SD=3.0$ ) using educational strategies in children with SB ( $t(17)=3.04$ ,  $p=0.007$ ). While not significant, there was a positive trend in educational experience before ( $M=7.1$ ,  $SD=3.4$ ) and after ( $8.1$ ,  $SD=2.8$ ) using the strategies in children with CP ( $t(20)=1.02$ ,  $p=0.32$ ).

**Conclusions:** It has been demonstrated that there is both a high demand for further educational support in children with SB and CP and that utilizing an instructor education paradigm represents a cost effective avenue for advocating and enhancing the educational livelihood of these students.

### **Abstract 84: Maternal Mindfulness is associated with Lower Child Body Mass Index Z score**

*Chioma Torres, MD; Julie Lumeng, MD, University of Michigan, Ann Arbor, MI; Holly Brophy-Herb, PhD, Michigan State University, East Lansing, MI; Harlan McCaffery, MS, University of Michigan, Ann Arbor, MI*

**Purpose:** Maintaining a healthy weight in childhood requires a multidisciplinary approach. Based on its effectiveness in promoting healthy parent-child interactions, mindful parenting may be an effective approach.

**Methods:** This is a secondary analysis of pre-intervention data from the Simply Dinner randomized control trial. Participants included Head Start preschoolers ( $n=105$ ) and their mothers. Mothers completed the Philadelphia Mindfulness Questionnaire generating Awareness, Acceptance, and Total Mindfulness subscales, as well as reporting demographic information, child dietary intake and family meal frequency. Maternal and child weight and height were measured, BMI calculated, and child BMI z-score (BMIZ) generated. Multivariate linear regression models adjusting

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for covariates examined associations between parental mindfulness and child BMIz, child fruit intake, child vegetable intake and frequency of family meals.

**Results:** Greater maternal Mindful Awareness and greater maternal Total Mindfulness were associated with lower child BMIz ( $\beta=-0.03$ (SE 0.01),  $p=.045$ ), and ( $\beta=-0.02$ (SE 0.01,  $p=.025$ ) respectively). Maternal Mindful Acceptance was not associated with child BMIz. Neither maternal Mindful Awareness, Mindful Acceptance, or Total Mindfulness were associated with child fruit intake, child vegetable intake or frequency of family meals.

**Conclusions:** Greater maternal mindful awareness, but not mindful acceptance, was associated with lower child BMIz. The mechanism of effect does not appear to be healthier child dietary intake or frequency of family meals. Future work should examine mechanism of effect. Pediatric providers might consider supporting maternal mindful awareness as one element of multicomponent strategies for child obesity prevention.

### **Abstract 85: External Validation of The “Rama Autism Awareness” Mobile Application for Screening Autism Spectrum Disorders in Thai Children Aged 18 to 30 Months**

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**Purpose:** An integrated screening mobile application, composed of the Modified Checklist for Autism in Toddlers (M-CHAT) - Thai version, receptive and expressive language developmental screening questionnaires, and information regarding Autism Spectrum Disorders (ASDs) for parents, has been developed. The internal validation study of the application reported the high validity for screening ASDs. The objectives of this study were to evaluate external validity and feasibility of the mobile application for screening ASDs in Thai children.

**Methods:** Children aged 18 to 30 months and their primary caretakers were enrolled from day care centers and well child clinics in Bangkok Metropolitan Area, Thailand. After informed consent obtained, the screening tools embedded in the mobile application were used by primary caretakers of participants. They were randomly assigned to a non-coaching group and a coaching group. Primary caretakers in the non-coaching group used the screening application by themselves, while primary caretakers in the coaching group used the screening application under close supervision by a health care provider. Subsequently, all participants were clinically assessed following DSM-V criteria, and administered the Developmental, Dimensional and Diagnostic Interview (3Di) to confirm the diagnosis of ASDs. Validity and feasibility of the screening mobile application were evaluated.

**Results:** The prevalence of ASDs in this study was 3.3%. The mean age of diagnosis was 24.9 months (standard deviation (SD): 4.9 months). No significant differences of demographic characteristics of participants and primary caretakers between the non-coaching and the coaching group were detected. We found the acceptable validity for screening of ASDs in the total participants ( $n=300$ ), the non-coaching ( $n=149$ ) and the coaching group ( $n=151$ ). Overall, the screening mobile application had the sensitivity of 1.0 (95% confidence interval (CI): 69.2-100), the specificity of 0.93 (95% CI: 90-96), the area under the ROC curve of 0.97 (95% CI: 0.953-0.983) and the positive likelihood ratio of 15.3 (95% CI: 9.88-23.6).

**Conclusions:** The integrated screening mobile application could be used effectively for screening of ASDs in Thai children aged 18 to 30 months. The use of application both by parents themselves and under supervision of health care providers were acceptable.

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### **Abstract 86: Parent Perceptions of Symptoms in Infants at High Risk of Death and Association with Parent Depressive Symptoms**

*Keagan Lipak, BA; Zackery Dunnells, BS; Olivia Clark, BA; Amy Baughcum, PhD; Cynthia Gerhardt, PhD, Nationwide Children's Hospital, Columbus, OH; Christine Fortney, PhD, RN, The Ohio State University College of Nursing, Columbus, OH*

**Purpose:** Neonatal Intensive Care Unit (NICU) admissions may lead to increased stress on parents due to their critically-ill infant's symptoms. Studies have retrospectively analyzed parents' experiences following their infant's discharge from the NICU. The aim of this study was to prospectively examine the association between parent report of symptoms observed in their infant near admission to the NICU and associations with parent depressive symptoms.

**Methods:** Mothers ( $N=42$ , 19-44 years old,  $M_{age}=29.38$ ) and fathers ( $N=24$ , 19-54 years old,  $M_{age}=34.75$ ) of infants with diagnoses associated with high mortality rates were recruited from a level IV NICU. As part of a larger longitudinal study, parents reported on symptoms in their infant on the Parent Perceptions of Infant Well-Being measure and their own depressive symptoms on the Beck Depression Inventory (BDI). Parents received weekly questionnaires from admission to 12 weeks or discharge, depending on which occurred first. Data from baseline to one month were included in analyses.

**Results:** Mothers and fathers did not differ significantly in BDI scores,  $M_{mothers}=11.16$  ( $SD=8.95$ ) and  $M_{fathers}=8.44$  ( $SD=7.37$ ,  $p=.217$ ), or number of symptoms perceived,  $M_{mothers}=3.10$  ( $SD=1.56$ ) and  $M_{fathers}=3.00$  ( $SD=1.71$ ,  $p=.942$ ). There was a significant positive association between mother and father report of infant symptoms ( $r=.60$ ,  $p=.002$ ) and mother and father report of depressive symptoms ( $r=.59$ ,  $p=.002$ ) at one month. Also, there was a significant positive association by mothers at one month between number of infant symptoms and depressive symptoms ( $r=.42$ ,  $p=.005$ ). Father report of infant symptoms near admission were not significantly associated with father depressive symptoms at one month ( $r=.15$ ,  $p=.482$ ). A hierarchical regression was run to predict depressive symptoms from demographic variables (Step 1) and infant symptoms (Step 2;  $F(7,33)=$ ,  $p=.03$ ,  $R^2=.353$ ). Both mother-report of annual income ( $\beta=-.386$ ,  $p=.03$ ) and mother perception of infant symptoms ( $\beta=.507$ ,  $p=.002$ ) contributed unique variance.

**Conclusions:** Increased number of perceived infant symptoms may be associated with depressive symptoms in mothers. This may impact parenting in a population of infants already facing life altering illnesses with numerous medical and developmental sequelae. Interventions to frequently assess and manage depression in parents with a child in the NICU during admission may contribute to better outcomes for these parents and ultimately their children.

### **Abstract 90: Sensory Processing and Hyperarousal in Individuals with Fragile X Syndrome**

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**Purpose:** This study sought to understand how sensory processing disruptions (SPD) and hyperarousal impact individuals with fragile X syndrome (FXS), their families and caregivers.

**Methods:** Data analyzed were derived from the Fragile X Online Registry with Accessible Research Database (FORWARD) Project on 937 subjects with the full fragile X mutation (724 males, mean age (MA) 12.1 yrs, SD 8.4 yrs; 213 females, MA 11.7 yrs, SD 8 yrs). This is a multisite observational study funded by the CDC which began collecting baseline longitudinal data in 2012 from individuals with FXS attending one of 25 FXS clinics in the USA. Clinician- and Parent-Report forms and three standardized questionnaires are used for the collection of demographic, clinical, developmental, and behavioral data. Sex and age group differences on SPD, hyperarousal, and behavior were

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assessed. Chi-squared tests for association and t-tests for differences between groups were used to determine statistical significance.

**Results:** Most caregivers reported concern about SPD and hyperarousal for individuals with FXS. More males were affected with sensory issues (87%) as compared to females (69%) ( $p < 0.0001$ ), and more males (92%) than females (79%) were impacted by hyperarousal ( $p < 0.0001$ ). Males with a strong sensory response (ever) had greater intellectual disability ( $p < .0001$ ), a diagnosis of autism spectrum disorder ( $p = 0.0003$ ), and a higher score on the Aberrant Behavior Checklist irritability subscale ( $p < .0001$ ) as compared to males with no strong sensory response (never). Several behaviors, including anxiety, attention problems, obsessive compulsive disorder/perseveration, and irritability/aggression/agitation/self-injury were more frequent among males reported to ever have a strong sensory response (all at  $p < 0.004$ ). Males and females were likely to have difficulty with eye gaze, sensitivity to certain sounds, and tactile defensiveness. Difficulties persisted across all age ranges studied, but as individuals aged there was less frequent use of non-medical therapies and more frequent use of medications (unspecified as to which type or for what condition).

**Conclusions:** Consistent with a decades-long phenotypic description of FXS, the present findings support a high frequency of SPD and hyperarousal in FXS, with large differences by sex. Non-medical treatment (through occupational therapy) is limited as individuals age despite persistent need. The prevalence of SPD and hyperarousal suggests the need for further research on treatment options.

### **Abstract 91: A Statewide Network for Early Diagnosis of Autism Spectrum Disorder and Developmental Delay**

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**Purpose:** Families of children across the nation face significant barriers to accessing timely, local neurodevelopmental evaluations, ultimately delaying entry into evidence-based interventions. As such, there has been significant interest in the development of innovative models of community-based neurodevelopmental diagnosis to address this critical public health need. We developed a statewide network of Early Evaluation (EE) Hubs in primary care practices with the goal of improving access to early, local neurodevelopmental diagnosis. We report on outcomes from the development of a network of EE Hubs across one state.

**Methods:** Between 2012 and 2018, 23 clinicians at 12 EE Hub locations were provided with a standard 6-day curriculum, including education on developmental screening, conducting a developmental history, DSM-5 criteria for autism spectrum disorder (ASD), medical and psychological differential diagnosis, delivering diagnostic feedback, local community resources, billing and practice issues, and practice quality improvement, as well as, practicum training on administration of the Screening Tool for Autism in Toddlers (STAT). EE Hub clinical teams participated in a monthly learning collaborative (via teleconference) and annual seminar at a statewide pediatric conference.

**Results:** In 2018, 922 children were evaluated in the EE Hubs. Mean age of diagnosis was 31.2 months (site range: 27-35 months). Distribution of diagnoses: 38% ASD, 15% global developmental delay, 21% speech/language delay, 11% developmental delay < 3 domains, and 15% other diagnosis. Mean wait time from referral to evaluation was 82 days (site range: 43-129 days), as compared to statewide average wait time of over 9 months. Referrals were received from 318 clinicians from 220 different practices representing 57 of 92 counties, containing 85% of the children under 5 in the state.

**Conclusions:** The EE Hub model is a feasible approach to providing timely neurodevelopmental diagnosis in local communities. Through this innovative model of care, young children received diagnostic evaluations well below the

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national average of 4-5 years with markedly reduced wait times. Further research is necessary to evaluate the accuracy of diagnoses made and to better understand how this model of service delivery contributes to earlier enrollment in evidence-based interventions, and thus improved child outcomes and reduced strain on the public healthcare system.

### **Abstract 92: Understanding Disparities in Shared-Decision Making among Patients with Autism Spectrum Disorder**

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**Purpose:** To (1) identify key elements of shared-decision making (SDM) during encounters where the diagnosis of autism spectrum disorder (ASD) is initially given to a child between the ages of 3 and 8 and treatment options are discussed; (2) explore patient and provider perspectives on their ability to engage in SDM; and (3) understand the role of race/ethnicity on SDM.

**Methods:** Diagnostic visits were audio-recorded and coded using the OPTION<sup>5 Item</sup> scale, an objective and validated measure used to rate 5 components of SDM in clinical visits. Following the diagnostic visit, parents (n = 20) were asked to participate in a semi-structured interview to share their perspective on the process of receiving a diagnosis of ASD and discussing treatment options for the first time and complete the OPTION<sup>5 Item</sup> scale. Finally, providers (n = 5) rated their own ability to engage families in SDM utilizing the OPTION<sup>5 Item</sup> scale and participated in a focus group to elicit their perspective on challenges and facilitators to engaging families in SDM. Scores on the OPTION<sup>5 Item</sup> scale were then compared across observed, parent and provider ratings.

**Results:** Scores from the OPTION<sup>5 Item</sup> rating scale indicated that providers observed ability to engage in SDM with families was low regardless of race. However, providers consistently engaged in behaviors that facilitated a therapeutic encounter, including: (1) eliciting parent goals, (2) explaining the purpose/goals of the recommended treatment options, as well as their evidence base, (3) providing follow up resources/referrals, (4) sharing their contact information for follow up questions. Although observed SDM was low, parents felt as though providers engaged them in SDM, often citing that their provider was knowledgeable and reassuring. Providers ratings on the OPTION<sup>5 Item</sup> scale of their ability to engage families in SDM were varied. In focus groups providers cited that time, parent's knowledge of available treatments, and other systemic barriers impede their ability to fully engage families in SDM.

**Conclusions:** Findings reinforce the idea that novel interventions to promote SDM across providers and families of children diagnosed with ASD are necessary. Future work will focus on the development of decision aides that can be used in clinical settings to enhance discussions with families around the diagnosis and management of ASD.

### **Abstract 93: Effects of Chronic Medical Conditions on Perceived Stress and Family Functioning in Caregivers of Children with Special Health Care Needs**

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**Purpose:** This study sought to evaluate the impact of chronic health conditions on family functioning and perceived stress in caregivers of children with special health care needs (SHCN).

**Methods:** Caregivers of children with SHCN ages 8 months to 17 years were prospectively recruited from an interdisciplinary developmental pediatrics clinic. Caregivers completed the Perceived Stress Scale, McMaster Family

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Assessment Device, and a questionnaire about demographics, family characteristics, and caregiver health status. SPSS-24 was utilized to analyze data.

**Results:** 151 caregivers for children with SHCN were recruited between June 2018 and April 2019. Greater than 90% of caregivers were female. Mean child age was 7 years 3 months (SD 3 years 10 months). The McMaster General Functioning Score was correlated with the Perceived Stress Scale total score (Pearson correlation of .430;  $p = 0.01$ ), suggesting a moderate relationship between the quality of family functioning and caregiver perception of stress. Two-thirds of caregivers reported one or more chronic health conditions, including physical conditions (hypertension, obesity, heart disease, etc.), mental health conditions (anxiety, depression, etc.), or both. A multivariate analysis of variance (MANOVA) was conducted to test the hypothesis that there would be one or more mean differences between caregiver levels of chronic health conditions (none, physical, mental), and assessment scores for family functioning and perceived stress. A statistically significant MANOVA effect was obtained, Pillais' Trace = .28,  $F(7.538, 278) = 11.94$ ,  $p < .001$ . The multivariate effect size was estimated at .140 or 14.0%. Follow-up analysis, including post hoc T-tests, revealed that the presence of one or more mental health conditions has a negative impact on overall perceived stress ( $p < .000$ ) and family functioning ( $p = .003$ ). This effect was not seen with a physical health condition alone ( $p = .417$  and  $p = .838$ ).

**Conclusions:** Caregivers with chronic mental health conditions reported higher levels of stress and lower family functioning than caregivers without any chronic conditions, or those with a chronic physical condition only. These findings will help to identify caregivers who would benefit from additional supportive services in the clinic and greater community.

### **Abstract 95: Screening for Fetal Alcohol Spectrum Disorders in a Developmental-Behavioral Pediatric Clinic**

*Catherine Lipman, MD, Case Western Reserve University, Cleveland, OH; Denise Bothe, MD; Rachel Tangen, PhD; Therese Dragga, RN, University Hospitals Health System, Rainbow Babies & Children's Hospital, Cleveland, OH; Hudson G Taylor, PhD, Nationwide Children's Hospital Research Institute and The Ohio State University, Columbus, OH; Nori Minich, BS, Case Western Reserve University, Cleveland, OH; Kiran Prasad, BA, Case Western Reserve, University School of Medicine, Cleveland, OH; Nancy Roizen, MD, Rainbow Babies and Children's Hospital, Cleveland, OH*

**Purpose:** Children presenting to a developmental-behavioral pediatric clinic (DBPC) are at risk for fetal alcohol spectrum disorders (FASD) and could benefit from screening. We developed the Fetal Alcohol Screening Tool (FAST) based on a combination of diagnostic guidelines. It was sensitive (0.96), relatively specific (0.75), and identified the range of FASD when used retrospectively to screen children previously presenting to an FASD clinic. The purpose of this study was to pilot the FAST to identify children at risk for FASD in a DBPC.

**Methods:** Patients screened FAST positive if any of the following 3 criteria were met: PAE; 3 out of 3 fetal alcohol syndrome facial features (FASFF); or 2 out of 3 FASFF plus a history of growth deficiency, central nervous system (CNS) abnormality, or birth defect (Figure 1). Screening consisted of a 2 step process over 2 months. All patients referred to the DBPC were evaluated for PAE during intake prior to a first visit. These patients were partially FAST screened as PAE was assessed without analysis of FASFF. Eligible patients aged 0-17 years at a first or second DBPC visit were approached to participate in full FAST screening. Information was gathered from facial photograph analysis and chart review. If a PAE was reported during intake or patients screened FAST positive during the DBPC visit they were offered a full FASD diagnostic evaluation.

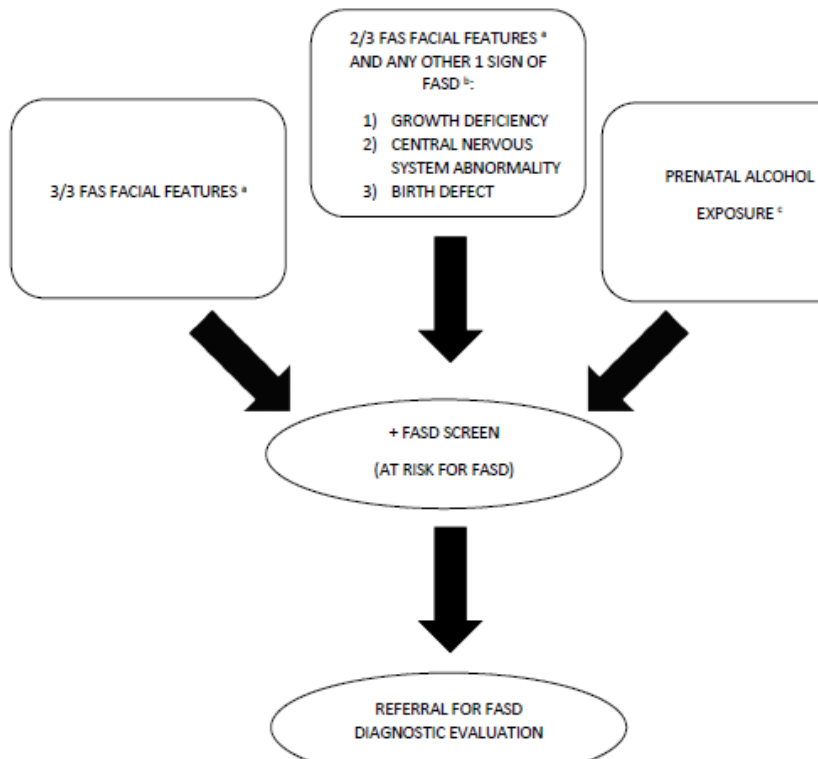
**Results:** PAE was reported for 9 out of 168 patients during intake prior to a DBPC visit (5.4%). Of 77 patients eligible for enrollment during a DBPC, 31 (40%) participated in full FAST screening. Twenty of the 46 excluded patients (43%) declined participation. One participant (3.2%) who completed full screening was FAST positive based on documented PAE. None had  $\geq 2$  FASFF, 11 had 1 FASFF (35%), 8 had a growth deficiency (26%), 2 had a PAE-associated birth defect (6%) and all had a CNS abnormality. Three had a PAE history that was either suspected ( $n=2$ ) or unknown ( $n=1$ ).

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**Conclusions:** All patients in this study identified as being at risk for FASD did so based on PAE history. These findings suggest that the PAE history may be the most high-yield component of FASD screening in a DBPC. The stigma of FASD diagnoses and reporting maternal alcohol use during pregnancy may have contributed to both an underestimation of the number of patients identified as at risk for FASD and the high percentage of patients who declined participation. This highlights the difficulty of screening for a stigmatizing group of disorders.

FIGURE 1. FETAL ALCOHOL SCREENING TOOL (FAST): FETAL ALCOHOL SPECTRUM DISORDERS SCREENING TOOL FOR HIGH-RISK PEDIATRIC POPULATIONS



### Abstract 96: A Quality Improvement Project to Promote Resources for Attention-Deficit/Hyperactivity Disorder in a Continuity Clinic

Lauren Walker, MD; Bethany Carlos, MD, MPH; Ellen Daly, MD; Caitlin Cojocar, MD; Claire MacGeorge, MD, MSCR, Medical University of South Carolina, Charleston, SC

**Purpose:** Many underutilized resources exist to provide support to parents of children with Attention-Deficit/Hyperactivity Disorder (ADHD). The objective of our study was to test the feasibility of an educational initiative to improve residents' recommendation of resources to parents during ADHD visits completed in a general pediatrics resident continuity clinic.

**Methods:** Our intervention included a presentation to all pediatric residents regarding available resources as well as a one-page diagram posted in clinic that detailed workflow and offered quick facts. Additionally, electronic medical record dot phrases were created and listed on the diagram to facilitate providing information to caregivers. Chart review was completed in the month before the intervention (9/10/18-10/5/18) as well as the month after (10/8/18 –

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11/2/18) with the first 10 charts per week with a complaint relating to ADHD reviewed. Variables collected included patient demographic factors, presence of structured symptom assessment, whether Individual Education Plan resources (IEP) or other ADHD resource discussion was documented. Comparisons between visits before and after implementation were performed using chi-square analysis.

**Results:** We reviewed 30 charts prior to the intervention and 40 charts after implementation. The proportion of visits with any ADHD resource provided increased from 0% to 43% ( $p<0.01$ ). The proportion of visits with an IEP present documented was unchanged (pre: 17% to post: 20%,  $p=0.72$ ). The proportion of visits with a structured symptom assessment scored was unchanged (pre: 23% to post: 25%,  $p=0.87$ ). The proportion of visits with a structured symptom assessment provided for the next follow-up decreased was unchanged (pre: 60% to post: 48%,  $p=0.3$ ).

**Conclusions:** Our educational intervention was able to increase our very low baseline rate of ADHD resource provision to over 40%; however, other opportunities exist to improve other aspects of ADHD care include inquiring about and providing resources about IEPs and 504 plans as well as use of structured symptoms assessments. Additionally, interventions that foster sustainability of change such as creation of note templates should be pursued.

| Variable                                                  | Pre-Intervention | Post-intervention | p-value |
|-----------------------------------------------------------|------------------|-------------------|---------|
| N                                                         | 30               | 40                |         |
| Determined if IEP or 504 plan in place                    | 5 (17%)          | 8 (20%)           | 0.72    |
| Provided resource on IEPs and 504 plans                   | 2 (6.7%)         | 1 (2.5%)          | 0.39    |
| Any ADHD resource provided                                | 0 (0%)           | 17 (43%)          | <0.01   |
| Structured symptom assessment provided for next follow-up | 18 (60%)         | 19 (48%)          | 0.3     |
| Structured symptom assessment scored at visit             | 7 (23%)          | 10 (25%)          | 0.87    |

### Abstract 97: Longitudinal Attention Deficit Hyperactivity Disorder Management in Primary Care

Cierra Moss, MD, Children's Hospital of Philadelphia; Children's Pediatric Institute, Philadelphia, PA; Kristina Metzger, PhD, MPH; Megan Carey, MS, Children's Hospital of Philadelphia, Philadelphia, PA; Allison Curry, PhD, MPH; Thomas Power, PhD, Children's Hospital of Philadelphia; Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA

**Purpose:** ADHD symptoms and impairments generally persist into adolescence. To examine changes in ADHD care during the transition from childhood to adolescence, we conducted a retrospective, longitudinal cohort study of patients diagnosed with ADHD prior to age 10 to assess changes from preadolescence through adolescence in the (1) frequency by which primary care providers offer ADHD care to patients; (2) range of concerns assessed during patient encounters; and (3) treatments implemented or recommended.

**Methods:** We identified patients from New Jersey (NJ) primary care practices included in Children's Hospital of Philadelphia network who were: (1) born between 1996–1997; (2) diagnosed with ADHD before age 10; and (3) received primary care continuously from age 9 through late adolescence. Clinical care was compared among patients in preadolescence (age 9–11), early adolescence (age 12–14), and late adolescence (age 15–18).

**Results:** Documentation of assessment of ADHD symptoms decreased as patients matured from preadolescence into late adolescence, from 60% to 38% of visits ( $p<.001$ ). The proportion of patients prescribed psychotropic medication at any point during each age period also decreased from preadolescence to late adolescence (70% to 57%,  $p<.005$ ). Discussions of medication diversion and driver readiness were essentially not documented. In contrast, depression, suicide, and substance abuse screening increased substantially from preadolescence to adolescence ( $p<.001$ ).

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**Conclusions:** Children diagnosed with ADHD received less frequent care for ADHD in primary care practices across the transition from preadolescence to adolescence. Strategies are needed to increase the monitoring of ADHD and associated risks as children with ADHD mature through adolescence.

Table 1: Demographic and select characteristics of the study sample (N=262)

| Demographics                                                          |                           | N   | %    |
|-----------------------------------------------------------------------|---------------------------|-----|------|
| Sex                                                                   | Female                    | 57  | 21.8 |
|                                                                       | Male                      | 205 | 78.2 |
| Race/ethnicity                                                        | Hispanic                  | 11  | 4.2  |
|                                                                       | Non-Hispanic white        | 172 | 65.6 |
|                                                                       | Non-Hispanic black        | 54  | 20.6 |
|                                                                       | Non-Hispanic other        | 25  | 9.5  |
| Insurance payer at last visit                                         | Medicaid                  | 10  | 3.8  |
|                                                                       | Private                   | 252 | 96.2 |
| Zip code-level household income, quintiles                            | Q1 (≤\$57,226)            | 34  | 13.0 |
|                                                                       | Q2 (\$57,227 - \$72,857)  | 106 | 40.5 |
|                                                                       | Q3 (\$72,858 - \$87,222)  | 70  | 26.7 |
|                                                                       | Q4 (\$87,223 - \$105,888) | 42  | 16.0 |
|                                                                       | Q5 (≥\$105,889)           | 10  | 3.8  |
| Zip code-level population density, quintiles (population/square mile) | Q1 (≤408)                 | 39  | 14.9 |
|                                                                       | Q2 (409 - 1,223)          | 71  | 27.1 |
|                                                                       | Q3 (1,224 - 2,615)        | 103 | 39.3 |
|                                                                       | Q4 (2,616 - 4,876)        | 46  | 17.6 |
|                                                                       | Q5 (≥4,877)               | 3   | 1.1  |
| Other mental health conditions                                        |                           |     |      |
| Learning disorder                                                     |                           | 73  | 27.9 |
| Disruptive Behavior Disorders                                         |                           | 63  | 24.0 |
| Anxiety Disorders                                                     |                           | 49  | 18.7 |
| Mood disorders                                                        |                           | 25  | 9.5  |
| Autism Spectrum Disorder                                              |                           | 23  | 8.8  |
| Seizures                                                              |                           | 13  | 5.0  |

Table 2: Rates of Assessment and Treatment of ADHD and Screening for Risk Factors among Patients with ADHD in the Preadolescent, Early Adolescent and Late Adolescent Periods

| Late Adolescent Periods                 |            |       |             |       |             |       |         |
|-----------------------------------------|------------|-------|-------------|-------|-------------|-------|---------|
|                                         | 9-11 years |       | 12-14 years |       | 15-18 years |       |         |
|                                         | N          | %     | N           | %     | N           | %     | P-value |
| <b>ADHD assessment</b>                  |            |       |             |       |             |       |         |
| ADHD on the Problem List                | 183        | 69.8  | 202         | 77.1  | 203         | 77.5  | 0.08    |
| ADHD Diagnosis on Visit Encounter       | 165        | 63.0  | 141         | 53.8  | 107         | 40.8  | <0.001  |
| Assessment of ADHD Symptoms             | 156        | 59.5  | 126         | 48.1  | 100         | 38.2  | <0.001  |
| Prescribed Any Psychotropic Medications | 183        | 69.8  | 173         | 66.0  | 148         | 56.5  | 0.005   |
| Prescribed Stimulant Medications        | 167        | 90.8* | 149         | 86.1* | 117         | 78.5* | 0.007   |
| <b>Specialty Care</b>                   |            |       |             |       |             |       |         |
| Any Specialty Care Provider             | 85         | 32.4  | 68          | 26.0  | 69          | 26.3  | 0.18    |
| Neurology                               | 33         | 12.6  | 33          | 12.6  | 31          | 11.8  | 0.95    |
| Psychiatry                              | 21         | 8.0   | 22          | 8.4   | 33          | 12.6  | 0.14    |
| Developmental Pediatrics                | 32         | 12.2  | 24          | 9.2   | 19          | 7.3   | 0.15    |
| <b>Psychosocial Interventions</b>       |            |       |             |       |             |       |         |
| Evidence of Behavioral Interventions    | 39         | 14.9  | 34          | 13.0  | 54          | 20.6  | 0.05    |
| Evidence of School Interventions        | 95         | 36.3  | 41          | 15.6  | 46          | 17.6  | <0.001  |
| <b>Social History Screening</b>         |            |       |             |       |             |       |         |
| Discussion of School Performance        | 243        | 92.7  | 250         | 95.4  | 239         | 91.2  | 0.16    |
| Screening for Emotional Well-Being      | 96         | 36.6  | 250         | 95.4  | 237         | 90.5  | <0.001  |
| Screening for Sexual Activity Screening | 0          | 0     | 24          | 9.2   | 122         | 46.6  | <0.001  |
| Screening for Depression Conditions     | 98         | 37.4  | 246         | 93.9  | 234         | 89.3  | <0.001  |
| Screening for Suicide                   | 91         | 34.7  | 245         | 93.5  | 235         | 89.7  | <0.001  |
| Screening for Substance Abuse           | 63         | 24.0  | 247         | 94.3  | 239         | 91.2  | <0.001  |
| Safety Screening <sup>b</sup>           | 66         | 25.2  | 247         | 94.3  | 236         | 90.1  | <0.001  |
| Discussions of Driver Readiness         | 0          | 0     | 0           | 0     | 2           | 0.8   | 0.26    |

Note: Findings based on data derived from chart abstraction. \*Percentage reflects the rate for those taking any psychotropic medications. <sup>b</sup>Safety refers to general safety in the home, school, or neighborhood.

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### **Abstract 99: Metacognitive Beliefs and Emotional Eating in Adolescents**

*Catherine Shea, MA; Katherine Magnuson, BA; Christine Limbers, PhD, Baylor University, Waco, TX*

**Purpose:** Eating disorders pose a major public health concern for adolescents. The prevalence of eating disorders continues to grow among this population and is tied to life threatening behaviors like starvation and suicidality. There is some research with adults that indicates dysfunction in metacognitive beliefs (i.e., beliefs about thinking) are associated with eating disorder pathology. Specifically, adults with eating disorders demonstrate greater negative beliefs about the uncontrollability and danger of thoughts. To the best of our knowledge, no studies to date have examined whether dysfunctional metacognitive beliefs in adolescents are associated with emotional eating (i.e., eating in response to negative emotions), a well-known risk factor for the development of eating disorders. The purpose of the present study was to evaluate the associations between emotional eating and metacognitive beliefs in a sample of adolescents.

**Methods:** The sample consisted of 103 eighth grade students who were predominantly Caucasian (63.11%) and female (66.99%). The majority of these students were children of parents with a college degree or higher (71.43%). The students were administered the Metacognitions Questionnaire for Children and the Emotional Eating Scale Adapted for Children and Adolescents Short-Form to examine both the maladaptive metacognitive processes and the presence of emotional eating. The present study utilized a one-way analysis of variance to examine the presence of differences in means of emotional eating levels across low, moderate, and high maladaptive metacognitive processes.

**Results:** There was a significant difference in the mean emotional eating score across adolescents who endorsed low, moderate, and high maladaptive metacognitive beliefs ( $F = 7.97, p < 0.001$ ). Participants with low maladaptive metacognitive beliefs (Mean=14.21; SD=4.78) had significantly lower levels of emotional eating when compared to the moderate (Mean=20.99; SD=7.86) and high (Mean=23.24; SD=8.00) maladaptive metacognitive belief groups.

**Conclusions:** The association between maladaptive metacognitive processes and emotional eating within this sample of adolescents suggests maladaptive metacognitive processes may contribute to the presence of emotional eating. While further research is needed, this data may inform the development of programs aimed at the prevention of eating disorders in adolescents.

### **Abstract 101: Evaluating Executive Function in Early School Age Children Born Very Preterm: Differences Between Performance-based Measures and Parent Ratings**

*Carolyn Sawyer, MD, University of California, San Diego, San Diego, CA; Roger Bakeman, PhD, Georgia State University, Atlanta, GA; Natacha Akshoomoff, PhD, University of California, San Diego, San Diego, CA*

**Purpose:** To examine the associations of a general behavioral measure of executive function (EF) with other performance-based and parent report measures of EF in children born very preterm (VPT).

**Methods:** Participants were 60 healthy children born VPT (25-32 weeks gestation) and 31 full term children assessed before starting kindergarten (mean age 5.3 years, SD 0.05) and again at ages 6 and 7. Each assessment included three EF performance measures: the Head Toes Knees Shoulders (HTKS) task and the CANTAB Stop Signal and Spatial Working Memory tasks. The parent rating scales were the Behavior Rating Inventory of Executive Function (BRIEF) and the Child Behavior Checklist (CBCL). We examined EF differences between groups over time and the correlation between HTKS performance and other EF measures. Statistical methods included t-tests, Pearson correlations, and linear regression.

**Results:** Children born VPT scored significantly lower on the HTKS task than term controls across all three time points. The CANTAB scores were not significantly different across the groups. Parent ratings indicated significantly more EF

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difficulties in the VPT children at 5 years, but there were no group differences at 6 and 7 years; mean t-scores were not in the clinically significant range at any time point. In the VPT group, higher HTKS scores at age 5 were correlated with faster inhibitory responses ( $r=-0.456$ ,  $p<0.01$ ) and lower parent report of EF problems (BRIEF  $r=-0.341$ ,  $p=0.039$ , CBCL  $r=-0.350$ ,  $p=0.034$ ). At age 6, HTKS scores were again correlated with faster inhibitory response in the VPT group ( $r=-0.337$ ,  $p=0.011$ ) but at age 7, they were not significantly correlated with any of the performance or parent report measures in either group. In the VPT group, the CANTAB measures were significant predictors of HTKS scores across the 3 ages but not the parent report measures.

**Conclusions:** Children born VPT performed worse on a measure of general EF than term controls at a young age. Performance improved with age but the VPT group did not catch up to the term controls. There were weak to moderate correlations between HTKS performance and other performance-based and parent report measures of EF, suggesting these measures capture different skills. Further study of the role of both performance-based and parent report measures of EF as predictors of functional outcomes is needed for the development of effective interventions in this high risk population.

### Poster Symposium: Psycho-pharmacology Related Studies (Abstracts 103-107) *\*note: 105 was a previously presented abstract*

#### **Abstract 103: A Randomized, Double-Blind, Placebo-Controlled Study of Delayed-Release and Extended-Release Methylphenidate (DR/ER-MPH) in Children with ADHD: An Evaluation of Safety and Efficacy Throughout the Day and Across Settings**

*Ann Childress, MD, Center for Psychiatry and Behavioral Medicine, Inc., Las Vegas, NV; Andrew Cutler, MD, Meridien Research; SUNY Upstate Medical University, Bradenton, FL; Andrea Marraffino, PhD, Meridien Research, Maitland, FL; Norberto DeSousa, MA; Bev Incledon, PhD, Ironshore Pharmaceuticals & Development, Inc., Camana Bay, NA, Cayman Islands; Randy Sallee, MD, PhD, Ironshore Pharmaceuticals, Inc., Durham, NC; Sharon Wigal, PhD, AVIDA Inc., Newport Beach, CA*

**Purpose:** Evening-dosed HLD200 is a once-daily delayed-release and extended-release methylphenidate (DR/ER-MPH) designed to provide onset of treatment effect upon awakening and lasting throughout the day. Herein, we present the efficacy and safety of DR/ER-MPH from a pivotal, phase 3, placebo (PBO)-controlled laboratory classroom study that enrolled 125 children (6–12 years) with attention-deficit/hyperactivity disorder (ADHD) (NCT02493777).

**Methods:** During a 6-week open-label (OL) phase, DR/ER-MPH was titrated to an optimal dose (20–100 mg/d) and dosing time (8 PM  $\pm$  1.5 h) based on improvements on ADHD Rating Scale-IV, Before School Functioning Questionnaire, and Conners' Global Index – Parent. Participants were then randomized 1:1 to double-blind (DB) optimized DR/ER-MPH or PBO for 1 week. The primary endpoint was the model-adjusted average of post-dose Swanson, Kotkin, Agler, M-Flynn, and Pelham Rating Scale combined score (SKAMP CS) from 8 AM to 8 PM. Key/other secondary measures included the Parent Rating of Evening and Morning Behavior-Revised, Morning (PREMB-R AM) and Evening (PREMB-R PM) subscales, and Permanent Product Measure of Performance-Attempted (PERMP-A) and -Correct (PERMP-C). Safety endpoints included treatment-emergent adverse events (TEAEs), with direct questioning for sleep disturbances.

**Results:** Efficacy was analyzed in 117 participants (64 DR/ER-MPH; 53 PBO). After dosing optimization (mean optimized dose: 66.2 mg; most common prescribed dosing time: 8 PM), 1 week of DR/ER-MPH treatment significantly improved outcomes over a 12-h classroom day versus PBO: SKAMP CS (least squares [LS] mean: 14.8 vs. 20.7;  $P<0.001$ ), PERMP-A (LS mean: 125.8 vs. 92.1;  $P=0.006$ ), and PERMP-C (LS mean: 121.2 vs. 89.0;  $P=0.009$ ). DR/ER-MPH also significantly improved functional impairment versus PBO in the early morning (PREMB-R AM [LS mean]: 0.9 vs. 2.7;  $P<0.001$ ) and late afternoon/evening (PREMB-R PM [LS mean]: 6.1 vs. 9.3;  $P=0.003$ ). No serious TEAEs or TEAEs

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leading to discontinuation were reported during the DB period. The most common TEAEs ( $\geq 5\%$  in any group) were increased diastolic blood pressure (DR/ER-MPH: 13.8%; PBO: 13.0%) and any type of insomnia (DR/ER-MPH: 7.7%; PBO: 9.3%); all TEAEs during the DB period were mild/moderate in severity.

**Conclusions:** DR/ER-MPH was well tolerated and demonstrated significant improvements in ADHD-related symptoms and functional impairment from the early morning and throughout the day versus PBO in children with ADHD.

### **Abstract 104: Use of Rating Scales and Complexity of Presentation for Preschoolers Treated with Medication for ADHD: A Developmental-Behavioral Pediatrics Research Network (DBPNet) Study**

*Shruti Mittal, MD, Medical University of South Carolina, Johns Island, SC; Angela LaRosa, MD, MUSC, Charleston, SC; Irene Loe, MD, Lucile Salter Packard Children's Hospital/Stanford University, Palo Alto, CA; Shelby Tulio, MS, Children's Hospital of Philadelphia, Philadelphia, PA; Douglas Vanderbilt, MD, MS, Keck School of Medicine, University of Southern California / Children's Hospital Los Angeles, Los Angeles, CA; Elizabeth Harstad, MD, MPH, Boston Children's Hospital, Boston, MA*

**Purpose:** To report the frequency with which rating scales are used by developmental-behavioral pediatricians (DBPs) as part of the diagnostic evaluation for ADHD. 2. To describe symptom profiles, number of co-morbidities, and school supports for preschool age children with ADHD treated with medications.

**Methods:** Sites within DBPNet completed chart reviews of children 0 to < 72 months with a visit to DBP clinicians between 1/1/13 and 7/1/17 and treated with medication for ADHD. We abstracted data about ADHD assessment, age, documented rating scales, co-morbidities, and services received prior to ADHD medication treatment. We report descriptive statistics about rating scales used, score profiles, number of co-morbidities, and school supports.

**Results:** We collected data from 261 charts at 6 DBPNet sites. Mean age was 56.3 months at ADHD diagnosis and 59.7 months at initial ADHD medication treatment. The majority (78.9%) had documented use of a parent rating scale, consisting of the Behavior Assessment System for Children (BASC; 41.8%); ADHD rating scale (29.1%); Child Behavior Checklist (CBCL; 27.6%); and Vanderbilt rating scale (8.4%). Teacher rating scales were documented for 48.6% and consisted of ADHD Rating Scale (22.2%); CBCL (20.7%); BASC (14.9%); Vanderbilt (8.1%). Children's T-scores were consistently in the clinically significant range for externalizing behaviors on parent CBCL (mean 69.7, SD = 10.5) and parent BASC (mean = 72, SD = 12.9), but internalizing T-scores were not as elevated (CBCL mean 59.5, SD = 11.8, BASC mean = 57, SD 13.2). Parents and teachers reported high total symptom count on Vanderbilt (parent mean = 13.4/18 SD 3.3, teacher mean = 12.2/18 SD = 4.7) and ADHD rating scales (parent mean = 13.3/18, SD 3.3, teacher mean = 12.3/18, SD = 4.2). One co-morbidity was identified in 28.35% of children, 2 co-morbidities in 29.50%, 3 in 18.77%, and > 4 in 11.87%. The majority (n = 170, 65.4%) had special education school supports at initial ADHD medication treatment; 163 through an Individualized Education Program and 7 through a 504 Accommodation Plan.

**Conclusions:** For preschoolers treated with medication for ADHD by DBPs there were a variety of rating scales used documenting the high rates of externalizing problems. Most preschoolers had one or more identified co-morbidity and were receiving special education services. These findings highlight the complexity of preschool ADHD from both clinical and research perspectives.

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### **Abstract 106: Predictors of Stimulant Medication Continuity in Children with Attention-Deficit/Hyperactivity Disorder (ADHD)**

*Kelly Kamimura-Nishimura, MD, MS; William Brinkman, MD, MSc, MEd; Jeffery Epstein, PhD; Yin Zhang, PhD; Mekibib Altaye, PhD, Cincinnati Children's Hospital Medical Center, Cincinnati, OH; Tanya Froehlich, MD, MS, Cincinnati Children's Hospital Medical Center, Cincinnati, OH*

**Purpose:** ADHD medications are effective at reducing core ADHD symptoms, yet pediatric ADHD medication continuity is often poor. Although some predictors of ADHD medication continuity have been delineated, prior studies have not investigated comprehensive models which simultaneously incorporate a range of child and family factors. The purpose of this study is to examine the impact of sociodemographic, clinical and parent attitudinal predictors of medication continuity in the first year after children are diagnosed with ADHD.

**Methods:** Stimulant-naïve children (N=144, mean age=8 years, 71% male) with ADHD completed a 4-week methylphenidate (MPH) dose-finding randomized controlled trial (RCT) and were followed for one year after RCT completion and return to community care. We investigated predictors of having at least 1 filled ADHD prescription versus none in the year after the RCT via a multivariable analysis using the least absolute shrinkage and selection operator (LASSO) method. Among participants with at least one filled prescription, we determined predictors of having more days covered with ADHD medicine using LASSO regression models. Predictors examined included race, age, sex, income, baseline ADHD symptom severity, experience with MPH during the RCT (efficacy and side effects), child and family mental health conditions, and family beliefs about ADHD, ADHD medications, and their clinical therapeutic alliance.

**Results:** 121 (84%) children had at least 1 day of medication coverage (mean=178 days) in the year after returning to community care post-RCT. Multivariable models identified only one factor - having a low family-reported working alliance with the clinician - as a predictor of not filling any ADHD prescriptions. Among those who filled at least one prescription, factors linked to fewer days of medication coverage included non-White race, older age, female gender, low income, comorbid Oppositional Defiant Disorder, non-improvement of ADHD symptoms during the RCT, caregiver diagnosis of ADHD, lower caregiver beliefs that the child's ADHD affects their lives, and higher caregiver beliefs that medication is harmful.

**Conclusions:** Some children, based on sociodemographic characteristics, clinical characteristics, caregiver mental health diagnosis, and caregiver perceptions, are less likely to continue ADHD medication treatment. These findings may facilitate development of effective strategies to improve ADHD medication continuity.

### **Abstract 107: Effects of Testosterone on Executive Function in Adolescents with Klinefelter Syndrome**

*Caroline Harrison, MPH, Children's Hospital Colorado/University of Colorado Anschutz Medical Campus, Aurora, CO; Richard Boada, PhD; Lisa Cordeiro, MS; Jennifer Janusz, PsyD; Nicole Tartaglia, MD, MS, Children's Hospital Colorado/University of Colorado Anschutz Medical Campus, Aurora, CO*

**Purpose:** Klinefelter syndrome (KS) occurs in 1/650 male births and causes reduced testosterone production and executive function (EF) deficits. Pilot studies suggest benefits of exogenous testosterone treatment for improving some motor function, mood, energy level, self-esteem and verbal fluency, but there have been no controlled trials to date and no research measuring its effect on EF subdomains. This study examined the effect of testosterone on EF subdomains including attention, working memory, inhibition and planning/switching in adolescents with KS.

**Methods:** A double-blinded placebo-controlled trial randomized 49 males with KS (Tanner 2 or 3) to apply testosterone or placebo gel daily for 12 months, 44 completed the study. Performance-based measures and parent questionnaires assessed EF at baseline and 1 year. Factor analysis allowed creation of composite EF scores. An independent-samples t-test compared baseline EF between treatment groups and a one-sample t-test compared the

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total cohort to standardized norms. A multivariable linear regression tested whether performance-based EF measures predict parent questionnaire EF scores. Repeated measures ANOVAs assessed treatment effect of testosterone. Effect sizes on difference scores were calculated.

**Results:** The study cohort showed EF deficits compared to norms, consistent with prior literature. None of the performance-based EF measures predicted parent questionnaire EF composite score ( $R^2 = 0.057$ ,  $p = 0.70$ ), so both outcome measures were included in subsequent analyses. Interestingly, the questionnaire EF composite was predicted significantly by internalizing and externalizing behavior scores ( $R^2 = 0.574$ ,  $p = <.001$ ). Testosterone neither worsened nor improved EF, regardless of testing modality, but small effect sizes were noted for inhibition (both modalities, Cohen's  $d = 0.3/0.2$ ), planning/switching (performance-based measure, Cohen's  $d = 0.3$ ) and attention (questionnaire, Cohen's  $d = 0.3$ ).

**Conclusions:** The effect sizes within particular EF subdomains support the need for multi-site replication with a larger cohort. Previous literature finding discrepancies between performance-based measures and questionnaires were replicated in this population. Future directions include analysis of the effect of testosterone on physical, motor, emotional/behavioral symptoms, and adaptive measures in adolescents with KS.

### Platform Session I: ACES/ Psychological Stressors

**(Abstracts 108-112)** *\*note: 110, 112 were previously presented abstracts*

#### **Abstract 108: Association between food insecurity and developmental delay and behavioral problems in US children 2-5 years of age**

*Devina Savant, MD, Brown University, Providence, RI; Annie Gjelsvik, PhD, Alpert Medical School of Brown University, Brown School of Public Health, Providence, RI; Colleen Caron, PhD., Brown school of Public Health, Providence, RI; Pamela High, MD, Rhode Island Hospital/Hasbro Children's Hospital, Providence, RI*

**Purpose:** Food insecurity negatively impacts children's academic performance, cognition, mental health and risk of chronic disease. In 2017, 1 in 6 U.S. households were food insecure, half with >1 child with food insufficiency.

Our study aims to investigate the relationship between food insecurity and developmental delay and/or behavior problems (DD/BP) in non-institutionalized US children 2-5 years old (yo).

**Methods:** Data from 14,464 children 2-5 yo from the National Survey of Children's Health 2016-2017 was analyzed. Food insecure children came from households reporting they sometimes or often don't have enough to eat. Diagnosis of DD/BP by a professional was also obtained by caregiver report. STATA version 15 adjusted for complex survey design and weighting in analysis.

**Results:** A quarter of these 2-5 yos were in food insecure households; 9% had been diagnosed with DD/BP. Food insecure children were more likely to be Black, Hispanic, publicly insured, with single parents, w/o high school education, <130% FPL, receiving food stamps (SNAP) (all  $p < .001$ ).

Adjusting for age, gender, race, ethnicity, poverty, family structure and parent education, food insecure children had 1.68X the odds of being diagnosed with DD/BP, vs food secure children. Also, 4-5 yos were 1.41X more likely to be diagnosed with DD/BP, vs 2-3 yos; boys were >2X as likely to be diagnosed with DD/BP than girls; black children had 1.52X the odds of diagnosis of DD/BP vs white children (all  $p < .05$ ). In similarly adjusted models excluding poverty and stratified by SNAP use-homes not receiving SNAP maintained this association between food insecurity and diagnosis of DD/BP, while in homes receiving SNAP, the association was not significant.

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**Conclusions:** In this population based study food insecure U.S. 2-5 yos were more likely to be diagnosed with DD/BP compared to those with food security, Receiving SNAP seemed to attenuate the association of food insecurity with diagnosis of DD/BP. Research into factors associated with poverty and early childhood neurodevelopmental outcomes is warranted, especially due to increasing trends in food insecurity and paradoxically declining enrollment in SNAP in qualifying immigrant families with young children.

### Abstract 109: Differences in Unmet Health Care Needs of Children with Intellectual Disability vs. Autism Spectrum Disorder

Kelly Haller, BS, Wright State University, Beavercreek, OH; Adrienne Stolfi, MSPH; John Duby, MD, Wright State University Boonshoft School of Medicine, Fairborn, OH

**Purpose:** With the increase in ASD awareness and diagnosis, concerns are raised as to whether children with ID have more unmet health care needs than children with ASD. The purpose of this study was to assess the unmet health care needs of children with ID compared to children with ASD and whether inconsistent health insurance coverage is associated with any differences.

**Methods:** The 2016-2017 NSCH identified children with diagnoses of ID and ASD (with or without ID). Caregivers were asked if the child had an unmet need for health care during the past 12 months, and the type of care that was not received. Caregivers were asked if a child had consistent health insurance coverage during the past 12 months. Adjusted odds ratios (AOR) and 95% confidence intervals for needed health care not received were calculated and adjusted for sex of the child, insurance, and parent's highest education level.

**Results:** In the 2016-2017 NSCH, the frequency of ID and ASD was 1.05% and 2.6%, respectively. Children with ID had 4.72 (95% CI: 1.93-11.49) times the odds of needing medical care and not receiving it as children with ASD (with or without ID). Similar odds ratios resulted for the other categories, with the exception of mental health where children with ID had 0.41 (95% CI: 0.19-0.92) times the odds of needed but unmet mental health care compared to children with ASD. The results for the unmet needs of care are shown in Table 1. In addition, children with ID had 0.36 (95% CI: 0.19-0.57) times the odds of having consistent health insurance compared to children with ASD during the past 12 months.

**Conclusions:** Children with ID are more likely to have unmet healthcare needs for medical, dental, hearing, and vision care than children with ASD. This suggests children with ID, more so than those with ASD, have unmet basic health care needs. Additionally, children with ID are less likely than children with ASD to have consistent health insurance, which hinders their ability to receive quality, sufficient care.

Table 1. Odds of Having Unmet Basic Health Care Needs for Children with ID Compared to Children with ASD

| Needed Health Care Not Received: | AOR  | Confidence Interval (95%) |
|----------------------------------|------|---------------------------|
| Medical Care                     | 4.72 | 1.93-11.49                |
| Dental Care                      | 4.67 | 2.03-10.75                |
| Vision Care                      | 2.81 | 1.13-6.99                 |
| Hearing Care                     | 4.52 | 1.55-13.16                |
| Mental Health Services           | 0.41 | 0.19-0.92                 |

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### **Abstract 111: Association between neighbourhood socioeconomic status and developmental vulnerability of kindergarten children with Autism Spectrum Disorder: A population level study**

*Ayesha Siddiqua, PhD Candidate; Eric Duku, PhD; Magdalena Janus, PhD, McMaster University, Hamilton, ON, Canada*

**Purpose:** To examine the association between neighbourhood socioeconomic status (SES) and developmental vulnerability at the individual level across neighbourhoods, while controlling for individual SES, among kindergarten children with Autism Spectrum Disorder (ASD) living in Ontario, Canada.

**Methods:** This study used data from a population-level database of child development in kindergarten, collected with the Early Development Instrument (EDI). The EDI is completed by kindergarten teachers, includes records of medical diagnoses, and has been administered at the population level in most Canadian provinces and territories. The EDI data provide information on children's developmental status in 5 domains: physical health and well-being, social competence, emotional maturity, language and cognitive development, and communication skills and general knowledge. Scores below a baseline 10th percent cut-off on any of the 5 domains indicate vulnerability and overall vulnerability is indicated by vulnerability on one or more domains. Neighbourhood SES was assessed using an SES index created using 10 variables from the 2011 Canadian Census and 2010 Taxfiler data. Individual SES was assessed using 4 variables from the 2016 Canadian Census data. Multilevel logistic regression analyses were used to examine the association between neighbourhood SES and developmental vulnerability of the child, while controlling for individual SES and demographic characteristics and accounting for clustering of children in neighbourhoods.

**Results:** After controlling for individual SES and demographic characteristics, there was a negative association between neighbourhood SES with overall vulnerability (OR: -0.16, 95% CI: -0.30 to -0.02;  $p < 0.05$ ), with vulnerability on the physical health and well-being domain (OR: -0.11, 95% CI: -0.20 to 0.02;  $p < 0.05$ ), with vulnerability on the social competence domain (OR: -0.12, 95% CI: -0.22 to -0.03;  $p < 0.05$ ), with vulnerability on the language and cognitive development domain (OR: -0.13, 95% CI: -0.23 to -0.04;  $p < 0.01$ ), and with vulnerability on the communication skills and general knowledge domain (OR: -0.15, 95% CI: -0.25 to -0.05;  $p < 0.01$ ).

**Conclusions:** Children with ASD living in neighbourhoods with higher SES are less likely to demonstrate developmental vulnerability, which emphasizes the importance of addressing neighbourhood deprivation to support the development of children with this disorder.

### **Abstract 112: The Relationship Between Adverse Childhood Experiences and Weight-Related Health Behaviors in a Nationally Representative Sample of Children**

*Melissa Harada, MD; Rebecca Dudovitz, MD; Lyre Fribourg, PhD, BCBA-D; Alma Guerrero, MD; Sai Iyer, MD; Irene Koolwijk, MD, MPH; Wendelin Slusser, MD; May Wang, DrPH; Moira Szilagyi, MD, PhD, UCLA, Los Angeles, CA*

**Purpose:** ACEs are traumatic childhood events that contribute to risk for many adult diseases such as obesity. Research has shown that ACEs contribute to health risk behaviors in adulthood, however few studies have explored this relationship in children at a time when early intervention and counseling could improve health outcomes. This study examined how adverse childhood experiences (ACEs) relate to the prevalence of healthy weight behaviors (HWBs) in children 6-17 years of age. We hypothesize that ACEs will be inversely associated with HWBs in a dose response manner.

**Methods:** Using the 2016 National Survey of Children's Health, we examined ACEs and HWBs in children 6-17 years old. ACE scores were calculated based on measures of household dysfunction (divorce, parent deceased, parent incarceration, domestic violence, household mental illness and substance abuse). Outcome measures for HWBs included physical activity, screen time (television and electronics) and sleep, based on the American Academy of Pediatrics (AAP) Recommendations on Obesity Prevention, and frequency of shared family meals. Dichotomous

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logistic regression models assessed for associations between ACE exposure and HWBs, controlling for child age, gender, race/ethnicity, parental education and family income.

**Results:** Among 32,528 U.S. children 6-17 years old, 60.5% had 0 ACEs, 21.9% had 1 ACE, 13.4% had 2-3 ACEs, and 4.2% had 4 or more ACEs. For children 6-12 years of age, cumulative ACE score was significantly associated with decreased odds of 2 hours or less of screen time (television and electronics), 4 or more shared family meals per week, and a minimum of 9 hours of sleep in a dose response manner (Table 1). For children 13-17 years of age, cumulative ACE score was significantly associated with decreased odds of 60 minutes of daily physical activity, 2 hours or less of screen time (television and electronics), 4 or more shared family meals per week and a minimum of 8 hours of sleep in a dose response manner (Table 1).

**Conclusions:** In children 6-17 years of age, ACE exposure is associated with increased screen time, decreased frequency of family meals, less adequate sleep and for children 13-17 years of age, decreased physical activity. These behaviors contribute to obesity risk and may be the focus of obesity counseling for children exposed to adversity.

Table 1: Odds of Healthy Weight Behaviors by ACE Score

| ACE Score | Television Time (2 hours or less)<br>OR (95% CI) |                   | Electronics Time (2 hours or less)<br>OR (95% CI) |                   | Family Meals (4 or more days)<br>OR (95% CI) |                   | Sleep<br>OR (95% CI)           |                                 | Physical Activity<br>OR (95% CI) |
|-----------|--------------------------------------------------|-------------------|---------------------------------------------------|-------------------|----------------------------------------------|-------------------|--------------------------------|---------------------------------|----------------------------------|
|           | 6-12 years                                       | 13-17 years       | 6-12 years                                        | 13-17 years       | 6-12 years                                   | 13-17 years       | 6-12 years<br>(9 hour minimum) | 13-17 years<br>(8 hour minimum) | 13-17 years                      |
| 0         | 1.46 (1.20, 1.80)                                | 1.64 (1.39, 1.94) | 1.44 (1.15, 1.80)                                 | 1.86 (1.60, 2.16) | 1.39 (1.17, 1.66)                            | 1.68 (1.44, 1.95) | 1.50 (1.26, 1.79)              | 1.31 (1.11, 1.55)               | 1.27 (1.02, 1.58)                |
| 1         | 0.88 (0.68, 1.14)                                | 0.69 (0.57, 0.85) | 0.81 (0.62, 1.05)                                 | 0.58 (0.48, 0.70) | 0.75 (0.61, 0.93)                            | 0.62 (0.52, 0.75) | 0.74 (0.60, 0.91)              | 0.81 (0.66, 0.99)               | 0.75 (0.57, 1.00)                |
| 2-3       | 0.50 (0.38, 0.65)                                | 0.54 (0.43, 0.68) | 0.60 (0.44, 0.82)                                 | 0.49 (0.39, 0.63) | 0.68 (0.52, 0.87)                            | 0.55 (0.44, 0.67) | 0.64 (0.51, 0.82)              | 0.69 (0.55, 0.87)               | 0.89 (0.66, 1.20)                |
| 4 or more | 0.49 (0.30, 0.81)                                | 0.45 (0.32, 0.65) | 0.51 (0.29, 0.89)                                 | 0.47 (0.33, 0.68) | 0.65 (0.41, 1.04)                            | 0.64 (0.45, 0.90) | 0.42 (0.28, 0.64)              | 0.79 (0.55, 1.14)               | 0.61 (0.40, 0.94)                |

OR, Odds Ratio

CI, Confidence Interval

## Platform Session II: Evaluation and Identification of DBP Disorders

### (Abstracts 113-117) *\*note: 113, 116, 117 were previously presented abstracts*

#### Abstract 114: Presenting Characteristics and Potential Phenotypic Subgroups of Toddlers with DSM-5 Autism Spectrum Disorder

Holly Hodges, MD; Georgios Sideridis, PhD; William Barbaresi, MD; Elizabeth Harstad, MD, MPH; Collin Lee, BS, Boston Children's Hospital, Boston, MA

**Purpose:** Autism spectrum disorder (ASD) is a diagnosis with significant heterogeneity and, to our knowledge, phenotypic subgroups of toddlers diagnosed with DSM-5 ASD have not yet been identified. Our objective was to describe the neurodevelopmental characteristics of toddlers diagnosed with DSM-5 ASD and to identify phenotypic subtypes if present.

**Methods:** We conducted a retrospective review of 500 toddlers (< 36 months) diagnosed with DSM-5 ASD via an interdisciplinary assessment between July 2013 and May 2016. We abstracted cognitive and language functioning standard scores (SS) and ASD core symptoms. We conducted separate latent class analyses (LCA) for each core symptom domain to assess for subgroups.

**Results:** Subjects had an average age of 26 months and 79% (N = 396) were male. Mean Bayley Scales of Infant and Toddler Development scores were as follows: Cognitive SS = 81, Language SS = 63, and Motor SS = 79. The LCA assessing social communication favored a 3-class model of high (31%), moderate (44%), and mild (25%) severity groups. Cognitive and language functioning differed significantly across groups (chi-square p-value < 0.05); subjects

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with more severe social communication deficits also had lower cognitive and language abilities. The LCA for restrictive/repetitive behaviors favored a 2-class model of high (63%) and low (37%) severity. Again, cognitive and language functioning differed significantly across groups (chi-square p-value < 0.05), but in an inverse way; subjects with more restrictive/repetitive behaviors had higher cognitive and language abilities.

**Conclusions:** Latent class analysis offers an approach to understand the heterogeneity of core symptom severity in a population of toddlers with DSM-5 ASD. In our sample, a three class model best described social communication deficits, while a two class model best described restrictive/repetitive behaviors. For social communication deficits, subjects in the higher severity classes had lower cognitive and language skills. The inverse was seen with restrictive/repetitive behaviors, suggesting that restrictive/repetitive behaviors may only be manifested among toddlers with a certain minimal level of cognitive or language function. In a prospective follow-up, we will determine if these subgroups of core symptoms persist over time or if group membership relates to developmental trajectory or outcomes.

### **Abstract 115: ADHD and its Comorbidities in School-Age Children: A Cross-Cultural Comparison**

*Jason Fogler, PhD, Boston Children's Hospital, Boston, MA; Martin Schofl, PhD, Johannes Kepler University-Linz, Linz, NA, Austria; Irene Koolwijk, MD, MPH, UCLA, Los Angeles, CA; Georgios Sideridis, PhD; Sarah Weas, M.S., Boston Children's Hospital, Boston, MA; Johannes Fellingner, MD, PD, Johannes Kepler University-Linz, Linz, NA, Austria; William Barbaresi, MD, Boston Children's Hospital, Boston, MA*

**Purpose:** To begin to explore the question of whether comorbidity patterns in pediatric ADHD are predominantly neurobiologically driven (as has been suggested in the extant literature) or whether there are important environmental correlates -- in this case, cultural differences between the U.S. and Austria.

**Methods:** Two cohorts of school-aged children with ADHD recruited from subspecialty developmental clinics -- one in the U.S. (N = 144, ages 7-11 years) and one in Linz, Austria (N = 149, ages 6-10 years) -- underwent secondary data analysis (Latent Class Analysis) to explore differences in their comorbidity patterns. The samples of both cohorts consisted of children with no diagnoses, adhd, autism-spectrum disorders, psychiatric disorders, learning disorders, communication disorder, motor disorders and others (not otherwise specified).

**Results:** Three clusters emerged from the Latent Class Analysis: one representing over half the sample of both countries and characterized by simple ADHD and low rates of comorbidity; one characterized by ADHD and high rates of learning disorder that occurred in 42% of the Austrian sample; and one characterized by high rates of psychiatric comorbidity that occurred in nearly one-third of U.S. participants. Differences are attributed in part to sampling between the two clinics and in part to differences between the two countries in how psychologists are trained.

**Conclusions:** Rates of overall comorbidity were comparable to that seen in other studies, but the manifestation of these comorbidities appeared to vary as a function of site. This study suggests that while there are likely to be broadband "culture-blind" components to treatments for ADHD, some tailoring for different cultural groups is likely to be beneficial and perhaps necessary to achieve optimal effects.

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## Comorbidity Differences Among USA and Austrian Samples of ADHD (Fogler, Schofl, et al.)

G. Sideridis (ICCTR)

**Preliminary Summary.** The figure below shows percentage differences between USA and Austrian samples of individuals with ADHD across various comorbid conditions. Values are row percentages in that for example, 24.3% of the USA sample had psychiatric disorders compared to 4% in Austria. Analyses involved crosstabulations and tests of significance are available for each comorbid condition by use of a chi-square test.

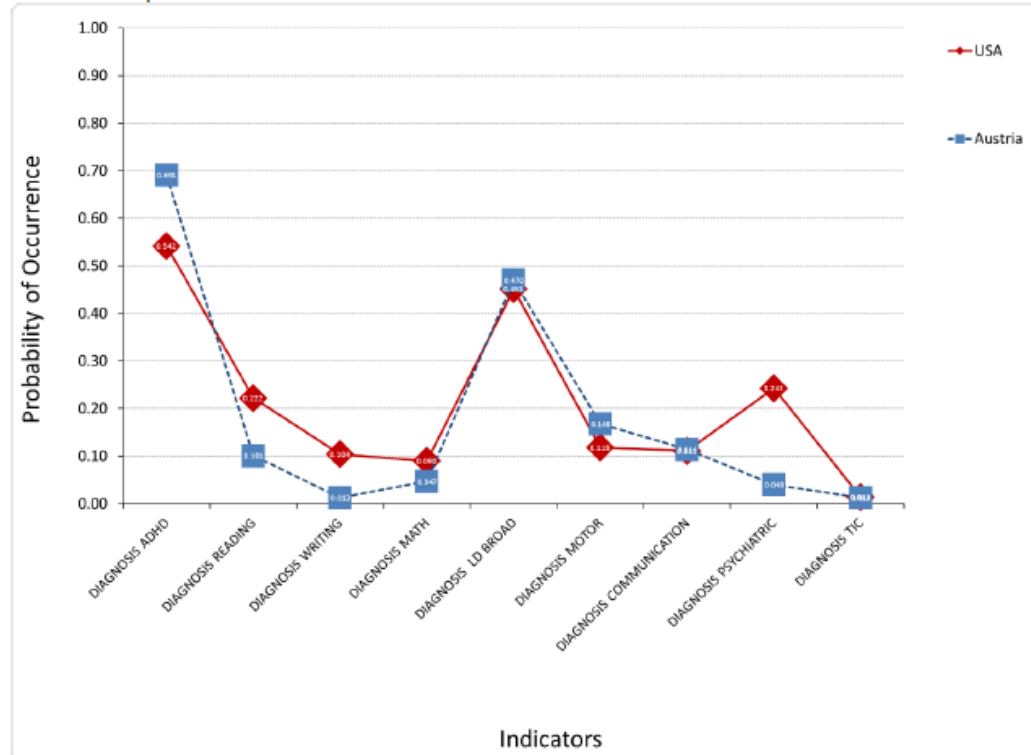


Figure 1. Differences in prevalence of comorbid conditions across US and Austrian samples.

**Conclusions:** The two samples appear to be quite similar across comorbid diagnoses with few exceptions.

Table 1.

*Demographics of the U.S. and Austrian Samples.*

| Demographics       | U.S. Sample | Austrian Sample | P-value            |
|--------------------|-------------|-----------------|--------------------|
| Mean Age in Months | 107.93      | 99.38           | <.001 <sup>a</sup> |
| Mean IQ            | 97.51       | 103.97          | N/A                |
| Gender: Males      | 72.9%       | 65.8%           | .185 <sup>b</sup>  |
| Gender: Females    | 27.1%       | 34.2%           | .185 <sup>b</sup>  |

**Note:** Tests of significance were not conducted for IQ as the instruments utilized in each study were not identical.

<sup>a</sup>By use of an F-test.

<sup>b</sup>By use of a chi-square test.

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### Platform Session III: Reading and Media (Abstracts 118-122)

#### **Abstract 118: Effects of Early Screen Media Multitasking on Executive Function in School-Age Children: A Prospective Cohort Study**

*Pornchada Srisinghasongkram, MD, Pon Trairatvorakul, MD; Weerasak Chonchaiya, MD, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand*

**Purpose:** Media multitasking (MMT), the use of any type of media in conjunction with another media, has increasingly become more common worldwide. Screen media multitasking (SMM), a new term, is defined as using more than one type of electronic screen media simultaneously, including television (TV), video/digital versatile disc (DVD), smartphone, tablet and computer. SMM accounts for both foreground and background media use. Although heavy single media use is associated with lower executive function (EF) in children, less is known whether SMM is also related to EF.

**Methods:** A prospective cohort study, with data collected between February 2012 to February 2019, was a part of the Impact of Electronic Media Exposure on Children Project, which originally enrolled typically developing participants at 6 months of age and collected children's and caregivers' data from age 6 months to 6 years. SMM was assessed in depth at age 1, 2, 3, 4 and 6 years. EF at age 6 years was evaluated by utilizing Behavior Rating Inventory of Executive Function (BRIEF) and performance tasks such as Head-Toes-Knees-Shoulders Task, Simon Says Task, and Tower of Hanoi Task. The higher scores in BRIEF represented more EF problems whereas higher scores on performance tasks, calculated to EF index, indicated less EF problems. Data between SMM and no SMM groups were compared by using chi-square or ANOVA. Path analyses were finally performed to elucidate whether early SMM had an effect on EF during school age.

**Results:** One hundred and ninety-nine healthy children (97 boys) were followed-up until the age of 6 years in February, 2019. While infants and toddlers used TVs and tablets concurrently, preschoolers tended to use TVs and smartphones simultaneously. SMM group were found to have significantly more working memory problems (51.8 vs. 48.9,  $p = 0.04$ ) and initiate problems (48.1 vs. 45.4,  $p = 0.031$ ) on the BRIEF than those without SMM. Early onset of media exposure was associated with increased SMM at age 2, 3 and 4 years, respectively. SMM at age 4 years directly increased EF problems at age 6 years, especially in working memory and initiate subscales.

**Conclusions:** SMM during preschool was associated with decreased EF (working memory and initiate subscales) during school age. Pediatricians play a pivotal role in recommending age-appropriate media exposure, and in particular, discouraging SMM since early childhood.

#### **Abstract 119: Cross-Cultural Caregiver Perceptions of Book Sharing and Promoting School Readiness in Young Children**

*Mei Elansary, MD, Boston Children's Hospital, Boston, MA; Alexandra Chen, EdM, Harvard University, Cambridge, MA; Jocelyn Kuhn, PhD, Boston Medical Center, Boston, MA; Yousef Aleghfeli, EdM; Ka Ya Lee, EdM, Harvard University, Cambridge, MA; Sarah Strader, EdM, FHI 360, Washington, DC; Dana Charles McCoy, PhD, Harvard University, Cambridge, MA*

**Purpose:** Caregivers with greater knowledge of early child development are more likely to provide stimulation, such as through book sharing, resulting in improved academic and economic outcomes. Despite evidence about the benefits of book-sharing programs, little research has examined caregivers' perceptions of early literacy and school readiness skills. This study used qualitative methods to examine the perceptions of caregivers across five countries regarding (1) activities for young children related to books and literacy and (2) their role in supporting their children's early literacy skills and school readiness.

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**Methods:** We recruited 131 caregivers (92% mothers) of children ages 0-3 years in Hong Kong, Brazil, Guatemala, Ghana, and Lebanon. We conducted 30-minute semi-structured interviews in local languages and analyzed English translations with NVivo software, using standard grounded theory. Transcripts were double coded, with discrepancies arbitrated by a third reviewer.

**Results:** Caregivers in Lebanon indicated that they would teach their children to read. Parents in Guatemala, Hong Kong, and Ghana noted that siblings, grandparents, and teachers would additionally help. Caregivers across all countries indicated the importance of reading with their children, but for varying reasons. Those from Guatemala indicated that reading with children was extremely important because it stimulates parent-child interactions and children “can’t go to school without having ever seen a letter.” Parents in Ghana agreed about the importance of reading, but indicated limitations in their teaching role due to their own illiteracy: “Even though I am illiterate if they show it to me I can admire the pictures while they read.” In Hong Kong, parents emphasized the importance of developing a “reading habit,” and reading to support children’s wellbeing and happiness. In Lebanon, parents highlighted the utility of reading to capture children’s attention and teach morals from stories.

**Conclusions:** Parents expressed diverse perspectives of book sharing and their roles in developing school readiness in their children. Given that caregivers overall believed that reading with their children was an important activity, book sharing is an intervention for advancing early childhood development that is likely to have high acceptability across cultures. However, when encouraging book sharing interventions, it may be important to frame the reason for book sharing in a manner that reflects specific cultural values.

**Cross Cultural Perceptions of Book Sharing: Thematic quotes from caregivers**

| Quote                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Country   | Caregiver Characteristics                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------------------------------------------|
| Yes. I think this is something important to do when they are young. I saw this when his older brother started school -- children need this type of stimulation. They can't go to school without having ever seen a letter. To him, I would read the bible even if he didn't understand it. After some time, he knew most of the stories. So then, he is able to recognize letters, and sounds, and so on.                                                                                                                                                                                                                             | Guatemala | Ladina mother of a 24-month-old boy with vocational schooling    |
| Even though I am illiterate if they show it to me I can admire the pictures while they read, or they will laugh at me in my confusion. That means I actually wanted to learn but I can't, so it's important.                                                                                                                                                                                                                                                                                                                                                                                                                          | Ghana     | Mother of 17 month old boy with no schooling                     |
| Very important. I have read some research before. Before she is able to pronounce, she is already learning language. The earlier we start reading, the better to the child. So that she develops a reading habit. Otherwise, even I knew reading is important, I do not have this habit. To her, reading is relaxing and happy. To me, reading is a task and work. It is not a part of daily life. Reading is critical for learning... Firstly she does not know the words. I can increase the parent-child moment with her. Through story-reading, I can convey messages such as elements to be a good child or some life attitudes. | Hong Kong | Mother of 31-month-old girl with university or bachelor's degree |
| Because it will open the mind of the person, becoming more intelligent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Brazil    | Mother of 31-month-old girl with no schooling                    |
| Yes, I play with my child with all toys. We read stories, sing together, dance together but the most important thing is reading stories because it attract child's attention and teach him the moral from the story.                                                                                                                                                                                                                                                                                                                                                                                                                  | Lebanon   | Palestinian mother of 24-month-old girl with associate's degree  |

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### **Abstract 120: Electronic Screen Media Exposure in the First Two Years of Life and Preschool Cognitive Development: A Longitudinal Study**

*Weerasak Chonchaiya, MD; Sudarat Supanitayanon, MD; Pon Trairatvorakul, MD, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand*

**Purpose:** Although high electronic screen media exposure is related to developmental concerns in young children, associations between excessive media exposure with decreased parent-child interaction while the screen was on during early childhood and cognitive development in preschoolers are scarce. This study aimed to examine whether age of media onset, high media exposure, and verbal interaction during screen time in the first two years of life are associated with preschool cognition.

**Methods:** From February 2012 to September 2013, 291 typically developing infants were enrolled since age 6 months. Inclusion criteria were term singleton; birth weight  $\geq 2,500$  grams; uneventful pre-, peri-, and postnatal history; normal growth and development. To replace those who were lost to follow-up, 30 participants were recruited later at age 3 years by using the same criteria. Electronic media exposure at age 6, 12, 18 months, and 2 years were assessed in depth. Cognitive development was evaluated by Mullen Scale of Early Learning at age 2, 3, and 4 years. Positive parenting scores were computed based on Parenting Styles & Dimensions Questionnaire. Path analyses were performed to explore pathways among variables.

**Results:** There were 291, 265, 267, 267, 280, and 274 participants at 6-, 12-, 18-month, 2-, 3-, and 4-year-old visits, respectively. Median age of media onset was 1.0 (interquartile range 0-3) month. Upper quartile of total duration of media exposure was 422.5, 392.5, 465, and 435 minutes at age 6, 12, 18 months, and 2 years, respectively. Means of early learning composite (ELC) were 106.9 (15.4), 103.3 (16.3), and 109.7 (18.7) at age 2, 3, and 4 years, respectively. Earlier onset of media exposure had both direct and indirect relationships with lower ELC at 2 years of age via longer duration of media exposure above the upper quartile. ELC at age 2 years was also predicted by longer duration of verbal interaction during media use and higher maternal education. Longer duration of media exposure above the upper quartile had a direct relationship with decreased positive parenting at age 3 years. ELC at 4 years of age was predicted by 2- and 3-year ELC in addition to positive parenting.

**Conclusions:** To mitigate detrimental effect of inappropriate media use on cognition, delayed introduction of screen media, appropriate electronic media exposure, and increased verbal interaction during media use with children should be recommended at health supervision visits.

### **Abstract 121: The Relationship between U.S. Children's Screen Time and Family Practices, Caregiver Aggravation and Caregiver Coping/Support**

*David Jimenez, BS, Cohen Children's Medical Center, Lake Success, NY; Eli Rapoport, BS, Steven & Alexandra Cohen Children's Medical Center, New Hyde Park, NY; Andrew Adesman, MD, Cohen Children's Medical Center of NY, Lake Success, NY*

**Purpose:** The objective of this study is to investigate associations between screen time (ST) and family practices, caregiver frustration, caregivers' support network, and caregivers' ability to cope for children in the U.S.

**Methods:** Data for children ages 1 to 17 from the combined 2016-2017 National Survey of Children's Health, a nationally representative survey, were analyzed ( $n=69,163$ ). ST was computed as a sum of time spent watching television, videos, or playing video games on a typical weekday and time spent using a computer or other electronics for non-school related activities on a typical weekday. Associations between ST and caregiver responses concerning family practices (sharing ideas/discussing important topics, eating meals together), caregiver aggravation, and caregiver coping/support were tested using logistic regressions, controlling for demographic factors.

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**Results:** The adjusted odds ratios and confidence intervals for the sample are shown in Table 1. Greater ST was significantly associated with a lower likelihood of sharing ideas/discussing important topics. Furthermore, additional ST was associated with a lower likelihood of families eating a meal together one or more days per week. With respect to caregiver aggravation, more ST was significantly related to caregivers reporting that their child bothered them, angered them, and they felt their child was harder to care for compared to other same-aged children. ST was inversely related with caregivers feeling they were able to cope with the daily demands of raising their child. Finally, caregivers were significantly more likely to indicate they did not have anyone to turn to on a daily basis for emotional support with regards to caring for the child.

**Conclusions:** Overall, increased ST was negatively associated with beneficial family practices, caregivers' ability to cope and positively correlated with increased caregiver aggravation. Of note, ST was heavily related to high levels of frustration and anger in caregivers. Pediatricians should keep these strong correlations in mind in order to identify caregivers that may require additional emotional support with caring for their child. Future research should expand upon our findings by examining the directionality of these relationships and exploring other connections between ST and the family unit.

**Table 1. Association between Screen Time in Children Ages 1 to 17 and Family Interactions and Caregiver Aggravation and Coping/Support; 2016-2017 National Survey of Children's Health (n=69163)**

|                                                                                                                                              | Children with<br>< 3 hours<br>screen time<br>per typical<br>weekday<br>n (%) |        | Children with<br>≥ 3 hours<br>screen time<br>per typical<br>weekday<br>n (%) |        | Adjusted<br>OR <sup>a</sup><br>(corresponds<br>with a 1-hour<br>increase in<br>screen time) | (95% CI)     |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------|------------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------------------|--------------|
| Family Practices                                                                                                                             |                                                                              |        |                                                                              |        |                                                                                             |              |
| How well caregivers and child share ideas or talk about things that really matter (6 – 17 years)                                             |                                                                              |        |                                                                              |        |                                                                                             |              |
| Very well                                                                                                                                    | 14678                                                                        | (75.3) | 18992                                                                        | (64.0) | Ref                                                                                         |              |
| Somewhat well                                                                                                                                | 4545                                                                         | (22.2) | 9479                                                                         | (30.4) | 1.09                                                                                        | (1.07, 1.12) |
| Not very well                                                                                                                                | 416                                                                          | (2.0)  | 1350                                                                         | (4.5)  | 1.22                                                                                        | (1.15, 1.29) |
| Not at all                                                                                                                                   | 94                                                                           | (0.4)  | 225                                                                          | (1.2)  | 1.09                                                                                        | (0.96, 1.23) |
| Number of days in the past week that family members who lived in the household ate a meal together (1 – 17 years)                            |                                                                              |        |                                                                              |        |                                                                                             |              |
| No days                                                                                                                                      | 611                                                                          | (1.8)  | 1514                                                                         | (4.5)  | Ref                                                                                         |              |
| 1-3 days                                                                                                                                     | 6492                                                                         | (18.3) | 11019                                                                        | (29.7) | 0.90                                                                                        | (0.85, 0.95) |
| 4-6 days                                                                                                                                     | 12318                                                                        | (31.9) | 11724                                                                        | (27.6) | 0.82                                                                                        | (0.78, 0.87) |
| Every day                                                                                                                                    | 15815                                                                        | (48.0) | 10829                                                                        | (38.2) | 0.80                                                                                        | (0.76, 0.84) |
| Caregiver Coping/Support                                                                                                                     |                                                                              |        |                                                                              |        |                                                                                             |              |
| How well caregivers feel they are handling the day-to-day demands of raising children (1 – 17 years)                                         |                                                                              |        |                                                                              |        |                                                                                             |              |
| Very well                                                                                                                                    | 24803                                                                        | (69.8) | 21953                                                                        | (63.7) | Ref                                                                                         |              |
| Somewhat well                                                                                                                                | 10323                                                                        | (29.3) | 12746                                                                        | (34.6) | 1.09                                                                                        | (1.07, 1.11) |
| Not very well                                                                                                                                | 268                                                                          | (0.7)  | 538                                                                          | (1.4)  | 1.24                                                                                        | (1.14, 1.35) |
| Not at all                                                                                                                                   | 20                                                                           | (0.1)  | 56                                                                           | (0.3)  | 1.20                                                                                        | (0.95, 1.52) |
| Caregivers had someone they could turn to for day-to-day emotional support with parenting or raising children past 12 months) (0 – 17 years) |                                                                              |        |                                                                              |        |                                                                                             |              |
| Yes                                                                                                                                          | 30122                                                                        | (80.7) | 27405                                                                        | (70.8) | Ref                                                                                         |              |
| No                                                                                                                                           | 5146                                                                         | (19.3) | 7698                                                                         | (29.2) | 1.07                                                                                        | (1.04, 1.10) |
| Caregiver Aggravation                                                                                                                        |                                                                              |        |                                                                              |        |                                                                                             |              |
| How often caregiver felt that this child did things that bothered them a lot during the past month (1 – 17 years)                            |                                                                              |        |                                                                              |        |                                                                                             |              |
| Never                                                                                                                                        | 17714                                                                        | (54.7) | 14773                                                                        | (44.1) | Ref                                                                                         |              |
| Rarely                                                                                                                                       | 12416                                                                        | (31.7) | 12472                                                                        | (34.1) | 1.09                                                                                        | (1.07, 1.12) |
| Sometimes                                                                                                                                    | 4636                                                                         | (11.9) | 6830                                                                         | (18.5) | 1.17                                                                                        | (1.14, 1.20) |
| Usually                                                                                                                                      | 422                                                                          | (1.3)  | 852                                                                          | (2.6)  | 1.22                                                                                        | (1.15, 1.30) |
| Always                                                                                                                                       | 110                                                                          | (0.4)  | 230                                                                          | (0.7)  | 1.17                                                                                        | (1.03, 1.33) |
| How often caregiver felt angry with child during the past month (1 – 17 years)                                                               |                                                                              |        |                                                                              |        |                                                                                             |              |
| Never                                                                                                                                        | 13739                                                                        | (45.1) | 10399                                                                        | (34.3) | Ref                                                                                         |              |
| Rarely                                                                                                                                       | 16317                                                                        | (41.8) | 17128                                                                        | (44.2) | 1.09                                                                                        | (1.07, 1.12) |
| Sometimes                                                                                                                                    | 5112                                                                         | (12.7) | 7225                                                                         | (20.3) | 1.19                                                                                        | (1.15, 1.22) |
| Usually                                                                                                                                      | 127                                                                          | (0.3)  | 305                                                                          | (1.0)  | 1.31                                                                                        | (1.17, 1.45) |
| Always                                                                                                                                       | 14                                                                           | (0.1)  | 58                                                                           | (0.2)  | 1.33                                                                                        | (1.01, 1.74) |
| How often caregiver felt child was much harder to care for than peers during the past month (1 – 17 years)                                   |                                                                              |        |                                                                              |        |                                                                                             |              |
| Never                                                                                                                                        | 24181                                                                        | (71.1) | 23099                                                                        | (66.7) | Ref                                                                                         |              |
| Rarely                                                                                                                                       | 6745                                                                         | (17.4) | 6409                                                                         | (17.3) | 1.07                                                                                        | (1.04, 1.10) |
| Sometimes                                                                                                                                    | 3302                                                                         | (8.6)  | 4094                                                                         | (11.9) | 1.13                                                                                        | (1.10, 1.17) |
| Usually                                                                                                                                      | 737                                                                          | (2.0)  | 1014                                                                         | (2.5)  | 1.08                                                                                        | (1.02, 1.14) |
| Always                                                                                                                                       | 362                                                                          | (1.0)  | 563                                                                          | (1.5)  | 1.11                                                                                        | (1.01, 1.22) |

<sup>a</sup> Odds Ratios adjusted for: caregiver age, caregiver education, caregiver sex, caregiver marital status, child age, child sex, child race/ethnicity, child health status, and poverty level.

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## Accepted for Presentation at the 2019 Annual Meeting of the Society for Developmental and Behavioral Pediatrics

### Abstract 122: A National Profile Of Reading Trajectories Of Typically Developing Children From Kindergarten Through 4th Grade

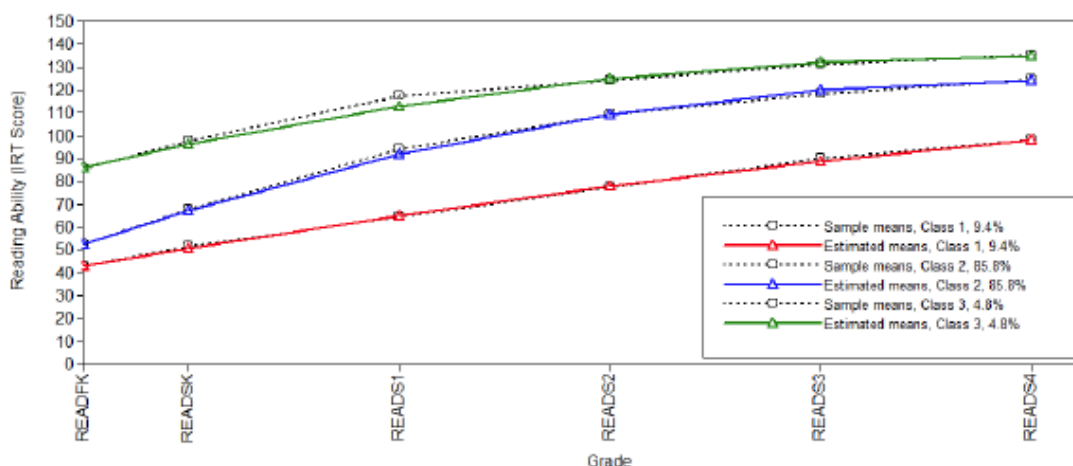
Sai Iyer, MD, Christopher Biely, MS; Rebecca Dudowitz, MD; Nicholas Jackson, PhD; Peter Szilagyi, MD, UCLA, Los Angeles, CA; Paul Chung, MD, Kaiser Permanente Medical School, Los Angeles, CA; Alma Guerrero, MD, UCLA, Los Angeles, CA

**Purpose:** About 30% of children across the US remain poor readers at the end of 4th grade. Reading difficulties are expected in children with developmental delays. Less is known about reading trajectories of children who enter school without a prior diagnosis of developmental delay. Our aim is to describe the longitudinal reading trajectories of children without previously identified developmental delays from Kindergarten(K) through 4th grade. We also examined differences in demographic characteristics and home literacy environment (HLE) between the different trajectory groups.

**Methods:** Data were analyzed from the Early Childhood Longitudinal Study, K-2011 (ECLS-K-2011), a nationally representative sample of children. We used Item response theory-based scores from the reading assessments conducted at 6 time points between K entry to 4th grade for children who did not receive early intervention services before the age of 3 years. Growth mixture modeling (GMM) was utilized to identify groups of children with distinct reading trajectories from K entry to the end of 4th grade using a quadratic model of growth.

**Results:** The analytic sample included 12,134 children (50.8% male). GMM indicated 3 latent trajectory classes for reading (Fig 1) with 4.8% in the high achievement group (Class 3), 85.8% in the “catch-up” group (Class 2) and 9.4% in the low achievement group (Class 1). Class 3 started K with reading scores well above their peers and maintained this advantage through 4th grade. Class 2 start much lower, and demonstrate catch up from 1st through 4th grade. Class 1 start K below their peers and stay below through 4th grade. Compared to the others, Class 1 had significantly higher proportions of children who were boys, had history of prematurity, were Black or Hispanic, lower parental education, home language other than English and lower socio-economic status ( $p < .01$ ). A relationship was seen between the richness of HLE (frequency of reading aloud, looking at books, pretend reading, telling stories) and the reading trajectory group: i.e., higher HLE measures were associated with membership in Class 3 and 2 and lowest HLE measures were associated with Class 1 ( $p < .01$ ).

**Conclusions:** Children in the ECLS-K 2011 dataset who enter K without an identified developmental delay follow 3 basic early reading trajectories. Catch-up growth is associated with higher frequency of home literacy activities (a potential area of intervention). Nearly 1 in 10 children never catch up and might benefit from risk identification and targeted intervention as early as K entry



# Abstracts of Posters, Platform Sessions, and Poster Symposiums

## Accepted for Presentation at the 2019 Annual Meeting of the Society for Developmental and Behavioral Pediatrics

### SDBP Platform Session IV: System Issues: Autism/Neurodevelopmental Disorders (Abstract Presentations 123-127) *\*note 123-126 were previously presented abstracts*

#### Abstract 127: Reducing Waitlist Volume and Improving Access through Clinician Referral Management and Co-located DBP Visits

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**Purpose:** Despite the importance of early intervention for long-term outcomes of children with developmental disorders, many developmental-behavioral pediatrics (DBP) programs struggle with large referral lists and long wait times for the first diagnostic appointment. We determined the impact of clinician management of referrals and co-location of brief developmental visits on referral list volume and access to first diagnostic visit.

**Methods:** Between 7/1/15 and 6/30/16, a DBP clinician reviewed each referral and available patient records from one referring clinic, replacing the previous system of scheduling based on referral date. Patients were classified into 4 groups and actions taken as follows: 1) Needs already met elsewhere – verified with primary care clinician (PCC); 2) Needs could be met remotely – consultation provided to PCC through EMR or phone; 3) Needs could be met in brief DBP co-located visit in primary care – visit scheduled; 4) Complex needs requiring tertiary DBP evaluation – visit scheduled. Referral list volume and time from referral to first visit for brief, co-located visits and tertiary care visits were monitored. DBP-related education was provided to PCCs.

**Results:** Referral list volume decreased from 128 to 21, despite an additional 125 referrals during the study. For patients referred from the study clinic, time from referral to first diagnostic visit was reduced by 124.5 days (261 to 136.5 days) in the first 6 months. Despite allocation of 0.2 FTE of total 1.2 FTE DBP provider clinician time to this effort, time from referral to first visit for patients from other sites to the tertiary center did not increase (289 days vs. 263 days over the study period). PCC comfort assessing and treating ADHD and autism spectrum disorder increased on self-reported survey.

**Conclusions:** Clinician managed referrals can dramatically reduce referral list volume and reduce duplicative services for children whose needs were met elsewhere. When combined with brief co-located DBP visits, time from referral to first diagnostic visit for the study clinic was decreased without increasing time to visit for children referred from other sites. PCC self-reported comfort assessing and treating DBP concerns improved.

Table: Run Time Observations of Referral List Volume

| Observation Date | Referral List Volume | Additional Referrals Received |
|------------------|----------------------|-------------------------------|
| 7/20/2015        | 128                  |                               |
| 9/2/2015         | 93                   |                               |
| 9/24/2015        | 76                   | 35                            |
| 10/26/2015       | 56                   |                               |
| 11/4/2015        | 44                   |                               |
| 6/30/2016        | 21                   | 90                            |

**\*Abstracts: 1, 5, 6, 8, 9, 11, 13, 15, 18, 23, 26, 31, 33, 34, 35, 37, 38, 41, 43, 47, 48, 49, 53, 54, 55, 57, 58, 62, 63, 64, 65, 66, 69, 70, 71, 76, 87, 88, 89, 98, 102, 103, 105, 110, 113, 116, 117, 123, 124, 125, 126 were previously published research and are not included in this online publication.**

*Abstracts 19, 32, 94, 100 were not presented.*