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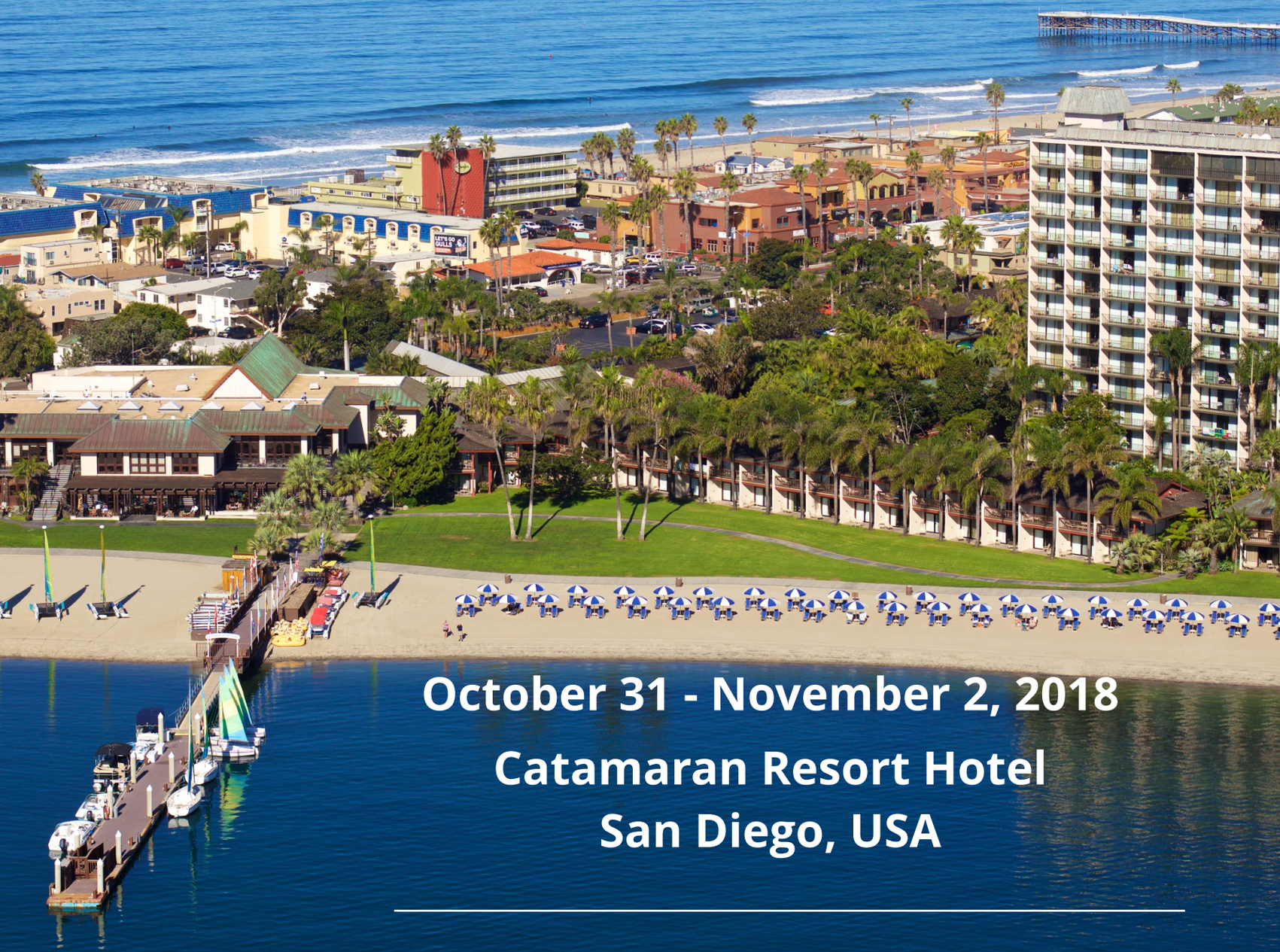

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O2-3

PHYSIOLOGICAL SYNCHRONY BETWEEN INFANTS AND MOTHERS IN THE STILL FACE PARADIGM, Drew Abney, *Indiana University, Bloomington, United States* E-mail: dhabney@indiana.edu

Drew Abney, Indiana University, Bloomington; Elizabeth daSilva, Indiana University; Bennett Bertenthal, Indiana University

By the second or third month of life, infants begin to engage in synchronous face-to-face interactions with their mothers involving mutual gaze, facial expressions, and vocalizations. The question addressed in this research is whether synchronous interactions extend to physiological regulation of state. Although empirical research suggests that sensitive parenting contributes to infants' physiological regulation, measuring the role of physiological synchrony between infant and mother has been elusive. Typically, physiological regulation is measured with respiratory sinus arrhythmia (RSA) which is calculated in epochs lasting 15 sec or even longer. Thus, it is not possible to measure the moment-to-moment changes in infants' and mothers' RSA. Here, we describe a solution to this problem, and illustrate how our new metric for physiological synchrony serves as an individual difference measure for infant-mother dyads. Our procedure involves computing RSA in 10 sec epochs with Porges' method (1985), and then applying a 10 sec sliding window to each data point sampled at 5 Hz. A cross-correlational analysis involving infants' and mothers' time series for each of the three phases of the still face paradigm is calculated as our measure of physiological synchrony. We applied this method to a sample of 119 infants (4- to 6-months-old) and mothers, and the results revealed zero-lag correlations ranging from -.84 to +.93; a classifier was used to divide the sample into three groups: positive, negative, or null correlations. Additional analyses revealed that measures of maternal sensitivity, infants' distress, and physiological arousal were all modulated by this measure of physiological synchrony.

P2-30

HOT AND BOTHERED? AN ANALYSIS OF THERMAL AND DYADIC CONTRIBUTIONS TO ANXIETY IN THE OPEN FIELD, Christopher Harshaw,
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Drew Abney, Indiana University, Bloomington; Christopher Harshaw, University of New Orleans

Emotional hyperthermia (EH) or a significant stress-induced elevation of core body temperature (tcore) is common in tests of anxiety in rodents. The exact relationship between EH and behavioral measures of anxiety is, however, an open question, as is the relation between EH during tests like the Open Field (OF) and social-chronobiological entrainment between cagemates prior to testing. We examined these issues in pairs of adult C57BL/6J mice surgically implanted with temperature sensors, sampling tcore every 5 min. This permitted the comparison of EH and behavior during OF with EH during other stressors, including cage moving. We found that EH in response to cage moving was the best predictor of overall variance in tcore or heterothermy ($F = 10.1$, $p < .01$), with less heterothermic (generally, heavier) individuals showing greater EH. During OF testing, EH appeared to be almost entirely determined by baseline tcore in the 2 hrs prior to handling and testing ($r = -.90$, $p < .000002$; $r = -.98$, $p < .00002$ for females). Fecal boli during the OF was similarly best predicted by baseline tcore and EH, albeit in opposite directions for males and females (sex x EH: $F = 18.6$, $p < .005$). Center:edge ratio and activity during the OF, in contrast, showed more complex relationships with sex, order of testing, and sex x EH interaction. In addition, degree of dyadic synchrony or physiological coordination between cagemates in the week prior to testing—indexed by a cross-correlation function—appears to significantly impact OF anxiety-related measures.

P1-01

EFFECTS OF CONGENITAL BLINDNESS ON OLFACTORY FUNCTIONS AND BRAIN PLASTICITY, **Syrina AL AIN**, *UQTR, Canada* E-mail: Syrina.Alain@uqtr.ca

Syrina AL AIN, UQTR; Jasmin THIBAULT, UQTR; Gilles BRONCHTI, UQTR; Elaina LUNA, UQTR

Early blindness clearly results in an enhancement of auditory and tactile performances, associated with dramatic cerebral structural and functional changes. On the other hand, human studies showed contradictory results regarding olfactory abilities in early blind individuals. However, recent studies found that olfactory bulb is larger in blind than in sighted humans and visual cortex is activated by olfactory exposure in blinds only. So far, the impact of congenital blindness on olfactory functions and its underlying neurobiological basis remain poorly understood.

The present study aims to determine the effects of blindness on olfactory functions and brain plasticity in mouse model of congenital blindness. We used the ZRDBA mouse strain, a unique mouse model, from which half of newborns are sighted and half are anophthalmic.

In this study, a series of behavioral tests were performed on 20 anophthalmic and 20 sighted mice to assess their olfactory performances (i.e., odor sensitivity, discrimination, localization, memory tasks). To investigate olfactory processing in the brain, mice were exposed to a 5-minute odor stimulus. After perfusion, the brains were collected, frozen, and cut to perform serial sections for immunohistochemistry analysis.

Preliminary results indicate that anophtalmic mice exhibit higher olfactory abilities in most of behavioral tasks. Ongoing immunohistochemistry analysis will test whether enhanced olfactory performance in blind mice may correlate with structural changes and functional alterations in olfactory processing areas and in the visual cortex. This research brings a better understanding of the impact of visual deprivation on olfactory functions and the underlying neuronal mechanisms.

PARENTING AFTER STRESS: THE EFFECT OF GESTATIONAL ADVERSITY ON THE TRANSITION TO, AND PERSISTENCE OF, MOTHERHOOD., Sarah Altmann, *University of New South Wales, Australia* E-mail: s.altmann@unsw.edu.au

Sarah Altmann, University of New South Wales; Rick Richardson, University of New South Wales

Prenatal stress has a marked effect on both the developing infant and their mother. However, the mechanisms underlying these effects are not well understood. Given that the mother-infant bond is critical to the emotional-wellbeing of both mother and child, we hypothesised that disruption to maternal bonding may underlie the effects of prenatal stress. To examine this question we utilised a rodent model to assess whether prenatal stress alters the formation, and persistence, of the mother-infant bond. Our first experiment examined how prenatal stress impacts the mothers' transition to motherhood, the process by which the body, brain, and behaviour is prepared for mothering in the first hours after birth. Specifically, the propensity of stressed and control mothers to display maternal behaviour to novel pups at postnatal day 10 was assessed, following removal of their own pups 24 hours after birth. Prenatally stressed mothers performed similarly to controls. In a second experiment we examined whether the proclivity of mothers to act maternally towards novel pups was less persistent in prenatally stressed mothers. To do this mothers reared their own pups until weaning, and were then tested with novel pups following a 25-day pup-free delay. Results from this experiment showed that the behavioural changes of motherhood were less persistent in prenatally stressed mothers, such that these mothers take longer than controls to demonstrate maternal behaviour to novel-pups after the 25-day-delay. Taken together, our results suggest that prenatal stress alters the persistence of the maternal experience, but does not alter the transition to motherhood

S3-1

LEARNING TO ATTEND: 2D AND NATURALISTIC ENVIRONMENTS REQUIRE DIFFERENT LEARNING SYSTEMS, Dima Amso, *Brown University, United States*
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Dima Amso, Brown University; Thomas Serre, Brown University

Human adults have demonstrated sensitivity to visual context cues, exploiting implicitly learned memories of the structure of the visual environment to facilitate both spatial navigation and visual search. Studies of contextual cueing in childhood have produced mixed results. These discrepancies may derive from issues with construct validity, the use of screen-based tasks to study an inherently embodied process that depend not only on simple memory and attention, but complex interactions of these systems with bodily frames of reference. The allocentric frame involves information about objects in the environment relative to each other (2D), while the egocentric frame includes information about the viewer's location relative to objects in the environment. In naturalistic environments, these frames of reference are coupled in the service of spatial abilities. Here we examined developmental change in naturalistic and 2D contextual cueing in the same N = 39 4-9 year-old children in two parallel tasks, one in our naturalistic SmartPlayroom space and the other using snapshots of the space in a 2D computerized task. The computational power of the SmartPlayroom allowed us to examine behaviors associated with co-occurrence learning, incidental encoding, relational encoding, and estimation of similarity in path and eye movement trajectories. Our data showed generally successful visual search and spatial attention in both 2D and naturalistic environments, but that incidentally fixating objects in the SmartPlayroom, but not the 2D task, resulted in implicit encoding of object location into memory in a way that resulted in more efficient search when that object later became the target.

P2-03

EARLY ADVERSITY AND CURRENT LIFE STRESS AS PREDICTORS OF CORTISOL DYSREGULATION, Lisa Badanes, *Metropolitan State University of Denver, United States* E-mail: lbadanes@msudenver.edu

Lisa Badanes, Metropolitan State University of Denver; Breanna Flores, Metropolitan State University of Denver; Tayler Hanson, Metropolitan State University of Denver

Exposure to adverse childhood experiences (ACEs) before age 18 dramatically increases the odds of a wide range of negative outcomes (Felitti et al., 1998). Severe levels of current life stress is associated with similar maladaptive outcomes (Lantz et al., 2005). What remains unclear is which type of stressor (early vs. current) serves as a stronger predictor for negative health outcomes. Much of the mechanistic research has focused on the enduring effects on stress regulatory systems like the HPA-axis, with both hyper and hypo responsivity of cortisol documented (Burke et al., 2005).

Utilizing a sample of 109 high-risk college students (average age = 23, 65% female, 63% White), we investigated the extent to which early adversity and current life stress were uniquely associated with dysregulated cortisol reactivity. Participants prepared and gave a five-minute speech discussing a major stressor from their life. Salivary cortisol was collected at three time points in twenty-minute intervals across the task and area under the curve with respect to ground (AUCg) was calculated. Participants completed the ACES Questionnaire (Felitti et al., 1998), and a 26-item current stress checklist. A linear regression predicting AUCg, including both early and current life stress as predictors indicated that ACES (Beta = -.22, p = .03), but not current life stress (Beta = .05, p = .62), significantly predicted AUCg across the speech task. Participants with 4 or more ACES showed a flatter and lower cortisol pattern. This was particularly true for males. Discussion will focus on the developmental implications of these results.

P2-07

CORTISOL AND HEART-RATE REACTIVITY AND REGULATION PREDICT EXECUTIVE FUNCTIONS IN LOW-INCOME CHILDREN, Stephen Braren, *New York University, United States* E-mail: stephen.braren@gmail.com

Stephen Braren, New York University; Annie Aitken, New York University; Meriah DeJoseph, University of Minnesota; Clancy Blair, NYU

Exposure to early-life environments of stress can influence the development and functioning of cognitive processes such as executive functions (EF). The relation between EF and stress has been associated with both hypothalamic-pituitary-adrenal (HPA) axis and autonomic nervous system (ANS) activity, although most related research has not examined these two physiological systems in tandem. In the current study, we used data from a large, longitudinal sample (N=1292) of low-income children to investigate concurrent functioning of HPA axis and ANS activity in relation to EF at two ages in early childhood. Children were seen in their homes at 48 and 58 months of age and participated in a battery of EF tasks. At 48 months, three child saliva samples were collected and assayed for cortisol, and electrocardiography was recorded before (baseline) and during (reactivity) the EF tasks to measure respiratory sinus arrhythmia (RSA) and inter-beat interval (IBI). Results revealed that baseline cortisol and baseline RSA were negatively associated with EF at 48 and 58 months, whereas baseline IBI was positively associated with EF at 48 and 58 months. Baseline cortisol was positively associated EF at 48 and 58 months, but only for children who displayed cortisol decreases during the EF tasks. These results provide insight into how ANS and HPA axis reactivity and regulation relate to children's EF, and point to possible mechanisms of risk and resilience in contexts of adversity that warrant further investigation.

P1-02

THE ASSOCIATIONS BETWEEN AGE, PUBERTY, AND THE ERROR-RELATED NEGATIVITY IN ADOLESCENCE ACROSS TWO INDEPENDENT SAMPLES,

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Tyson Barker, University of Oregon; Nathan Fox, University of Maryland; Sonya Troller-Renfree, University of Maryland; Daniel Pine, NIMH; Lindsey Bowman, UC Davis; George Buzzell, University of Maryland

The error-related negativity (ERN) is an event-related potential following an error that demonstrates developmental increases in magnitude across adolescence. It has been suggested that changes in the ERN are due to pubertal development. However, high correlations between puberty and age creates difficulties in determining the unique influences of puberty on ERN development. The present studies address this limitation by examining the associations between age, puberty, and the ERN across two independent samples that differ by age variability. In study 1, 76 adolescent girls (9-17 years of age) completed a flanker task and reported on pubertal status. Results revealed that age and pubertal status jointly predicted developmental changes in ERN magnitude. In addition, age continued to predict the ERN when controlling for pubertal status. However, pubertal status did not predict ERN beyond shared associations with age. To reduce confounds with chronological age, study 2 examined developmental changes of the ERN in a large sample of both male and female adolescents (N = 109) within a narrow age range (12.5 - 14.5 years of age). Results revealed that pubertal status was unrelated to ERN magnitude in both boys and girls. In addition, sex moderated the association between ERN and age such that the ERN was related to age only among girls. Taken together, the results from both studies indicate that chronological age, not pubertal status, is the best predictor of ERN development. However, different developmental patterns of the ERN between sexes suggests that puberty may still contribute to ERN development.

S4-2

EARLY LIFE STRESS IS ASSOCIATED WITH PRECOCIOUS AMYGDALA DEVELOPMENT AND AN UNEXPECTED DIP IN THREAT-ASSOCIATED FREEZING, Kevin Bath, *Brown University, United States* E-mail: kevin_bath@brown.edu

Kevin Bath, Brown University; Gabriela Manzano Nieves, Brown University

Early life stress (ELS) increases the lifetime risk for affective pathology in humans and animal models. The mechanisms underlying increased risk for later pathology are not well understood. Here, we investigate the effect of ELS on the development of cued and contextual threat-associated learning in a mouse model of ELS. Stress was induced through the use of a maternal bedding restriction paradigm from P4-P11. Development of threat associated learning and neural circuitry underlying these behaviors was assessed in separate cohorts of mice at P16, 21, 28, and 50 days of age. In the contextual fear learning paradigm, ELS was associated with a significant acceleration in the development of contextual fear suppression, an effect that was associated with precocious maturation of the hippocampus. Interestingly, for auditory cued fear, we observed what appeared to be a delay in development of tone-associated freezing, as ELS mice failed to show normal levels of freezing at postnatal day 21, compared with control reared mice. To understand the mechanisms underlying this observation, we tracked the effects of ELS on circuit development, and found asymmetries in the effect of ELS on the timing of cortical and basolateral amygdala (BLA) development (accelerated maturation of the BLA, but delays in PL connections to BLA). These data support the notion that ELS can significantly alter the timing of regional brain development, but may not do so uniformly across the brain. Such effect have significant consequences for behavioral maturation, and the development of appropriate responding to environmental cues.

P1-03

SECOND-BY-SECOND CHILD FRONTAL EEG ASYMMETRY AND CHILD BEHAVIOR PREDICT MATERNAL BEHAVIOR DURING AN INTERACTION TASK, **Martha Ann Bell**, *Virginia Tech, United States* E-mail: mabell@vt.edu

Martha Ann Bell, Virginia Tech; Madeline Slough, Virginia Tech; Cynthia Smith, Virginia Tech; Richard Ashley, Virginia Tech; Yu Zhou, Jinan University – University of Birmingham Joint Institute; Eunkyung Shin, Virginia Tech; Erika Hernandez, Virginia Tech; Kara Vlahcevic, Virginia Tech; Angela Scarpa, Virginia Tech; Julie Dunsmore, Virginia Tech

During interactions, mothers continuously respond to their children's behaviors, and potentially their children's physiology, in guiding children in the development of self-regulatory behaviors (Crockenberg & Leerkes, 2004; Feldman, 2012). We micro-coded the behaviors of mothers and their preschoolers to see if we could capture the influence of children's behaviors and physiology on maternal parenting behaviors during a low stress interaction. Our physiological measure was frontal EEG asymmetry (FA) because this measure is conceptually and empirically meaningful in the self-regulation research literature (Fox, 1994). Thirty typically developing 3-year-old children and their mothers visited the research lab and completed a child appropriate puzzle. Using dynamic regression modeling, we regressed second-by-second maternal behaviors of responsive encouragement, sensitive instruction, and harshness on second-by-second child FA scores and child behaviors of active noncompliance and passive noncompliance. Maternal encouragement behavior was predicted by the interaction of child FA and child passive noncompliance, both at 1-sec lag, for boys ($p=.04$) but not girls ($p=.45$). Maternal instruction was predicted by the interaction of child FA and child active noncompliance, both at 1-sec lag, for boys ($p=.002$) and girls ($p=.01$). Maternal harshness was predicted by the interaction of child FA and child passive noncompliance, both at 1-sec lag, for boys only ($p=.03$; girls $p=.12$). These findings suggest that children's noncompliance behaviors, interacting with children's FA, differentially influence maternal behaviors depending on the type of noncompliance and the gender of the child. Implications for differences in interaction patterns will be discussed. [NIH HD049878 & HD57319 to MAB; VT-ISCE to MAB]

P1-04

INCUBATION TEMPERATURE INFLUENCES FALL FREQUENCY IN BOBWHITE QUAIL NEONATES, Starlie Belnap, *Flordia International University, United States*

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Starlie Belnap, Flordia International University; Robert Lickliter, Florida International University

Maternal influences on offspring occur not only during egg formation, but also during prenatal development in both birds and mammals. During incubation, avian hens provide key elements essential for normal embryonic development, including temperature regulation. Previous work indicates developing avian embryos are sensitive to small fluctuations in temperature and respond to fever-like temperatures with increased prenatal activity. Here, we examined the influence of maternally regulated prenatal temperature on postnatal motor coordination in bobwhite quail. Starting on embryonic day 5 (of 23), randomly assigned quail embryos experienced 4 days of low (36.9°C), normal/control (37.5°C), or high (38.1°C) temperature. Growth parameters of weight and tarsometatarsus bone length were collected prior to testing. Motor coordination was measured at 24 hours after hatching during a video recorded ambulation task. Videos were analyzed for gait patterns, including fall frequency, stride length, and base of support (BOS). Results revealed no differences in growth parameters between temperature conditions. However, hatchling in the low and high temperature conditions fell significantly more often compared to controls. Further, hatchlings in the low and high conditions showed more variability in their BOS, and low condition hatchlings showed more variability in their stride length, suggesting a decline in motor control. These findings suggest optimal prenatal temperature promotes the development of a more coordinated motor system. The processes contributing to this link are currently under investigation. [NSF grant BCS 1525371]

P1-05

COMPLEX HEART, COMPLEX MIND: THE FRACTAL NATURE OF HRV IN EARLY CHILDHOOD COGNITIVE CONTROL, Daniel Berry, *Institute of Child Development, University of Minnesota, United States* E-mail: dberry@umn.edu

Daniel Berry, Institute of Child Development, University of Minnesota; Isabella Stallworthy, University of Minnesota

Executive functions (EFs) describe a set of higher-order cognitive processes that facilitate goal-directed behavior. Dynamic systems models posit that EF is best understood as an emergent property of rapid changes in network functional dynamics between the frontal cortex and its vast cortical and subcortical connections—highly interactive processes occurring across multiple loci and timescales.

These dynamics are supported by a central autonomic network (CAN)—a network integrating the parasympathetic and sympathetic branches of the ANS with cortical (e.g., PFC) and subcortical (e.g., mesolimbic) regions underlying motivation and goal-directed behavior. Empirically, links between the ANS and EF have typically concerned cardio-respiratory markers of PNS/vagal activity (e.g., RSA). Notably, given the complex, nonlinear dynamics of the CAN, RSA is likely only one small piece of the puzzle.

The aim of our study is to begin to characterize the complexity of the relation between ANS dynamics and EF. Specifically, using task-evoked cardiac data from an EF task, we modeled the fractal structure of the inter-beat-interval (IBI) time-series from a sample of preschoolers (n = 90). Fractality represents the repeated, self-similar organization of the series, across varied time-scales and is thought to capture the non-linear, interaction-dominant nature of ANS functioning. We hypothesized and found a quadratic relation between IBI fractality and EF performance/RT. Those with IBI fractality suggestive of comparatively less organized (white noise) or more rigid (brown noise) ANS functioning, performed worse than their peers in the optimally-flexible middle of the distribution (pink noise). We discuss some of the benefits and costs these methods.

P2-04

POORER FLUID INTELLIGENCE AT 8 YRS IS ASSOCIATED WITH HIGHER NEONATAL PAIN-RELATED STRESS IN GIRLS BORN VERY PRETERM, **Mark Bichin**, *British Columbia Childrens Hospital Research Institute, Canada* E-mail: mbichin@bcchr.ca

Mark Bichin, British Columbia Childrens Hospital Research Institute; Cecil Chau, BC Children's Hospital Research Institute; Vann Chau, Sickkids Hospital; Anne Synnes, British Columbia Childrens Hospital Research Institute; Steven Miller, Hospital of Sick Kids; Ruth Grunau, University of British Columbia

Children born very preterm display poorer fluid intelligence (FI), compared to fullterm. FI is the ability to learn in novel situations, and includes working memory, executive functions, attention, episodic memory and processing speed. Early-life stress induces impaired learning and memory in animals, with some sex-dependent differences. In the neonatal intensive care unit, during periods of rapid brain development, infants born very preterm are exposed daily to neonatal pain-related stressful procedures or pain/stress. Little is known about the role of pain/stress in FI problems of very preterm children.

Objective To explore whether fluid inteligence abilities in 8-year-old children born very preterm are related in a sex-dependent manner to pain/stress.

Design/Methods N=72 (39M/33F) 8-year-old children born very preterm (24-32 weeks gestational age). FI was assessed using the NIH Toolbox Fluid Cognition Composite score.

Neonatal chart review: clinical factors, including gestational age, morphine exposure, illness severity day 1, infection, surgeries, pain/stress (number of invasive procedures).

Exclusions: IQ < 7 0 on the Wechsler Abbreviated Scale of Intelligence (WASI-2).

Results General linear modeling: interaction of sex and pain/stress, adjusted for mother's education (p=.07), neonatal clinical factors (R2adj = .21, p = 004), predicted FI (p=.002, n2 = .15),. Greater exposure to pain/stress was associated with poorer FI only in girls.

Conclusion More exposure to neonatal pain-related stress is associated with poorer fluid intelligence at school-age only in girls, independent of clinical risk factors and

mother's education. This suggests a role for early stress and sex in the alteration of higher-order learning and memory problems in children born very preterm.

P1-06

ELECTROPHYSIOLOGICAL CHARACTERISTICS OF OXYTOCIN RECEPTOR EXPRESSING NEURONS IN ENDOPIRIFORM NUCLEUS ACROSS DEVELOPMENT OF MICE, Lindsey Biggs, *Florida State University, United States*
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Lindsey Biggs, Florida State University; Elizabeth Hammock, Florida State University

The neuropeptide oxytocin (OXT) modulates social behaviors across species and may play a developmental role for these behaviors and their mediating neural pathways. Previous results from our lab, using OXT receptor (OXTR) ligand binding, have shown that OXTR are located in the oronasal cavity as well as the endopiriform nucleus in neonatal mice. The endopiriform nucleus integrates olfactory and gustatory input and has bilateral connections with several limbic areas. Thus, the endopiriform nucleus could play a role in the development of social behavior based on perinatal exposure to OXT. In these experiments, OXTR localization in the endopiriform nucleus was evident by an EGFP reporter in transgenic OXTR-EGFP mice shortly after birth (postnatal day zero; P0) through postnatal day 28 (P28). EGFP could be visualized in live cortical tissue slices. Using whole cell slice electrophysiology, electrophysiological responses of OXTR (EGFP) expressing neurons to bath applied OXT (200 nM) were collected. Bath application of OXT increased the excitability of OXTR expressing neurons in early postnatal mice (P0-P3) and P10-P21 mice. Acute responses of endopiriform neurons to OXT exposure in development may be important for the development of appropriate social behaviors based on olfactory, gustatory and other orofacial sensory input.

P1-07

THE TREE AMONG THE FOREST: THE DEVELOPMENTAL TRAJECTORY OF THE GLOBAL PRECEDENCE EFFECT WITH AND WITHOUT THE USE OF INSTRUCTIONS, **Emily Blakley**, *Binghamton University, United States* E-mail: emily@blakley.org

Emily Blakley, Binghamton University; Nicholas Duggan, Binghamton University; Sarah Olsen, Binghamton University; Alecia Moser, Binghamton University; Peter Gerhardstein, Binghamton University

During object processing, adults exhibit the global precedence effect (GPE), such that the overall global form of an object is processed faster than recognition of the local features. Although robust and consistent in adults, the developmental trajectory of this effect is unclear. Bhatt and colleagues (1994) found that 5-month-old infants showed no bias toward global or local information, but in a study by Poirel et al. (2014), children ages 4-5 years displayed a strong local bias that switched over to an adult-like GPE around the age of 6. However, studies where children exhibited a strong local bias typically used explicit instructions and practice that may have contributed to this local bias.The present study was conducted to investigate the developmental trajectory of the GPE and the influence of instructions and practice in 3- to 6-year-old children. Children completed one of two tasks; a two-alternative forced choice task where children had to select an image that either represented a global or local match to a previous stimulus or a same/different task in which children were shown two images that could be the same or different on the global or the local level and were asked to indicate same or different. Contrary to past research, preliminary results revealed that children in all age groups and across tasks showed a bias towards global information. Additional effects of instructions will be tested and reported. Future research should explore this effect in younger children, and eliminating instructional-related issues, particularly bias, will be essential.

S1-2

PRENATAL AIR POLLUTION AND MATERNAL STRESS ALTER BRAIN DEVELOPMENT IN THE ANTERIOR CINGULATE CORTEX, Carina Block, *Duke University, United States* E-mail: carina.block@duke.edu

Carina Block, Duke University; Cagla Eroglu, Duke University; Staci Bilbo, MassGeneral Hospital for Children/Harvard Medical School; Oznur Eroglu, Duke University; Kafui Dzirasa, Duke University; Caroline Smith, Massachusetts General Hospital for Children; Steve Mague, Duke University

Prenatal air pollution (diesel exhaust particles; DEP) combined with maternal stress (MS) during the last trimester of gestation activate the maternal immune system and act synergistically on offspring to promote long lasting changes in neuroimmune function and deficits in behavior in adulthood. Microglia are the primary immune cells in the CNS, they are important in immune host defense and are involved normal brain development. Previous research has demonstrated that microglia are abnormal in several neurodevelopmental disorders, and in rodent models, transgenic manipulation of microglia number or function results in brain dysfunction. However, it is unclear whether environmentally relevant MIA produces a similar phenotype. In this study, we aimed to determine whether prenatal DEP and MS (DEP+MS) alter social behaviors, microglia infiltration and cortical development in the anterior cingulate cortex in offspring. Pregnant mouse dams were intermittently exposed via oropharyngeal aspiration to DEP (50 µg x 6 doses) or vehicle (VEH) throughout gestation. This exposure was combined with standard housing for dams or nest material restriction (a model of MS) during the last third of gestation. Prenatal DEP+MS altered social communication behavior in developing offspring. At postnatal day 15, prenatal DEP+MS resulted in changes in synaptic connectivity, development of microglia and astrocyte distribution in cortical regions implicated in autism. Together, these results suggest that environmental risk factors can alter microglia development/function, resulting in changes in brain development commonly seen in autism. This model thus affords a unique opportunity to explore environmentally relevant cellular and molecular mechanisms that contribute to neurodevelopmental disorders.

P2-05

LONGITUDINAL CHANGE IN AMYGDALA REACTIVITY TO EMOTIONAL FACES FROM EARLY CHILDHOOD THROUGH YOUNG ADULTHOOD, Paul Bloom,
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Paul Bloom, Columbia University; Nim Tottenham, Columbia University; Michelle VanTieghem, Columbia University; Jessica Flannery, University of Oregon; Mor Shapiro, Kaiser Permanente Woodland Hills; Kathryn Humphreys, Vanderbilt University; Dylan Gee, Yale University; Laurel Gabard-Durnam, Boston Children's Hospital; Bonnie Goff, UCLA; Christina Caldera, UCLA; Eva Telzer, UNC Chapel Hill

Rodent models and human neuroimaging studies have provided converging evidence for the importance of the amygdala and its connections with prefrontal regions in the development of emotion regulation. Altered amygdala function in adulthood has also been associated with both exposure to early caregiving adversities and anxiety-related disorders. Thus, thorough characterization of age-related changes in amygdala function in healthy developing individuals may be a crucial baseline from which to examine mechanistic links between early life experience, neural function, and psychopathological outcomes. While recent work has suggested a decline in amygdala reactivity to salient stimuli from childhood to adolescence in humans, such age-related changes have not to date been charted longitudinally. The present study examined developmental changes in amygdala reactivity to fearful and neutral faces using event-related functional magnetic resonance imaging in a longitudinal sample (N = 97; 180 total scans; 1-3 scans per participant) spanning ages 4-22. We use multilevel modeling in order to account for multiple scans nested within participants and to examine both intra and interindividual change across development. Consistent with prior studies, preliminary results suggest an age-related decline in right amygdala reactivity to fearful faces. However, developmental trajectories display both a high degree of heterogeneity between subjects and high variability within subjects across timepoints.

P2-06

CHILDHOOD CYTOKINE PROFILES ARE ALTERED BY PRENATAL ALCOHOL EXPOSURE: RISK VS. RESILIENCE SIGNATURES, **Tamara Bodnar**, *University of British Columbia, Canada* E-mail: tamara.bodnar@ubc.ca

Tamara Bodnar, University of British Columbia; Charlis Raineki, University of British Columbia; Wladimir Wertelecki, University of California San Diego; Lyuba Yevtushok, International Omni-Net for Children Charitable Fund; Larisa Plotka, Rivne Oblast Medical Diagnostic Center and OMNI-Net Center; Natalya Zymak-Kakutnya, International Omni-Net for Children Charitable Fund; Alan Wells, University of California San Diego; Gordon Honerkamp-Smith, University of California San Diego; Claire Coles, Emory; Julie Kable, Emory; Christina Chambers, UCSD School of Medicine; Joanne Weinberg, University of British Columbia

Prenatal alcohol exposure (PAE) is associated with a range of neurocognitive, physiological, and behavioural abnormalities. Notably, immune disturbances and health problems are also common following PAE. While growing evidence has established a link between alterations in immune function and risk for diseases/disorders in later life, immune-related research remains an understudied area in the PAE field.

We performed a comprehensive examination of childhood immune function through the measurement of 40 plasma cytokines/chemokines and related factors. Plasma samples were collected at two ONMI-Net sites in Western Ukraine, as part of the Collaborative Initiative on Fetal Alcohol Spectrum Disorders (CIFASD) Ukrainian study. Children were classified based on both maternal alcohol-exposure history and childhood neurodevelopmental status (Bayley) resulting in the following groups: alcohol-exposed, typical neurodevelopment (A/TD), alcohol-exposed, neurodevelopmental delay (A/ND), low/no exposure, typical neurodevelopment (C/TD), and low/no exposure, neurodevelopmental delay (C/ND).

Preliminary data show an impact of PAE on immune status. Overall, PAE resulted in elevated eotaxin-3 and decreased VEGF. In addition, we detected cytokine signatures differentiating alcohol-related (A/ND) from alcohol-independent (C/ND) neurodevelopmental delay. Specifically, A/ND was associated with decreased MIP-1β and elevated CRP, whereas C/ND was associated with elevated IFN-ɣ, IL-10, and IL-2. Ongoing analyses are examining the impact of PAE on networks of functionally interconnected cytokines. Changes in immune function during critical periods may underlie some of the long-term effects of PAE on cognitive, physiological, and immune function, as well as the increased risk for physical and mental health problems later in life.

NIH-NIAAA U01AA014834 to CDC; U24AA014811 and U01AA026101 to JW.

P1-08

SOCIAL NETWORK DYNAMICS ACROSS TWO AFFILIATIVE, BUT RISKY, INTERACTIONS IN COLOMBIAN SPIDER MONKEYS (ATELES FUSCICEPS RUFIVENTRIS), Emily Boeving, *Florida International University, United States* E-mail: eboev001@fiu.edu

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The fission-fusion social dynamic is characterized by marked unpredictability in social group composition in which members split into sub-groups and reunite by engaging in dyadic affiliative interactions. Grooming is commonly used to measure the strength of social bonds, but spider monkeys exhibit atypical patterns of affiliation in which grooming occurs at much lower rates. Instead, spider monkeys engage in an affiliative contact gesture known as embracing at the time of fusion. We previously captured 186 hours of observation on 15 socially housed Colombian spider monkeys (Ateles fusciceps rufiventris), and described two sub-types of embracing in a dimension related to social risk given the close contact between individuals: embrace, which involves contact along the torso with arms wrapped around the body and face-embrace, which involves mutual cheek contact. To explore if social network structure is related to different levels of social risk, we leveraged social network analysis to identify structural relationships within embrace and face-embrace behavior. Results indicate a significant structural difference between the networks ($t = 3.38$, $df = 19.64$, $p = 0.003$), in which adult monkeys with centrality in the embrace network do not also have centrality in the face-embrace network; no juveniles exhibited centrality in either network. Furthermore, directed edges indicate juveniles receive both types of embraces, but almost never initiate them. We discuss

these results in light of spider monkey ecology with social network analysis as a unique tool for elucidating the structure and dimension of social behavior.

P1-09

HINDLIMB STEPPING IN RESPONSE TO TREADMILL SPEED IN NEONATAL SPINAL-TRANSECTED RATS, Aimee Bozeman, *Idaho State University, United States* E-mail: bozeaime@isu.edu

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Examining locomotor behavior in complete spinal-transected animals can provide insights into the mechanisms of plasticity that regulate locomotion and contribute to recovery following a spinal injury. Sensory stimulation is important for the induction and regulation of stepping in adult animals with a spinal cord transection. In the current study, we examined changes in hindlimb stepping in response to a moving treadmill belt, in intact and spinal-transected neonatal rats. Rats received a low-thoracic spinal transection or sham operation on postnatal day 1 (P1). On P5, pups were tested on one of four treadmill belt speeds: slow, medium, fast, or non-moving (control). Following a 5-min baseline, subjects received an intraperitoneal injection of 3.0 mg/kg quipazine (a serotonin receptor agonist) to induce stepping. They were then tested for 30 minutes on a treadmill, to examine if sensory feedback/treadmill training affects stepping. Results showed that spinal subjects exhibited significantly more alternating hindlimb steps, total hindlimb movements, and percentage of alternating steps compared to shams. This is consistent with previous studies demonstrating hindlimb supersensitivity to quipazine. Interestingly, there were no differences in hindlimb activity, including stepping, among the different treadmill

speed conditions. Further analyses will examine hindlimb step cycle duration, step area, and paw placement on the treadmill belt to determine kinematic parameters among the groups. Current results suggest that induction of alternating hindlimb stepping can be controlled at the low spinal level, however in the neonatal rat suprathoracic circuitry may be necessary for regulating changes in hindlimb activity to treadmill speed.

P1-10

ATTENTION IN INFANCY: A FOUNDATION FOR THE DEVELOPMENT OF SELF-REGULATION IN CHILDREN FROM LOW-SES BACKGROUNDS, **Annie Brandes-Aitken**, *New York University, United States* E-mail: aitkenannie@gmail.com

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Poverty-related risk has been associated with lower levels of self-regulation abilities at school entry. One important component of self-regulation is top-down attention control which begins to emerge across the first year of life. The development of attention is dependent on the environmental context and appears to be shaped by environments of poverty. Thus, we hypothesize that one possible mechanism by which poverty-related risk is associated with lower levels of self-regulation in early childhood is through disparities in infant attention. To test this hypothesis, we used data from a large, longitudinal sample (N=1,292) of children and their parents living in rural poverty. Using structural equation modeling, we assessed whether observed global attention behavior and task-specific sustained attention at infant-age 6 and 15 months accounted for significant variance in the relationship between poverty-related risk and multiple domains of self-regulation in Pre-K: executive functioning, effortful control, and emotion regulation. Results first suggested that early poverty exposure was associated with lower infant attention at 6 and 15 months and lower self-regulation in Pre-K. Further, the association between poverty-related risk and self-

regulation was longitudinally mediated by infant attention. These results provide support for a developmental model in which factors of the socio-economic environment contribute to the emergence of attention in infancy, which in turn affects self-regulation in Pre-K.

S3-2

ASSOCIATIONS AMONG SOCIOECONOMIC STATUS, HOME LANGUAGE ENVIRONMENT, AND RESTING EEG DURING INFANCY, Natalie Brito, *New York University, United States* E-mail: natalie.brito@nyu.edu

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Extensive research has demonstrated socioeconomic disparities in brain structure and function (Brito & Noble, 2014; Hackman & Farah, 2009). However, few studies have examined links among socioeconomic status (SES), experience, brain development and cognitive performance. Socioeconomically disadvantaged children tend to experience less linguistic and cognitive stimulation from their home environments than children from higher-SES homes (Hart and Risley, 1995; Bradley and Corwyn, 2002). The present study examines associations between SES, the home language environment, concurrent EEG power, and language skills for infants 6- to 12-months (current N = 50). We find no correlations between SES and language skills; however, significant positive associations were found between socioeconomic factors (family income, maternal education) and EEG (13-36 Hz) in the left parietal (β:0.21-0.42, p .27, p = .04) and AWC was also correlated with resting EEG (13-36 Hz), in the left parietal (β:0.56-0.88, p< 0.007) and right temporal

(β:0.38-0.42, p< 0.04) regions. When controlling for AWC, parental education (b = -0.03, p = 0.36) was not significantly associated with EEG (R2 = .37, Bootstrap: b = .04, SE = .02, 95% CI = .004 to .09), supporting a mediational hypothesis. Examining environmental mechanisms by which SES disparities operate is imperative in understanding risk and resilience during childhood.

P1-11

PRESCHOOL FRONTO-FRONTAL EEG COHERENCE PREDICTS SOCIAL RESPONSIVENESS AT 9 YEARS, **Alleyne Broomell**, *Virginia Tech, United States*
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The prefrontal cortex is a brain structure important for higher order thinking; connectivity within the frontal cortex is important for aspects of social behavior, including language and emotion regulation. This connectivity allows for the frontal lobe to enact top-down control over lower processes and maintain goal oriented behavior, a tenet of social behavior. However, it is undetermined if over the course of typical development individual differences in neuroconnectivity affect later social behavior. This study aims to elucidate if preschool fronto-frontal connectivity, as measured by continuous EEG coherence, is longitudinally associated with social behavior in middle childhood.

As part of a larger ongoing study, 202 children (99 girls) participated in a laboratory visit when they were 4 years old. During this visit, continuous EEG was collected

while the child watched a video clip. A total of 167 children returned when they were 9 years old and completed the Peabody Picture Vocabulary Test (PPVT) and parents filled out the Social Responsiveness Scale (SRS), a measure of social behavior appropriate for children. Results of a regression analysis show that 4-year fronto-frontal (F3-F7 and F4-F8) EEG coherence during baseline predicts 9-year social responsiveness, controlling for verbal IQ at 9 years $F(2, 132) = 6.39$, $p < .01$, $R2 = .09$.

These findings suggest the preschool period represents an important stage for frontal lobe connectivity development which has longitudinal effects on social behavior in middle childhood. The potential impact of these findings and future directions will be discussed.

P2-08

CHILDHOOD ADVERSITY, CORTISOL AWAKENING RESPONSE, AND MULTISYSTEMIC THERAPY OUTCOMES, April Brown, *Emory University, United States* E-mail: april.l.brown@emory.edu

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Multisystemic Therapy (MST) is a treatment program for externalizing behavior problems (e.g., aggression and substance use) that has demonstrated efficacy in several studies. There is evidence, however, of effect heterogeneity, and there appear to be moderators of treatment success. Few studies have explored how adverse childhood experiences (ACEs) might affect responsiveness to MST, although ACEs have been linked to risk for externalizing problems. Emerging research suggests that ACEs may have differential associations with externalizing problems and implicates physiological responsiveness (e.g., cortisol levels) as a mediator and moderator of these associations. Few studies, however, have examined the complex relationship between ACEs, cortisol levels, and problem behaviors in a treatment context. This study aimed to examine 1) the differential effects of types of adversity (i.e., threat versus deprivation), and 2) the role of the

cortisol awakening response in the association between ACEs and changes in problem behavior over the course of MST. The study used data from youth ages 12 to 17 years (N=118) who were enrolled in a longitudinal study of youth undergoing MST treatment in Denver, CO. Results from growth curve analyses indicated that response to treatment may vary, depending on the type of adversity exposure and on the level of the awakening cortisol response. Implications for theory and potential treatment modifications are discussed.

P2-09

OVER STRESSED AND OVERWEIGHT? NEIGHBORHOOD STRESS MODERATES THE RELATIONSHIP BETWEEN BIOLOGICAL STRESS RESPONSE AND BMI IN URBAN YOUTH, Bridget Brush, *DePaul University, United States* E-mail: bbrush1@depaul.edu

Bridget Brush, DePaul University; Claire Trainor, DePaul University; Jocelyn Carter, DePaul University; Kathryn Grant, DePaul University; Emma Adam, Northwestern University

Introduction: Stress may contribute to obesity risk via activation of the HPA axis leading to greater cortisol exposure. Low-income youth neighborhoods experience more early life stress and higher obesity rates than their more advantaged peers. However, there are few studies on mechanisms through which chronic stress exposure may affect stress biology in adolescence. The current study investigated

associations between neighborhood stress, salivary cortisol, and weight status among urban youth.
Methods: 101 urban youth (89% non-white; 54% female) ages 11-16 (M= 14, SD= 2) completed a modified Trier Social Stress Test-Group Version (TSST-G). Salivary cortisol was measured 6 times throughout the stress session. Participants were measured for height and weight; BMI was calculated based on age and gender national norms.
Results: The regression model significantly predicted adolescents' BMI (F= 3.52, p=.02, R^2=.11). A significant interaction effect emerged (b = -38.85, p = .018). At low levels of neighborhood stress (1 SD below the mean), higher cortisol response to stress was associated with higher BMI, although this relationship did not reach statistical significance (b = 1.95, p = .10). At high levels of neighborhood stress (1 SD above the mean), lower cortisol response to stress was associated with higher BMI (b= -3.95, p = .01).
Conclusions: Findings suggest associations between neighborhood stress, biological stress response, and weight status in adolescence. Results highlight physiological stress pathways as potential targets for intervention in overweight/obesity treatment and prevention, particularly in neighborhoods with high levels of community violence and other stressors.

P1-12
THE EFFECTS OF PERFORMANCE-BASED INCENTIVES ON EXECUTIVE FUNCTIONS DURING EARLY CHILDHOOD, Lauren Bryant, *University of Connecticut, United States* E-mail: lauren.bryant@uconn.edu

Lauren Bryant, University of Connecticut; Kimberly Cuevas, University of Connecticut; Dilsara Liyanage, University of Connecticut; Nicholas Pinnock, University of Connecticut; Michaela Barratt, University of Connecticut

Executive functions (EFs) are higher-order processes (e.g., inhibitory control) that rely on the prefrontal cortex (Diamond, 2013). Developmental work has traditionally used different measures, varying in demands, to investigate EF within motivationally-salient and neutral contexts (e.g., Brock et al., 2009). This limitation hinders our understanding of the unique influence of reward/motivation on EF during early childhood. Furthermore, no study has investigated how the influences of motivation

on EF may vary with child temperament. We administered rewarded and non-rewarded versions of equivalent EF measures (Day/Night task: Gerstadt et al., 1994; Big/Small task) to 3- to 5-year-old children (N= 53; 29 girls; Mage= 4.61 years, SD= 0.54). For both tasks, children completed the non-Stroop phase, followed by the more challenging Stroop phase, saying the opposite of what was presented (e.g., “night” for sun/“small” for elephant). Parents completed the Behavior Activation System (Blair, 2003) to measure children’s reward sensitivity, a component of temperament. A repeated-measures MANOVA revealed a significant Phase × Reward interaction; for the Stroop phase only, children made errors on a lower proportion of trials on the rewarded task (M= .08, SD= .07) than on the non-rewarded task (M= .14, SD= .14), $t(52)= 2.94$, $p= .005$. Preliminary analyses indicate that these rewards-based improvements in Stroop performance were negatively correlated with reward-responsiveness, $r(50)= -.26$, $p= .06$. While rewards can successfully enhance children’s EF, these benefits may be countered by over-arousal in children with high reward sensitivity. Future analyses will include a larger sample and consider the influences of reward on response time.

P1-13

RAT MATERNAL BEHAVIOR TOWARDS HEALTHY PUPS COMPARED TO PUPS WITH NEURAL INJURY, Nicholas Burgett, *Idaho State University, United States* E-mail: burgnich@isu.edu

Nicholas Burgett, Idaho State University; Hillary Swann, Idaho State University; Derek Viall, Idaho State University; Aimee Bozeman, Idaho State University; Michele Brumley, Idaho State University

Maternal behavior plays a critical role in offspring neurobehavioral development in mammals. Because a lot of developmental studies are conducted with rodents that have received a neonatal brain or spinal cord injury, it is therefore important to know if maternal behavior remains the same or is altered when pups have a neural injury. Thus, the aim of this study was to determine if maternal behavior in rats is affected by the neural condition of her pups. It was hypothesized that maternal behavior would be reduced in litters with neural-injured pups compared to litters with healthy controls, because injured pups presumably would not behave, look, or smell normal. Twenty-four hours after birth, individual litters of rat pups received a low-thoracic spinal cord transection, sham surgery, or no treatment. A neonatal spinal transection does not paralyze infant rats, but it does reduce their mobility to a large extent. Whole litters were recorded for 30 minutes in the home cage, along with the dam, on P1 (postnatal day 1; immediately after recovery from surgery), P3, P5, and P7. Results show that pup-directed maternal licking was higher, and nursing was lower, for litters of spinal pups on P1. However, over the course of the first postnatal week, maternal behavior (i.e., nursing, licking, picking up pups, nose-contact with pups) was similar across all treatment conditions. In general, our findings do not indicate large or long-term differences in maternal behavior directed to spinal-injured vs. healthy pups.

O3-8

INCONSISTENT PATTERN OF ATTENTION TOWARDS NEGATIVE EMOTION IN CHILDREN FROM LOW SES BACKGROUNDS, Jessica Burris, *Rutgers University, United States* E-mail: jlburris@ucdavis.edu

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Infants from low SES backgrounds demonstrate delays in attention starting in infancy, and display more disorganized patterns of attention across different types of stimuli (Clearfield & Jedd, 2012). Here we investigated the impact of SES on the development of consistent patterns of attention to emotional stimuli in infancy. Infants (N=23, data collection ongoing) were shown an emotional vigilance task on an eye tracker at 4, and again at 8 months of age. We measured visual latency to fixate neutral, happy, and angry faces that appeared at random in one of four corners of the screen. To quantify SES, parents answered questions related to their education and income level.

Difference scores between the emotional faces and the neutral faces were calculated to identify attention bias patterns to neutral, positive (happy) and negative (angry) stimuli. As predicted, the children who showed inconsistency in their attentional behavior by switching bias patterns to and from angry faces between time points came from lower SES backgrounds, while infants who showed consistent bias patterns to anger across time points were from significantly higher SES backgrounds, $F(1, 22)=5.09$, $p = .03$. These findings support previous research suggesting that infants from low SES backgrounds demonstrate disorganized patterns of attention, and most importantly, that these attention patterns begin to develop early in infancy.

S3-3

MEMORY MATURATION: UNDERSTANDING THE ROLE OF THE HIPPOCAMPUS IN LONG-TERM MEMORY FORMATION ACROSS DEVELOPMENT, Bridget Callaghan, *Columbia University, United States* E-mail: bridgetcallaghan281@gmail.com

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Episodic memories underlie our sense of self, acting as the cornerstone of human experience. Healthy episodic memories are critical for emotional health as dysregulated memory systems characterize many mental illnesses. While children can learn and remember events for long periods of time, episodic memories undergo rapid change in childhood and through adolescence. However, the neural mechanisms underlying such developmental trajectories are not well explicated. In this study we use functional magnetic resonance imaging (fMRI) to examine the role of the hippocampus in episodic memory encoding during childhood and adolescence (ages 5-17 years). We then assess youth's memory performance outside of the scanner and a week later at their home. We test the prediction that encoding patterns in the hippocampus will strengthen with age, and will predict long term memory performance. The findings from this study are essential for our understanding of typical hippocampal maturation and the neurobiology of learning and memory in childhood.

P2-10

DEVELOPMENTAL ASTHMA LEADS TO LONG-TERM CHANGES IN LUNG FUNCTION, ANXIETY-RELATED BEHAVIOR, AND GENE EXPRESSION RELATED TO EMOTION REGULATION, Sonia Cavigelli, *Pennsylvania State Univ, United States* E-mail: sac34@psu.edu

Sonia Cavigelli, Pennsylvania State Univ; Jasmine Caulfield, The Pennsylvania State University; Michael Caruso, Pennsylvania State University; Rebecca Crouse, Penn State University; Nicole Chirichella, Tulane University; Laura Klein, Pennsylvania State Univ; Timothy Craig, Pennsylvania State Univ - Medical Center; Avery August, Cornell University; Robert Bonneau, Pennsylvania State Univ - Medical Center

Allergic asthma is the most common chronic condition, with approximately 10% of youth affected. Developmental asthma is associated with mental health issues related to stress/emotion regulation. To understand causal mechanisms by which developmental asthma may affect emotion-related behavior, brain, and health trajectories, we developed a mouse model of peri-adolescent allergic asthma. We tested the long-term effects of developmental asthma on adult lung function, and behavior and brain gene expression associated with stress/emotion regulation. We manipulated airway inflammation and bronchoconstriction in young male and female BALB/cJ mice and measured adult outcomes three months after final asthma manipulations. Intranasal allergen exposure (post-natal days 7-56), used to induce airway inflammation, led to persistent airway inflammation and mucus buildup, and elevated lung IL-5 gene expression three months after final allergen exposure. This developmental allergen exposure also led to relatively long-term changes in brain gene expression related to stress/emotion regulation (prefrontal corticotropin releasing hormone receptor 1, hippocampal glucocorticoid receptor) and serotonin function (brainstem serotonin transporter). On the other hand, developmental acute labored breathing events (induced by weekly exposure to aerosolized methacholine, postnatal days 22-57) led to altered anxiety-related behavior. These effects were modulated by mouse sex and pre-asthma fear-related behavior (i.e. rates of isolation-induced ultrasonic vocalization). Pre-asthma fear-related behavior predicted unexpected results: low-calling (low-fear) neonates treated with methacholine exhibited increased anxiety-like behavior compared to mice that had been categorized as high-calling (high-fear) neonates. Developmental asthma may have long-term impacts on emotion and stress regulation mechanisms, and these influences may differ across sex and pre-asthma temperament.

P2-11

LET'S LOOK AT BRAIN-GUT INTERACTION FROM A FORENSIC SCIENTIST'S PERSPECTIVE, Filiz Çevik, *Istanbul University, Institute of Forensic Sciences, Turkey* E-mail: fecevik@gmail.com

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The bidirectional communication between the brain and gut microbiota, referred to as the gut-brain-axis, has been of significant interest in recent years. The gut-brain axis has been arisen as an interest subject of interest in psychiatry. The gut microbiota is important for human health. Before a human being is born, it is actually “microbialcell-free”. However, the baby exits from the uterus, consumes food and interacts with parents / siblings and the environment, he/she is vaccinated with microorganisms that live and develop in the body. There is a common comorbidity of between psychiatric and gastrointestinal patients. Recent studies have focused on variations in the gut microbiome and on the effects of various central nervous system disorders, including, but not limited to anxiety, depressive disorders, schizophrenia and autism. In addition, researchers conducted postmortem microbiological studies. This is accomplished by extracting DNA, amplifying the 16s rRNA genes using PCR (polymerase chain reaction), and sequencing the amplicons using the new generation sequence (NGS). 16S rRNA sequence is commonly used to identify different species of bacteria due to its variability and its presence on a wide variety of species. In this study, the effects of intestinal microbial on brain, behavior and psychiatric disorders were reviewed. Psychiatric disorders, crime, behavioral genetics, epigenetics and gut microbiyom connection from the forensic scientist point of view were investigated.

P2-12

NEURAL CORRELATES OF EMOTIONAL PICTURE PROCESSING IN SCHOOL-AGED CHILDREN, Mariya Chernenok, *University of California-Davis, United States*
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Attention acts as a gateway to the social world and is directly linked to social cognition and behavior. While some level of attention is necessary for adaptive functioning, excessive attention to threat (i.e., threat bias) in the environment has been linked to the development and maintenance of anxiety disorders. We previously followed children during the first four years of life to investigate the presence of attentional biases towards affective information using eye tracking methodology (Burris et al., 2017). To investigate the link between early visual processing biases, related neural activation, and symptoms of anxiety in later development, these participants are being brought back at 6-7 years of age to assess underlying neural activity during affective information processing. During EEG recording, participants passively view 180 developmentally appropriate images of pleasant, unpleasant, and neutral scenes from the International Affective Picture System (IAPS). Sustained attention to and appraisal of emotionally salient information is indexed by the late positive potential (LPP) ERP component. Preliminary ERP results (N=6, data collection ongoing) show increased LPP amplitude over centro-parietal electrodes (400-500ms) in response to emotion eliciting images (pleasant and unpleasant), relative to neutral images. These findings provide evidence of heightened neural activation in response to emotional images which may be more pronounced in children who show an attentional bias towards affective information in early childhood. Characterizing these attentional and neural patterns may be useful in identifying potential risk factors for the development of anxiety.

P2-83

THE EFFECTS OF SPATIAL CUEING ON NEURAL CORRELATES OF INFANT ATTENTION AND PERCEPTUAL PROCESSING, William Chollman, *University of Tennessee Knoxville, United States* E-mail: wchollma@vols.utk.edu

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A growing body of research indicates spatial cueing can enhance recognition memory in infancy (e.g., Markant & Amso, 2013). Utilizing high density event-related potentials (ERPs) and a hybrid spatial cueing/recognition memory task, the current study aimed to identify the effects of spatial cueing on neural correlates of infant attention and perceptual processing. Sixteen infants were tested at 4 or 9 months of age. Infants were shown repeated presentations of a dynamic central stimulus paired with a cue shown to the left or right of midline. Following a brief delay (150 ms) after cue removal, a target appeared for 1500 ms either ipsilateral (valid trials) or contralateral (invalid trials) to the cue location. Using video coding and the electrooculogram for an accurate measure of saccade latency, the ERP was segmented around target fixation onset. The Nc ERP component associated with infant attention and the late slow wave (LSW) associated with infant perceptual processing were examined on valid and invalid trials. Both age groups showed greater amplitude LSW associated with enhanced perceptual processing on valid compared to invalid trials. Interestingly, only 9-month-old infants showed greater amplitude Nc on invalid trials compared to valid trials. Thus, although both age groups showed evidence of enhanced processing of cued targets, only older infants show greater visual attention toward uncued targets. This may indicate that younger infants' neural responsiveness to cued targets was primarily driven by basic spatial orienting processes whereas older infants' neural responsiveness was also influenced by the predictive validity of spatial cues.

P2-13

PARENTING MATTERS! ENGAGEMENT, MATERNAL STRESS, AND EMOTIONAL REACTIVITY IN PRESCHOOL-AGED CHILDREN, Madeleine Cohen, *Emory University, United States* E-mail: mfcohe3@emory.edu

Madeleine Cohen, Emory University; Cassandra Hendrix, Emory University; Patricia Brennan, Emory University

Emotional reactivity during early childhood may be a precursor for later maladaptive socioemotional development, particularly in high-risk children. The present study explored both biological (i.e., salivary cortisol) and behavioral proxies for child emotional reactivity in response to LabTAB stressor tasks in a cohort of n = 178 preschool-aged children. The majority of the mothers in the sample received treatment for psychiatric disorders during pregnancy, making this a high-risk sample. Parenting behaviors (derived from a Principal Component Analysis of the Dyadic Parent-Child Interaction Coding System) and maternal postnatal stress (assessed by Stressful Life Events Scale) were leveraged to examine predictors of biological and behavioral measures of preschool-age emotional reactivity.

Parenting behaviors were significantly associated with child biological reactivity: increased positive engagement was associated with decreased salivary cortisol reactivity ($p = 0.04$), while increased negative engagement was associated with increased salivary cortisol reactivity ($p = 0.01$). There was no main effect of maternal stress on child biological reactivity, nor did it interact with parenting behaviors to predict to biological reactivity. Consistent with previous research, biological and behavioral measures of emotional reactivity were uncorrelated ($p > 0.05$).

Maternal stressful life events interacted with parenting behaviors to predict to behavioral scores of emotional reactivity: stressful life events were positively associated with child emotional reactivity only in cases where mothers displayed low positive engagement ($p = 0.05$) or high negative engagement ($p = 0.03$). These results suggest that mothers' parenting behaviors may exert protective effects in stressful early life contexts for children at high-risk for psychopathology.

P2-14

NEURAL MECHANISMS OF STRESSOR CONTROLLABILITY ACROSS HUMAN DEVELOPMENT: PRELIMINARY FINDINGS, Emily Cohodes, *Yale University, United States* E-mail: emily.cohodes@yale.edu

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Animal research on stressor controllability (SC) has highlighted that exposure to controllable stress may sensitize frontostriatal-amygdala circuitry to promote more adaptive biobehavioral reactivity to subsequent stressors (Amat et al., 2006). Dynamic changes in frontostriatal-amygdala circuitry across human development suggest the importance of a neurodevelopmental approach to examining SC. As part of an ongoing study of SC following trauma across human development, the present study examined neural correlates of SC in young adults. Participants (n = 20; mean age = 21.75, range = 18-27 years) were randomized to controllable or uncontrollable stress conditions, and completed two SC tasks during fMRI acquisition. Relative to previous controllable stress exposure, previous uncontrollable stress exposure was associated with higher STG activation during subsequent uncontrollable stress, as well as higher mPFC and dACC activation during anticipation of the subsequent uncontrollable stress. Moreover, a whole brain searchlight classification analysis revealed that patterns of activity in the amygdala, dACC, striatum, anterior insula, and STG during subsequent uncontrollable stress exposure can be used to classify participants' previous group assignment to either controllable or uncontrollable stress with 85-96% accuracy. Findings suggest potential mechanisms by which exposure to uncontrollable stress affects neurobiological and perceptual responses to subsequent environmental stressors. Neuroimaging data from a broader developmental sample of 8-30-year-olds will be presented with implications for neurodevelopmental changes associated with stressor controllability.

P1-14

ROLE-DIFFERENTIATED BIMANUAL MANIPULATION DIFFERENCES IN EFFICIENCY AMONGST DIFFERENT HANDEDNESS GROUPS., Sarai Cortina,
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Sarai Cortina, Illinois State University; Rachel Flores, Illinois State University; Leanne Mordan, Illinois State University; Kevin Gehm, Illinois State University; Julie Campbell, Illinois State University

Role-differentiated bimanual manipulations (RDBMs) are a complex action in which two hands, each performing a different task, work together to accomplish a mutual goal (Babik & Michel, 2015). RDBMs can be used as an indicator of hemispheric specialization for hand preference, and hand preference has been implicated to have an impact on a host of cognitive abilities (Michel, 2017). Hand preference for acquisition and hand preference for RDBM have previously been shown to be related, as infants prefer to use their ipsilateral hand for performing both of these actions (Babik & Michel, 2015).

The goal was to examine the relation of acquisition hand preference to RDBM efficiency, which is defined as the speed of an infant successfully completing a RDBM action. Thirty (10 right-handed for acquisition, 10 left, and 10 no preference) infants' (20 males) videos were derived from archived data from a larger longitudinal study. Videos were examined for the time taken to successfully complete simple and difficult RDBM actions. The start time was indicated by the infant's initial contact with an object and stop time was indicated by successful completion of a RDBM action.

A two-way ANOVA revealed a difference in performance time between the 9 month RDBM performance times and each of the other months of testing, indicating that RDBM speed increased across time. Infants with a left acquisition hand preference (M = 6.14) performed RDBMs significantly faster than infants with a late right preference (M = 7.64).

AS-2

Dissertation Award: MICROORGANISMS TO THE RESCUE: THE USE OF A PROBIOTIC TREATMENT TO REDUCE DEVELOPMENTAL VULNERABILITY IN RATS, Caitlin Cowan, *University College Cork, Cork, Ireland* Email: caitlin.cowan@ucc.ie

Caitlin Cowan, University College Cork, Cork, Ireland; Rick Richardson, University of New South Wales, Australia

Recent findings have led to a resurgence of scientific interest in the interactions between the gut and the brain, and their fundamental contribution to both physical and mental health (Cowan et al., 2018; Cryan & Dinan, 2012). This growing body of research highlights the key contribution of the gut microbiota to modulation of physiological and psychological responses to stress, via the so-called 'microbiota-gut-brain axis' (Foster et al., 2017). However, few studies within this emerging field have examined the impact of microbiota manipulations on psychological functioning during development. In my PhD dissertation, I examined the efficacy of a probiotic treatment to attenuate stress-induced alterations from typical developmental trajectories that might predispose individuals to later psychopathology. I replicated previous findings that maternal separation stress alters developmental trajectories of physical, behavioural, and neural maturation in rats, particularly with respect to developmental patterns of fear expression and inhibition (Callaghan, Cowan, & Richardson, 2016). Importantly, I showed that these stress-induced shifts in the developmental timelines can all be attenuated by a non-invasive probiotic treatment administered in the maternal drinking water. My findings add to the growing evidence that enteric microorganisms have a critical role in determining physical and mental health outcomes via the microbiome-gut-brain axis. Furthermore, these studies highlight the clinical promise of probiotic treatments; the potent stress-attenuating actions of the probiotic formulation suggests that such treatments have the potential to improve both preventative strategies and interventions for stress-related mental health problems.

O3-5

VISUAL PLASTICITY: THE ROLE OF EARLY ENVIRONMENT IN FRUIT FLY VISUAL DEVELOPMENT, John Currea, *Florida International University, United States* E-mail: jpcurrea@fiu.edu

John Currea, Florida International University; Jamie Theobald, Florida International University; Robert Lickliter, Florida International University

Because fruit flies are holometabelous insects, their vision is plastic to environmental conditions twice: larval formation of the eye imaginal disc and pupal and early adult development of the optic lobes. Low nutrition or high temperature during larval development results in smaller adults with smaller eyes. Using microscopy and a goniometer, we demonstrate the specific optical consequences of larval temperature: higher temperature (26 vs 16°C) induces smaller eyes with smaller but about as many ommatidia as those exposed to normal temperatures. Smaller ommatidia absorb less light for phototransduction, reducing sensitivity similar to the effect of dim ambient light. Dark-reared flies develop smaller visual neuoropils and slower photoreceptor membrane. Could heat-rearing, resulting in smaller ommatidia, have similar effects to dark-rearing? Using a flight simulator and psychophysics paradigm, we measure the effects of rearing temperature (16 vs 26°C) and light (5 vs 300lux) on visual ability: dark-rearing induces lower contrast sensitivity and temporal acuity, suggesting an overall decrease in visual performance. In comparison, hot-rearing induces equivalent contrast sensitivity and a substantial loss in temporal acuity. Hot-reared flies, therefore, use temporal summation to account for low optical sensitivity, akin to those exposed to limited larval feeding, but dim-reared flies don't. This and supplementary within-group comparisons suggest that temporal tuning of the visual system is influenced by the amount of light exposure. Future research will investigate the corresponding spatial acuity tradeoffs because spatial summation can also recover contrast sensitivity; and test intermediate differences in light level, which may allow fairer comparison of contrast sensitivity.

P2-15

CORTISOL MODERATES THE ASSOCIATION BETWEEN CHRONIC POVERTY AND SOCIOEMOTIONAL PROBLEMS IN EARLY CHILDHOOD, **Meriah DeJoseph**, *University of Minnesota, United States* E-mail: dejos002@umn.edu

Meriah DeJoseph, University of Minnesota; Rosemarie Perry, New York University; Stephen Braren, New York University; Clancy Blair, NYU

Children growing up in poverty are at increased risk for socioemotional and adjustment problems that can persist throughout the lifespan. A growing literature suggests that poverty exposure in conjunction with elevated levels of stress hormones places children at particularly high risk for decreased prosocial behaviors and increased antisocial behaviors. These behaviors are core emerging symptoms of many psychopathologies and developmental disorders. Using data from the Family Life Project (N = 1,292), a prospective longitudinal sample of children in predominately low-income and rural communities, this study explored the extent to which stress physiology (as indicated by child cortisol levels at age four) operates independently and interactively with years spent below the poverty line to predict peer problems at age five. Main effects analyses indicated that cumulative risk and maternal depression were each uniquely associated with children's peer problems as rated by mothers. There were no statistically significant main effects of cortisol levels and cumulative poverty exposure. However, poverty exposure statistically interacted with cortisol such that children experiencing more years below the poverty line in combination with higher levels of baseline cortisol displayed significantly more peer problems at age five. The results highlight how early adversity, specifically cumulative exposure to poverty, gets under the skin to alter physiological functioning in ways that may lead to a heightened risk for social adjustment problems and later psychopathology.

O3-3

DEVELOPMENTAL CONSEQUENCES OF MALTREATMENT: MULTI-LEVEL PATHWAYS BETWEEN EXTERNALIZING BEHAVIOR, CORTISOL, AND PEER AGGRESSION, **Carrie DePasquale**, *Institute of Child Development, United States*
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Carrie DePasquale, Institute of Child Development; Dante Cicchetti, University of Minnesota; Elizabeth Handley, Mt. Hope Family Center

The impact of early maltreatment on development is widespread and pervasive. To effectively curb the public health impact of maltreatment and promote resilient development in maltreated children, we must first identify drivers of developmental cascades that contribute to pervasive negative outcomes. There are two commonly postulated models for these cascades. A “top-down” model suggests that functioning at higher, broader levels (e.g., peer relationships) affects functioning at lower levels (e.g., cortisol regulation).1 A “bottom-up” model posits that dysregulation at lower levels expands to affect functioning at higher levels.2 This 1-year longitudinal study assessed top-down and bottom-up pathways following maltreatment involving morning cortisol, externalizing behavior, and peer aggression in a sample of 365 school-aged children (n=200 maltreated, confirmed by DHS records). Using structural equation modeling, we found that neither a top-down nor a bottom-up model adequately represented the data. Instead, the best fitting model for the effect of maltreatment was mediated through year 1 externalizing behavior to year 2 morning cortisol production and peer aggression (CFI=0.97, TLI=0.96, RMSEA=.05), controlling for concurrent stressful life events. Specifically, a higher number of different subtypes of maltreatment (neglect, emotional maltreatment, physical abuse, sexual abuse) predicted increased externalizing behavior at year 1, which in turn predicted increased peer aggression and higher morning cortisol at year 2 ($z=9.12$, $p<.001$; $z=2.31$, $p=.02$). These results indicate that externalizing behavior may be a potential mechanism through which the cascading effects of maltreatment occur. Future studies should attempt to replicate these findings with more time-points over a longer period of development.

P2-18

CORTISOL REACTIVITY IN PRESCHOOLERS: THE ROLE OF SETTING AND CHILD-RELATED FACTORS, **Amy Dominguez**, *University of Denver, United States* E-mail: amy.dominguez@du.edu

Amy Dominguez, University of Denver; Marina Mendoza, Denver Preschool Program; Lisa Badanes, Metropolitan State University of Denver; Julia Dmitrieva, University of Denver; Sarah Watamura, University of Denver

Background: Developmental programming of the HPA-axis is theorized as an important mediator linking early life experiences to adult health outcomes (Taylor et al., 2011). Despite the importance of understanding early stress responses in children, only 9% of studies have succeeded in evoking cortisol reactivity in 2- to 5-year-olds (Gunnar, Talge, & Herrera, 2009). The current study explored child and contextual factors associated with cortisol responses in preschoolers.

Method: Preschoolers (N=162, 2.50 to 5.64 years) from families who primarily identified as an ethnic or racial minority (43.8% Latino, 32.7% Caucasian, 19.8% non-Latino minority, 3.7% Multiracial/Multiethnic) participated in a 20-minute stress paradigm at home and at child care (order counterbalanced). Saliva samples were collected at baseline, 20 minutes (reactivity) and 40 minutes (recovery) post-challenge.

Results: Two-level latent growth curve modeling controlled for child age and accounted for stratification within classrooms. Administration at home, but not at child care, was associated with cortisol reactivity ($b = .05$, $p<.05$ vs. $b = -.01$, n.s.). Greater parent-reported effortful control was associated with decreased reactivity ($b = -.05$, $p<.05$) and increased recovery ($b = .05$, $p<.01$). In comparison to Caucasian

children, Latino children (b = -.12, p<.01), non-Latino minority children (b = -.09, p<.05), and multiracial/multiethnic children (b = -.11, p<.01) had decreased reactivity.

Conclusion: Results suggest that home stress paradigm administration may improve detection of reactivity in preschoolers, and that child temperament and family characteristics may influence how the stressor is perceived by the child and should be considered. Implications for study design, including important considerations with home protocols, will be provided.

S5-2

IS MODIFYING THE IMPACT OF EVENINGNESS CHRONOTYPE IN ADOLESCENCE A PATHWAY TO IMPROVED HEALTH?, Lu Dong, *University of California, Berkeley, United States* E-mail: lu.dong@berkeley.edu

Lu Dong, University of California, Berkeley ; Armando Martinez, University of California Berkeley ; Nicole Gumport, University of California Berkeley ; Allison Harvey, University of California Berkeley

This talk will present empirical evidence suggesting that improvements in sleep and circadian problems mediate the effect of a novel transdiagnostic sleep and circadian intervention (TranS-C) on health outcomes in five domains (emotional, cognitive, behavioral, social, and physical) in community-residing, evening chronotype adolescents who were at risk for problems in these five health domains. Participants were 176 adolescents (age mean [SD] = 14.77 [1.84] years; 58% female), who were randomized to receive 6-sessions of TranS-C or psychoeducation (PE). Putative mediators tested were eveningness, weekday-weekend discrepancy in total sleep time and waketime, daytime sleepiness, Pittsburgh Sleep Quality Index score, and parent-reported sleep-wake problems. Risk in five health domains was measured using adolescent self-reported questionnaires, parent-reported Child Behavior Checklist, and ecological momentary assessment (EMA) of problems in the five health domains. Improvement in eveningness mediated the effects of TranS-C on reducing both self-reported and parent-reported risk in the five health domains. Reduction in daytime sleepiness mediated the effects of TranS-C on parent-reported risk in the five health domains. Reduction in parent-reported sleep-wake problems mediated the effects of TranS-C on self-reported, parent-reported, and EMA-assessed risk in the five health domains. Results did not support the other hypothesized mediators. TranS-C exerts effects on reducing risk in multiple mental and physical health domains through improving sleep and circadian problems in

evening chronotype adolescents. Further research of TranS-C in other samples to assess its benefits for sleep and circadian problems as well as mental and physical health is warranted.

O3-1

PSYCHOSOCIAL STRESS IN INFANCY PREDICTS GREATER CARDIOMETABOLIC RISK IN ADOLESCENCE: A PROSPECTIVE LONGITUDINAL STUDY OF CHILEAN INFANTS, Jenalee Doom, *University of Michigan, United States* E-mail: jrdoom@umich.edu

Jenalee Doom, University of Michigan; Brie Reid, University of Minnesota; Estela Blanco, Universidad de Chile; Raquel Burrows, Universidad de Chile; Betsy Lozoff, University of Michigan; Sheila Gahagan, University of California, San Diego

Objective: To assess in a prospective, longitudinal study whether psychosocial stress in infancy predicts cardiometabolic risk as early as adolescence.

Methods: Adolescents and their mothers participated in a longitudinal study beginning in infancy in Santiago, Chile (N = 588; 48.1% female; 16-18y). During infancy, mothers reported on depressive symptoms, stressful experiences, home support for child development, father absence, and socioeconomic status, which were used to create a psychosocial stress composite. Adolescents participated in an anthropometric and blood pressure assessment and provided fasting serum samples.

Results: Greater psychosocial stress in infancy was associated with a higher likelihood of metabolic syndrome (MetS) (aOR = 1.37; 95% CI = 1.02-1.83) and a higher number of MetS risk factors (B = 0.09, 95% CI = .01-.17) in adolescence, even after controlling for current psychosocial stress. Greater psychosocial stress in infancy was specifically associated with greater anthropometric risk indicators (waist circumference, total fat mass, percent fat mass, body mass index [BMI]; B = 0.08,

95% CI = 0.01-0.15) and higher blood pressure (B = 0.09, 95% CI = 0.03-0.16) in adolescence but not with biomarkers of cardiometabolic risk (insulin resistance, total cholesterol, triglycerides). Psychosocial stress in infancy was not associated with BMI as early as 5 years but there was a trend towards higher BMI starting at age 10 (B = 0.08, 95% CI = -.01-.17; p = .065).

Conclusion: These findings provide new information about the unique association of psychosocial stress in infancy with cardiometabolic risk indicators in adolescence, including MetS, anthropometric risk, and higher blood pressure.

P2-19

IMPACT OF CHRONIC EARLY LIFE ADVERSITY ON FEAR EXTINCTION IN JUVENILE AND ADOLESCENT RATS, Katherine Drummond, *The Florey Institute of Neuroscience and Mental Health, Australia* E-mail: katieddrummond@gmail.com

Katherine Drummond, The Florey Institute of Neuroscience and Mental Health; Jee Hyun Kim, The Florey Institute of Neuroscience and Mental Health; Geoffrey Faulkner, University of Queensland; Marnie Blewitt, Walter and Eliza Hall Institute

Early life is viewed as a developmental period in which adversity could cause long-term impairments in fear inhibition. Exposure to adversity in both the neonatal (Postnatal Day (P) 2-13) and adolescence period (P21-42) has been shown to cause robust changes to fear-related behaviors. We hypothesized that chronic adversity early in life would be deleterious to fear inhibition throughout development in both male and female Sprague-Dawley rats. In Experiment 1: We subjected male and female neonates to a limited bedding stress environment from P2-13. Five days later, animals underwent fear conditioning, extinction and were tested to see whether their fear would renew. In Experiment 2: We reared rats in social isolation from P21-42, at which they were either behaviorally tested or resocialized and then tested in adulthood at P70. All animals were tested for their extinction retrieval ability. In Experiment 1, we found that juvenile male rats exposed to a limited bedding stress environment displayed a robust relapse of fear following extinction compared to controls. However, juvenile females behaved no differently to controls as both groups displayed a relapse of fear. In Experiment 2, relative to group-housed controls, both male adolescents and resocialized adults displayed higher freezing at test. Contrastingly, females displayed enhanced extinction acquisition compared to controls but showed similar levels of freezing at test. Overall, this demonstrates that

exposure to developmental adversity impacts the ability of rats to inhibit fear. Future work will determine whether exposure to developmental adversity led to alterations in the activity of transposons in the genome.

P1-15

THE INFLUENCE OF SHORT-TERM, PERINATAL BPA EXPOSURE ON AFFILIATIVE HUDDLING BEHAVIOR IN RAT PUPS AT 15 DAYS OF AGE, Carly Drzewiecki, *University of Illinois, United States* E-mail: drzewie2@illinois.edu

Carly Drzewiecki, University of Illinois; Elli Sellinger, University of Illinois Urbana-Champaign; Jari Willing, University of Illinois; Janice Juraska, University of Illinois; Steven Rhoads, University of Illinois; Sueyoun Hwang, University of Illinois

Bisphenol A (BPA) is a nearly ubiquitous endocrine disruptor in polycarbonate plastics, and our laboratory has found perinatal BPA exposure results in less adolescent play. Here, rat pups orally consumed a 0 (control), 40 or 400 µg/kg/day BPA solution across a 3-day window from postnatal day (P)6-P8 or P10-P12. At P15, subjects were tested on an affiliative huddling task modeled on a paradigm used by Alberts & Brunjes (1978). The testing cage contained an age-matched, anesthetized conspecific and a fur-covered, heated tube. The amount of time the subject spent with each stimulus was quantified to establish preference over 90 minutes. Based on previous findings, we hypothesized control subjects would have a stronger preference for the conspecific compared to BPA-exposed subjects. However, our results indicated that both male and female control subjects overwhelming preferred the warmed tube, and only early BPA-exposed males spent more time with the anesthetized conspecific. We repeated our study using control P15 male subjects and an older conspecific (P38-P47), and all subjects showed a preference for the larger anesthetized conspecific over the warm tube. A prominent difference between experiments was the body temperature of the anesthetized conspecific; older conspecifics had a significantly warmer body temperature than the age-matched

conspecifics. We hypothesize that the stronger preference among BPA-exposed males for the smaller conspecific may indicate that short-term BPA treatment influences thermoregulation, which could confound any social behaviors at this young age. Further research is needed to examine these effects and possible long-term outcomes.

P1-16

DETECTION OF ILLUSORY CONTOURS: EYE-TRACKING DATA PROVIDES INSIGHT INTO YOUNG CHILDREN'S VISUAL DEVELOPMENT, **Nicholas Duggan**, *Binghamton University, United States* E-mail: nick.duggan824@gmail.com

Nicholas Duggan, Binghamton University; Emily Blakley, Binghamton University; Alecia Moser, Binghamton University; Sarah Olsen, Binghamton University; Peter Gerhardstein, Binghamton University; Erika Yamazaki, Binghamton University; Gloria Song, Binghamton University

Perception of illusory contours is influenced by several factors, including inducer size and spacing. The support ratio between these two factors is related to interpolation strength and reaction time (Shipley & Kellman, 1992). Illusory contour perception is a developing skill; performance appears to improve with age (Otsuka et al., 2004; Sireteanu, 2000). Hadad and colleagues (2010) found that children under 6 years appear to process illusory contours differently than adults. In the present study, visual processing of illusory contours in adults and 2- to 9-year old children was examined by integrating a visual search task with eye-tracking. Participants were presented with a 5x4 inducer array; four were arranged to display an illusory square, while the others were randomly oriented. Inducer support ratios ranged from 0.1 to 0.5, in steps of 0.05. Participants were instructed to make a gaze-contingent response to the Kanizsa square. Saccades to the target were used to calculate response accuracy and timing. We also measured visual pop-out by evaluating the time of participants' initiation of first saccades directed toward the area of interest. Preliminary results suggest that children and adults showed similar patterns of

results with the greatest decline in accuracy between the support ratios of 0.15 and 0.2. Adults produced more first saccades to the area of interest than children at most support ratios; adults demonstrated more visual pop-out. Analysis of age-related differences in children will be discussed. Our data provide a more precise description of the development of illusory contour perception.

P1-17

HETEROGENEITY IN THE AUDITORY ERP RESPONSES OF YOUNG, TYPICALLY-DEVELOPING CHILDREN, Patrick Dwyer, *UC Davis Department of Psychology, United States* E-mail: psdwyer@ucdavis.edu

Patrick Dwyer, UC Davis Department of Psychology; Rosanna De Meo-Monteil, UC Davis; Clifford Saron, UC Davis; Susan Rivera, Univ California, Davis

While sensory processing difficulties in autism often cause discomfort and decrease quality of life, it is well-known that there is great individual heterogeneity. Little is known, however, about such heterogeneity in typically-developing (TD) children, making it difficult to place heterogeneity in autism into context.

61-channel ERPs to auditory stimuli were investigated in 80 TD participants (51 male, Mage = 37.11mos, SDage = 6.48mos). While watching a quiet video, participants heard, via headphones, brief tones randomly varying in loudness between 50, 60, 70 and 80dB (200-300 trials/intensity). Mullen Scales of Early Learning (MSEL) and the Short Sensory Profile (SSP) were collected.

Time-wise one-way ANCOVAs were conducted on ERP global field power with loudness as a factor and (separately) MSEL Developmental Quotient (DQ), chronological age (CA), and SSP scores as covariates. A time-wise two-way mixed (sex x loudness) ANOVA was conducted. Only interaction effects with a p-value ≤

0.05 sustained for ≥25ms and robust to outlier removal are reported. A DQ x loudness interaction emerged (124-149ms): children with higher DQ exhibited a larger response to softer tones (50, 60dB). There was also a CA x loudness interaction (239-313ms): older children showed greater neural activation to softer tones (50dB) and less to louder tones (70dB). Finally, there was an interaction between SSP under-responsiveness/sensation seeking and loudness (226-251ms): under-responsive children trended towards less activation to softer (50dB), and more to louder (80dB) tones. These data reveal multiple patterns of heterogeneity within the TD population, cautioning against over-interpreting sensory processing differences in autism absent assessing TD variability.

P1-18

RELATIONS AMONG INTERSENSORY PROCESSING, SOCIAL COMPETENCE, AND VOCABULARY SIZE IN INFANCY, Elizabeth Edgar, *Florida International University, United States* E-mail: eedga001@fiu.edu

Elizabeth Edgar, Florida International University; James Todd, Florida International University; Myriah McNew, Florida International University; Lorraine Bahrick, Florida International University

Intersensory processing—coordinating temporally-synchronous stimulation across sensory modalities—is foundational for social and language development (Bahrick & Lickliter, 2012). For example, word-mapping and emotion perception are facilitated by synchronous audiovisual stimulation and attenuated by asynchronous or unimodal stimulation (Gogate & Bahrick, 1998; Vaillant-Molina & Bahrick, 2012). Research also indicates links between social and language development (Kuhl 2007; Vaughn van Hecke et al., 2007). However, interrelations among intersensory processing, social competence, and language have not been previously demonstrated. We thus explored relations among these domains.

The Multisensory Attention Assessment Protocol (MAAP; Bahrick et al., under review), assesses individual differences in multisensory attention skills to audiovisual events in infants and children. The MAAP presents two dynamic visual events – one

in synchrony with its natural soundtrack, and the other asynchronous. Intersensory matching is calculated as the proportion of total looking time to the sound-synchronous event.

Thirty-three infants participated. At 6 months, they received the MAAP. At 18 months, we obtained parent-reports of social competence using the Infant-Toddler Social Emotional Assessment (Carter & Briggs-Gowan, 2006) and expressive vocabulary size using the MacArthur-Bates Communicative Development Inventory (Fenson et al., 2007).

Social competence was correlated with both intersensory matching (r=.41; p=0.004) and vocabulary (r=.47; p=.006), suggesting a mediation model. Regression analyses indicated that social competence significantly mediated the relationship between intersensory matching and vocabulary, b=197.24, 95% CI:43.44-473.83, with no significant relation between intersensory matching and vocabulary, p=.46. Findings are among the first to demonstrate causal relations among intersensory processing, social competence, and vocabulary.

P1-19

EFFECTS OF BOOK DESIGN ON CHILDREN'S ATTENTION ALLOCATION AND LEARNING: AN EYETRACKING STUDY, Cassondra Eng, *Carnegie Mellon University, United States* E-mail: cassonde@andrew.cmu.edu

Cassondra Eng, Carnegie Mellon University; Karrie Godwin, Kent State University; Kristen Boyle, Carnegie Mellon University; Anna Fisher, Carnegie Mellon University

This study employed eye-tracking technology to examine whether extraneous illustration details (i.e., interesting but irrelevant to the story elements)–a design common in storybooks–promote attentional competition and hinder learning. The study used a within-subject design with 45 first and second graders. Children read from a commercially available "Standard" book condition, and in a "Streamlined" book condition in which extraneous details in illustrations were removed. Comprehension questions were administered after children read in each condition. An SMI RED250 eye-tracker calculated children's average gaze shifts away from the text, fixations to extraneous details, and fixations to relevant details. Children's comprehension scores were significantly higher in the Streamlined condition (M=79.89%) than in the Standard Condition (M=47.09%), paired-sample t(44)=6.91, p<.001; this effect was large, Cohen's d=1.80. Results indicated that children's

comprehension was associated with attention: as children's gaze shifts away from the text towards extraneous details increased, comprehension decreased; r=0.65, p<.001. Importantly, fixations towards extraneous details accounted for the unique variance in comprehension independent of verbal ability, age, and attending to relevant illustration details while reading. The results of this study provide the first systematic analysis of whether excluding extraneous details from reading materials for beginning readers could improve story comprehension. Attentional control, a foundational component linked to school readiness and reading achievement, should be taken into account when designing educational materials. This line of research ultimately aims to provide theoretical insights about design principles for reading materials that can be employed to optimize instructional materials and promote literacy development in young children.

P2-20

EARLY LIFE STRESS, PROINFLAMMATORY BIAS, AND SOMATIC COMPLAINTS IN ADOLESCENCE, Melissa Engel, *University of Minnesota, United States* E-mail: engel861@umn.edu

Melissa Engel, University of Minnesota; Megan Gunnar, University of Minnesota; Bonny Donzella, University of Minnesota Twin Cities; Chris Coe, University of Wisconsin

Childhood somatic complaints are a major public health concern. Somatic complaints may reflect heightened inflammatory activity of the immune system. Increased inflammation in childhood has been hypothesized to reflect conditions of early life stress (ELS), raising the possibility that youth with histories of ELS may exhibit both more somatic complaints and proinflammatory bias. The current study examined ELS (post-institutionalized [PI] youth who spent early lives in international orphanages before being adopted by age 36 months v. non-adopted [NA] youth), proinflammatory immune bias in response to stimulation by lipopolysaccharides

[LPS], and child- and parent-reported somatic complaints in a sample of 97 adolescents (14-17 years of age; 51.5% PI). Results revealed no group differences between PI and NA youth in either somatic complaints or proinflammatory bias in response to LPS, suggesting no persisting effect of ELS on these outcomes, at least by adolescence. Both parent- and child-reported somatic complaints demonstrated the expected female bias in somatic problems. For all youth, significant somatic complaints (top 15%) by parent report were associated with proinflammatory bias. Interestingly, males produced a greater proinflammatory response to LPS. This will be examined further through unstimulated plasma analyses, which will be completed prior to the meeting. This study demonstrated an unexpected sex difference in inflammation and suggested a psychobiological basis of somatic complaints. Future work should continue to examine sex differences, as well as the timing of stress, its biological embedding via inflammation, and its potential role in the development of somatic complaints.

P1-20

PRETERM BIRTH AND EARLY JOINT ATTENTION, Angela Fenoglio, *University of Minnesota, United States* E-mail: fenog004@umn.edu

Angela Fenoglio, University of Minnesota; Jed Elison, University of Minnesota, Twin Cities; Michael Georgieff, University of Minnesota

In neurodevelopmental assessment, preterm infants are most often compared to full-term children of the same “adjusted” age: time since birth, corrected for degree of prematurity. In some domains, such as motor development (Palisano 1986), skill acquisition appears to map closely to adjusted age. In other domains, such as language (Gonzalez-Gomez 2012) and memory (DeRegnier 2002), PT infants show some advancements relative to FT infants, suggesting that some aspects of development may be influenced by the amount of time spent ex-utero. Fewer studies

have looked at early social behaviors considered foundational to later development, such as joint attention (JA). Prior investigations of JA in PT infants have resulted in mixed findings and have generally relied on small sample sizes and limited gestational age (GA) ranges. The current study examined the relationship between adjusted age, birth GA, and JA at 12 months of adjusted age in a sample of 87 PT and 176 FT infants (GA 22-43 weeks). First, a linear regression was computed with adjusted age as a predictor of JA, resulting in a statistically significant model ($F(1, 261) = 47.63$; $p < .001$) which explained 15% of the variance in JA. Adding birth GA as a predictor significantly increased the total variance explained by the model to 17% [($F(2, 260) = 28.40$; $p < .001$); (R^2 Change = .025; $F(1, 260) = 7.90$; $p < .01$)]. This suggests that social-cognitive development is not simply an issue of time since conception, and age adjustment may not always be appropriate for characterizing the complexity inherent in prematurity.

P2-21

PARENTAL ANXIETY MEDIATES THE ASSOCIATION BETWEEN NORMATIVE STRESS EXPOSURE AND PRESCHOOL BEHAVIOR, Andrea Fields, *Columbia University, United States* E-mail: afields122@gmail.com

Andrea Fields, Columbia University; Chelsea Harmon, Columbia University; Nim Tottenham, Columbia University; Zoe Lee, Columbia University; Jennifer Louie, Kaiser Permanente

Exposure to stressors early in life has been associated with a number of deleterious outcomes during childhood development. While much work has focused on the impact of severe disturbances to the early environment, fewer studies have considered the potential influence of more normative childhood stressors. Therefore,

the current study sought to investigate the impact of exposure to normative family stressors on behavior among preschool-aged children (33-71 months old). Our findings indicate that exposure to normative family stressors is associated with increased child internalizing and externalizing symptomology. However, this association was mediated by parental anxiety. To better understand how these normative stressors impacted children and their parents, we also considered parent directed and child directed stressors separately. While exposure to child-relevant stressors was not associated with any parental or child behaviors, parent-relevant stressors were associated with increased parental anxiety and child symptomology. Moreover, to validate our parent reported measures of childhood outcomes, we administered laboratory assessments of inhibitory control and fear behaviors and measured child salivary cortisol. We found that parent reports of children's behavior were statistically consistent with children's observable behavior in the laboratory, and that parent's anxiety was associated with elevated evening levels of cortisol in their children. These results suggest that exposure to normative family stressors is associated with changes in childhood behavior, and that this link is mediated by parental anxiety.

P2-22

PREECLAMPSIA AND POLYCYSTIC OVARY SYNDROME ARE ASSOCIATED WITH INCREASED AUTISM RISK: THE ROLE OF MATERNAL TESTOSTERONE IN MALE SUCEPTIBILITY, Morgan Firestein, *Columbia University, United States*
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Males are more likely to be diagnosed with autism compared to females and it has been suggested that perturbations in the hormonal milieu during prenatal development may contribute to male vulnerability for autism and other neurodevelopmental disorders. While this area of research has primarily focused on the role of testosterone produced by the fetus, we present data supporting the notion that maternal testosterone may cross the placenta and affect the developing brain. Data from n=196 mother-infant dyads that participated in the nuMoM2b Study were analysed to determine the relationship between elevated maternal testosterone during pregnancy and risk for neurodevelopmental disorders. Mothers reported diagnoses of preeclampsia, a gestational condition characterized by hypertension, and polycystic ovary syndrome (PCOS), characterized by enlarged ovaries, both of which are associated with elevated maternal testosterone during the third trimester. Mothers also completed the Social Communication Questionnaire (SCQ), on which a score of ≥10 indicates risk for autism. Children of mothers who were diagnosed with preeclampsia and/or PCOS (n=31) had significantly higher SCQ scores (t=3.08, p=.003) and were significantly more likely to meet the “at risk” cut-off (p=.01). Boys, but not girls, whose mothers had preeclampsia and/or PCOS were more likely to be diagnosed with a developmental disorder (p=.03). Placental aromatase is increased in female placentas from preeclamptic pregnancies, and therefore, females may be protected against the adverse effects of increased maternal testosterone during pregnancy. In contrast, aromatase is decreased in male placentas from preeclamptic pregnancies, which may contribute to male susceptibility to the maternal hormonal perturbations.

P1-22

DEVELOPING MOTOR ABILITIES ALTER INFANTS’ EVERYDAY EXPERIENCES, **John Franchak**, *UC Riverside, United States* E-mail: franchak@ucr.edu

Infants’ body position affects developmentally-meaningful experiences. For example, infants look at faces less often while prone compared to while sitting or upright (Franchak et al., in press), and visual-manual manipulation of objects is hindered

when prone or supine but facilitated when sitting (Soska & Adolph, 2014). But whether these real-time body position effects have developmental consequences likely depends on the everyday frequency of such experiences, which are unknown. The current study measured everyday body position in infants at 3, 6, 9, and 12 months using a novel caregiver-report method (N = 95). Caregivers were prompted 5 times a day over 7 days with smartphone notifications to directly observe whether infants were held, supine, prone, reclined, sitting, or upright. Each body position was possible at each age despite differences in motor skill. For example, a 3-month-old standing in a jumper and a 12-month-old walking independently were both coded as upright.

At 3 months, infants were primarily held (49.8%), reclined (24.4%), and supine (18.3%); prone, sitting, and upright accounted for less than 7% of the samples. By 12 months, holding decreased to 18.0% as sitting (32.8%) and upright (22%) positions became dominant. Body position was directly related to developing motor abilities. Sitting frequencies for 6-month-olds who could sit independently were nearly double compared to 6-month-old non-sitters (15.8% vs. 8.5%). Similarly, 12-month-old walkers were upright twice as frequently as 12-month-old non-walkers. Thus, motor development impacts body position experiences in daily life, which may in turn initiate cascading effects on other areas of development.

P2-23

THE EFFECTS OF EARLY LIFE STRESS ON STRIATAL DOPAMINE AND

DEPRESSIVE-LIKE BEHAVIOR, Meghan Gallo, *Brown University, United States* E-mail: meghan_gallo1@brown.edu

Meghan Gallo, Brown University; Kevin Bath, Brown University; Haley Goodwill, Brown University

Early life stress profoundly impacts neural development and increases the lifetime risk for pathology. Significant sex disparities exist in risk for stress-associated pathology, however, the biological basis of these sex disparities are largely unknown. To study the effects of early life stress (ELS) on neurobehavioral development, we take advantage of a limited bedding paradigm in mice, an ELS model of resource restriction (Rice et al., 2008). Recent work in our lab has found that this form of ELS increases depressive-like behavior in female but not male mice. To test possible mechanisms underlying stress-associated depressive-like pathology, we assessed the effects of ELS on the development of the striatal dopamine system. Interestingly, we found an ELS-associated increase in striatal D2 and D4 receptor expression. To test if elevations in dopamine receptor expression may contribute to the expression of pathology, we used a pharmacological intervention, sonepiprazole, a D4 antagonist. Here, we report preliminary evidence that sonepiprazole treatment partially reverses the depressive-like phenotype observed in ELS reared female mice. Thus, ELS-associated effects on the developmental expression of dopamine receptors may contribute to the expression of depressive-like pathology in female mice and serve as a possible target for treatment of stress-associated depression.

P1-24

NEURITE DENSITY PATTERNS IN THE CORPUS CALLOSUM: COMPARISON

OF DIFFUSION-WEIGHTED IMAGING DENSITY METRICS, Dea Garic, *Florida International University, United States* E-mail: dgaric@fiu.edu

Dea Garic, Florida International University; Anthony Dick, Florida International University

Restricted diffusion imaging (RDI) is a novel diffusion-weighted neuroimaging metric that is proposed to measure cellular and axonal density (Yeh et al, 2016). This metric has been shown to be sensitive to tumors and inflammation in rats, but it has never been tested in humans. Our study aimed to use this in vivo imaging method to replicate anterior-to-posterior distribution of axonal density in the corpus callosum that are well-established in post-mortem tissue (Aboitiz et al, 1992). We hypothesized that the novel RDI metric would be the only diffusion metric currently capable of replicating the classic corpus callosum density pattern in both adult and developing samples.

Our participants were 840 adults from the human connectome project (HCP) database (undisclosed ages, age range= 20-40 years) and 129 children (M= 8.67 years) from the C-Mind database. In both samples, we were able to match the histological density patterns seen in post-mortem tissue. Specifically, contrast analyses showed a high degree of fit between the density patterns from the Aboitiz model and our adult sample, $t(839)= 167.99$ $p< .001$, and developing sample, $t(126)= 227.4$, $p< .001$. We also showed that the pattern was only apparent for RDI. The anterior-posterior distribution of other metrics, which included generalized fractional anisotropy, quantitative anisotropy, fractional anisotropy, radial diffusivity, axial diffusivity, NODDI, and mean diffusivity, did not match the pattern revealed in post-mortem tissue. These findings provide preliminary evidence in support of the RDI metric's sensitivity to cellular density and could potentially have large implications for future clinical neuro-assessments.

S4-1

MECHANISMS OF STRESSOR CONTROLLABILITY FOLLOWING EARLY-LIFE TRAUMA IN HUMANS, Dylan Gee, *Yale University, United States* E-mail: dylan.gee@yale.edu

Dylan Gee, Yale University

Rodent and initial human adult studies suggest that exposure to controllable stress may sensitize frontostriatal-amygdala circuitry to promote more adaptive biobehavioral reactivity to subsequent stressors. Dynamic changes in human frontostriatal-amygdala circuitry from childhood to adulthood suggest that the impact of controllable stress exposure may vary across development. Thus, variation in control may be a key determinant of both short- and long-term consequences of early-life stress. In the present functional magnetic resonance imaging (fMRI) study we designed a developmentally adapted stressor controllability task to test the neurobiological and behavioral mechanisms underlying the effects of controllable stress exposure. Participants were randomized to a controllable stress, uncontrollable stress, or no stress control condition at time 1, and all participants experienced uncontrollable stress exposure at time 2. Life history of trauma exposure was assessed as a key hypothesized moderator. Participants exposed to controllable stress reported significantly lower stress ratings to subsequent uncontrollable stress, and parallel findings were observed in a more objective measure of skin conductance response. Further, the experience of controllable stress engaged the hypothesized frontolimbic circuitry. These findings suggest that exposure to controllable stress promotes reduced reactivity to subsequent stress during development and may provide insight into approaches for optimizing behavioral interventions to foster resilience following early-life trauma.

P2-24

INTERPERSONAL STRESS AND SUBSEQUENT SLEEP DISTURBANCE MEDIATE THE RELATIONSHIP BETWEEN SEXUAL MINORITY STATUS AND SUICIDALITY IN YOUTH, Savannah Gibbs, *Birmingham-Southern College, United States* E-mail: savannah.gibbs@lebonheur.org

Savannah Gibbs, Birmingham-Southern College; Joseph Chandler, Birmingham-Southern College

Sexual minority status in youth is associated with an increased risk of suicidality, yet the exact path of this relationship remains unclear. The current research proposes and confirms a multiple mediation path in which sexual minority status (SMS) leads to increased interpersonal stress (IS), which in turn leads to significant sleep disturbance (SD), which leads to increased suicidality (S).

11,322 individuals answered questions regarding SMS, IS, SD, and S as part of the 2015 Youth Risk Behavior Survey (YRBS). One-way ANOVAs tested individual links in the proposed path: 1. SMS to S (C'); 2. SMS to IS; 3. IS to SD; 4. SD to S. Multiple mediation using the Preacher and Hayes Bootstrapping method tested the C' path in the presence of other proposed links.

All individual links were significant ($p < .05$), replicating previous results. The novel path prediction was confirmed, such that the significant C' path (SMS to S) is explained by a mediation from SMS to IS to SD to S, representing a significant C path, $p < .05$.

Sexual minority youths (SMY) are disproportionately at risk for suicidality compared to sexual majority peers, a difference long attributed to stress but rarely examined in relation to its many known associates. Accordingly, it has been difficult to effectively prevent and treat SMY suicidality. The present study indicates that suicidality in SMY develops via stress and sleep disturbance, providing new points of intervention and methods of treatment, such as cognitive-behavioral therapy for insomnia, to better assist SMY experiencing these concerns.

S5-3

POSTPARTUM DEPRESSIVE SYMPTOMS MEDIATE THE RELATION BETWEEN TESTOSTERONE AND SLEEP PROBLEMS IN NEW FATHERS, **Diane Goldenberg**, *University of Southern California, United States* E-mail: diane.goldenberg2@gmail.com

Diane Goldenberg, University of Southern California; Darby Saxbe, University of Southern California

The transition to fatherhood is characterized by alterations in testosterone, marked sleep disruption, and heightened risk for depression. These changes interact in bidirectional and complex ways with significant implications for individuals traversing an important life transition. Prior studies show males with lower testosterone after the birth of their child are more depressed. Additionally, postpartum sleep quality exacerbates depressive symptoms over time in new fathers. However, a clear and mechanistic understanding of how sleep, hormones, and depression interact over the transition to parenthood is currently missing, given a lack of prospective research conducted before and after infant birth. The aim of the current study is to begin to address this gap.

Data are drawn from the ongoing (Hormones Across the Transition to Childrearing) HATCH study. Thirty men expecting their first child provided self-reports of depressive symptoms (Beck Depression Inventory) and sleep quality (Pittsburgh Sleep Quality Assessment) six months into their partners' pregnancy and again six months after the baby's birth. In addition, saliva samples were provided at both time points and assayed for testosterone. Analyses revealed that lower levels of prenatal testosterone were associated with greater postpartum sleep problems, controlling for prenatal sleep. In other words, hormone levels predicted the emergence of sleep problems across the transition to fatherhood. This association was significantly mediated by endorsement of postpartum, but not prenatal, depressive symptoms. Implications for the role of prenatal hormones and postpartum depressive symptoms in the development of sleep problems across the transition to fatherhood will be discussed.

O2-1

WITHDRAWAL EMOTION DISPLAY PREDICTS HEIGHTENED PHYSIOLOGICAL REACTIVITY FOR CHILDREN WITH DISMISSING ATTACHMENT, **Alison Goldstein**, *University of California, Irvine, United States* E-mail: alisog1@uci.edu

Alison Goldstein, University of California, Irvine; Salvatore Panzariello, University of Trento; Patricia Smiley, Pomona College; Gianluca Esposito, University of Trento; Jessica Borelli, University of California, Irvine

The attachment relationship is critical in the development of self-regulation. A child who is exposed to sensitive parenting behaviors is more likely to develop healthy physiological regulation and secure attachment, which themselves are intercorrelated constructs (Feldman, 2003; Gander & Buchheim, 2015). Attachment is related to childhood emotion experience (Borelli et al., 2010), trait emotion (Borelli et al., 2010) and emotion understanding (Raikes & Thompson, 2006). However, few studies have explored links between attachment and the interrelations of different facets of emotion experience (e.g., self-report, behavior, or physiology). In the current longitudinal study we assessed 59 school-aged children for their attachment and their behavioral and physiological reactions to a stressful task 1.5 years later. Results revealed that children's emotion displays during the stressor moderated the association between attachment and stress reactivity. Specifically, children with more dismissing attachment who displayed withdrawal emotions (sadness/shame) showed greater decreases in respiratory sinus arrhythmia (RSA) during a stressful task ($b = 0.62$, $t(52) = 3.16$, $p < 0.01$) and lower RSA during a subsequent easy task ($b = 0.52$, $t(51) = 2.85$, $p < 0.01$). Similar, though non-significant effects emerged with respect to children's skin conductance levels (SCL; $b = 2.32$, $t(50) = 2.00$, $p = 0.05$) and cortisol reactivity ($b = 0.03$, $t(52) = 1.91$, $p = 0.06$). Together, these results suggest that when children who are dismissing, but not secure, experience withdrawal negative emotions, they show greater autonomic and cortisol reactivity.

P1-25

GROSS AND FINE MOTOR SKILLS DIFFERENTIALLY PREDICT EXPRESSIVE AND RECEPTIVE LANGUAGE OUTCOMES, **Sandy Gonzalez**, *Florida International University, United States* E-mail: sgonz219@fiu.edu

Sandy Gonzalez, Florida International University; Bethany Reeb-Sutherland, Florida International University; Eliza Nelson, Florida International University

Motor and language skills are commonly parsed into two categories: gross and fine motor, and receptive and expressive language. Research has highlighted the role of motor ability on language development, but it is unclear whether gross and fine motor skills are differentially related to receptive and expressive language outcomes over time. The current study measured motor and language longitudinally in infants (N = 76) at 12- and 24-months-old using the Mullen Scales of Early Learning (MSEL). MSEL gross (GM) and fine motor (FM) scores collected at 12 and 24 months were utilized to predict MSEL receptive (RL) and expressive language (EL) scores at 12 and 24 months. For concurrent relations, regression analyses demonstrated that GM and FM at 12 months were not related to 12 month RL or EL scores (ps>.05). However, greater 24 month GM and FM scores were significantly related to greater 24 month EL scores when analyzed separately (GM: $\beta = .218$, $p = .014$; FM: $\beta = .246$, $p = .027$), but non-significant when controlling for each other (ps>.05). Longitudinally, greater 12 month FM scores significantly predicted greater 24 month RL scores above and beyond 12 month GM scores (FM: $\beta = .29$, $p = .008$; GM: p>.05). GM and FM scores at 12 months did not predict 24 month EL scores (ps>.05). Data indicate differences in the predictive strengths of gross and fine motor skills in relation to receptive and expressive language outcomes across time: greater fine motor skills related concurrently and prospectively to greater receptive and expressive language, and greater gross motor related concurrently to greater expressive language.

P1-26

PRENATAL INCUBATION TEMPERATURE AFFECTS FEARFUL BEHAVIORS IN 1-DAY OLD BOBWHITE QUAIL CHICKS., Marien Govea, *Florida International University, United States* E-mail: mgove003@fiu.edu

Marien Govea, Florida International University; Douglas Gramajo, Developmental Psychobiology Lab; Starlie Belnap, Flordia International University; Robert Lickliter, Florida International University

Pervious research indicates paternal influences play an important role in driving behavioral plasticity. Most avian studies have focused on the mediating maternal effects of egg quality, composition, yolk hormones, and postnatal care. Few studies have investigated how maternally mediated environmental prenatal factors influence behavioral development. In quail, the embryo's survival is highly dependent on the mother hen's behavior; her behavior directly affects nest temperature during incubation. Here we investigate the role of maternally regulated prenatal temperature on social motivation and fear in one-day old bobwhite quail. Clutches of bobwhite quails eggs were exposed to four days of either high (38.1°C), low (36.9°C), or normal (37.5°C) thermal conditions during the second week of incubation. Within 24hours of hatching, chicks' fearfulness and social motivation were assessed and compared to chicks incubated in the optimal thermal condition. Latency to emerge from a hole-in-wall box task, and inactivity within an open I-maze were used to assess fear. Time spent near the maternal call, and latency to approach the call were used to assess social motivation. Results reveal hatchlings incubated in suboptimal temperatures did not vary in social motivation, but did differ in fearfulness. Hatchlings in the low condition showed more fearful behaviors compared to controls. In this study, we report the first evidence for incubation temperature on fearful behavior in neonatal quail. The effect of maternally mediated temperature on fear-related behaviors highlights the importance of prenatal stimuli on the development of postnatal social behaviors. Further research is necessary to identify neurobiological correlates.

P2-26

PROMOTING SHY TODDLERS' PHYSIOLOGICAL REGULATION DURING LOW- AND MODERATELY-THREATENING SOCIAL CONTEXTS, **Jessica Grady**, *University of the Pacific, United States* E-mail: jgrady@pacific.edu

Jessica Grady, University of the Pacific

The present study considered whether prompting parents to support their temperamentally shy 21-24-month-olds (N=38; 14 boys) during novel social settings facilitated toddlers' effective physiological regulation of arousal. Cardiac activity was measured while toddlers watched a neutral video (M = 4min) and participated in a series of moderate-threat (stranger work and stranger approach; M = 2 min) and low-threat episodes (clown and puppet show; M = 4min) from the Laboratory Temperament Assessment Battery (Buss, 2011). Four types of parental support were randomly assigned and included an encouragement condition (n=7), a warmth condition (n = 11), an encouragement plus warmth condition (n = 10), and a no support control condition (n = 9). For each episode, respiratory sinus arrhythmia was computed in 30-s epoch using parameters for frequency bands for respiration in children (0.24 to 1.04 Hz). Standardized residuals were obtained to index change in RSA during low- and moderate-threat episodes relative to the neutral video baseline. Univariate ANOVAs compared each support condition to the no-support control condition, controlling for child gender. Results indicated that toddlers in the warmth condition (M = -.37, SD = .97) versus the no-support control condition (M = .35, SD = .64) showed greater suppression during moderate-threat episodes, $F(1, 16)=4.45$, $p = .05$, $\eta 2 = .22$. Toddlers in the encouragement plus warmth condition (M=-.41, SD = .98) versus the no-support control condition (M = .37, SD = .85) tended to show greater suppression during low-threat episodes, $F(1, 16)=3.24$, $p = .09$, $\eta 2 = .17$. Toddlers in the encouragement condition did not differ from the no-support control condition. These preliminary findings suggest that parental warmth toward shy toddlers has the potential to facilitate adaptive physiological regulation during challenging social contexts.

P1-27

OXYTOCIN RECEPTOR EXPRESSION IN THE PERIPHERY OF NEONATAL RATS AND PRAIRIE VOLES, Maria Greenwood, *Florida State University, Psychology Department, Neuroscience Program, United States* E-mail: greenwoodm4@gmail.com

Maria Greenwood, Florida State University, Psychology Department, Neuroscience Program; Elizabeth Hammock, Florida State University

Oxytocin (OXT) is an important neuropeptide known to play an integral role in mediating mother-infant attachment across mammalian species. OXT and the OXT receptor (OXTR) facilitate a mother's ability to deliver, nourish, and nurture her offspring. OXT is found in maternal peripheral fluids such as amniotic fluid, saliva, and breast milk. Potential targets were recently identified for detection of maternal OXT by infant OXTR in the infant periphery of neonatal C57BL/6J mice (Mus musculus). In those studies, specificity was confirmed with a congenital OXTR knockout mouse model as well as competitive binding techniques. The aim of this project was to assess peripheral sites of OXTR for cross-species comparisons in commonly used laboratory rodent models with well-characterized social behaviors. These species included Long-Evans and Sprague-Dawley rats, and Prairie voles. Receptor autoradiography was performed on 20µm sagittal sections of whole neonatal (PD 0) males and females of each species using the 125iodinated-ornithine vasotocin ([125I]-OVTA) radioligand. A competition binding assay was used to assess the selectivity of [125I]-OVTA for peripheral OXTR. Radioactive ligand (0.05nM [125I]-OVTA) was competed against concentrations of 0 nM and 1000 nM excess unlabeled OXT. Regions analyzed for comparison were rostral and lateral periodontium, olfactory epithelium, ciliary bodies of the eye, whisker pads, adrenal gland, anogenital area, liver, and scapular brown adipose tissue. OXTR expression in all species was different from previous reports of OXTR receptor expression in the C57BL/6J mouse, as well as between species compared within this project. Within species sex differences are reported for specific regions.

P2-28

DEPRESSIVE SYMPTOMS, MELATONIN RECEPTOR 1B GENE RS10830963 POLYMORPHISM AND GLYCEMIC TRAITS, Kadri Haljas, *University of Helsinki, Finland* E-mail: kadri.haljas@helsinki.fi

Kadri Haljas, University of Helsinki; Jari Lahti, University of Helsinki; Tiinamaija Tuomi, Finnish Institute for Molecular Medicine, University of Helsinki; Bo Isomaa, Folkhälsan Research Center; Johan Eriksson , b National Institute for Health and Welfare; Leif Groop, Finnish Institute for Molecular Medicine, University of Helsinki; Katri Raikkonen, University of Helsinki

Background

Previous studies have identified a bi-directional association between depression and type 2 diabetes (T2D). It has been suggested that these disorders may share common underlying biological determinants. Because the neurohormone melatonin, which plays key role in circadian regulation, has been implicated in both depression and T2D, we examined if a common MTNR1B variant rs10830963 influenced the association between depressive symptoms and glycemic traits.

Methods

The Prevalence, Prediction and Prevention of Diabetes (PPP-Botnia) is a population-based study of 5208 participants aged 18-78 years. Of them, a sample of 4456 individuals without T2D diagnosis completed the Mental Health Inventory on depressive symptoms, underwent oral glucose tolerance test and were genotyped for rs10830963.

Results

Higher depressive symptoms and each addition of the rs10830963 minor allele were independently of each other associated with higher glucose area under the curve (AUC), lower Insulin Sensitivity Index (ISI) and lower Disposition Index (DI). These findings were significant across all adjustments including the fully adjusted model for age, sex, BMI, educational attainment, alcohol use, smoking status and physical activity (p Conclusions

Our study suggests that depressive symptoms and a common variant rs10830963 in the MTNR1B gene are independently associated with glycemic traits. Thus, the melatonergic system might not contribute to the known comorbidity between depression and T2D.

P2-29

MATERNAL TRAUMA HISTORY, PRENATAL GLUCOCORTICOIDS, MATERNAL-INFANT ATTACHMENT, AND INFANT TEMPERAMENT, Jennifer Hambleton, *Idaho State University, United States* E-mail: hambjenn@isu.edu

Jennifer Hambleton, Idaho State University; Hillary Swann, Idaho State University; Nicki Aubuchon-Endsley, Idaho State University

Following trauma exposure, women are twice as likely as men to meet diagnostic criteria for PTSD and often experience symptoms longer. These traumatic experiences often have adverse, lasting impacts on biopsychosocial functioning, which may lead to negative intergenerational effects. While empirical research has examined associations between mother-infant attachment and maternal trauma exposure, less is known about associations with early infant outcomes, such as infant temperament, and maternal biological factors (e.g., prenatal glucocorticoid exposure). Thus, the purpose of the present project is to examine maternal trauma history in a rural population of pregnant women (n = 96; trauma-exposed n = 76), in relation to maternal-infant attachment, prenatal glucocorticoid concentrations during the third trimester, and infant temperament at 6 months. We hypothesize that attachment will mediate the relationship between trauma history and infant temperament difficulties. Additionally, this mediation relationship will be moderated by greater prenatal glucocorticoid release. Preliminary data analyses revealed statistically significant Pearson product-moment correlations between maternal-infant attachment and infant temperament subscales: Attachment and Orienting/Regulation ($r = .24$, $p = .02$); Minimization and Negative Affectivity ($r = .23$, $p = .02$); Directive Control and Orienting/Regulation ($r = .28$, $p = .01$). Future follow-up analyses may further investigate relationships between these variables at 10, 14, and 18 months of age utilizing behavioral observation of infant temperament. These findings may elucidate critical developmental periods and factors which stand to benefit from prevention and early intervention programs designed to mitigate maternal risk factors for the development of infant temperament difficulties.

P2-81

LINKING SHYNESS, PHYSIOLOGICAL REGULATION, AND OBSERVED BEHAVIOR IN PRESCHOOLERS, Raha Hassan, *McMaster University, Canada* E-mail: hassar@mcmaster.ca

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Shyness is a temperamental trait characterized by an anxious preoccupation of the self in social situations and can be associated with maladaptive correlates across development including avoidance behaviors. In the present study, we tested if individual differences in physiological regulation during novel social contexts may account for variability in shy children's avoidance behaviors. Participants were 18 4-year old children (Mage = 4.69 years) and their mothers. Mothers reported on children's shyness, and children participated in the stranger approach task during which time vagal withdrawal [VW; change from baseline resting respiratory sinus arrhythmia (RSA) to on-task RSA] was measured, and observed avoidance behaviors were coded. Linear regression was used to determine whether VW moderated the association between children's shyness and avoidance behaviors in response to an interaction with a stranger. Results revealed a significant interaction between children's shyness and VW predicting children's behaviorally coded avoidance in the presence of a stranger ($B = -.99$, $p = .005$; $R2 = .70$). For children with low VW (i.e., relatively poorer physiological regulation), shyness was positively associated with avoidance behaviours ($B = 1.14$; $p = .01$, $R2 = .65$), whereas among children with high VW (i.e., relatively better physiological regulation), shyness was unrelated with children's avoidance behaviours ($B = -.47$; $p = .49$). These results highlight heterogeneity in behavioral expressions in shy children and underscore the importance of considering physiological regulation when examining the behavioural correlates of shyness in children.

P2-31

SENSITIZATION OF DEPRESSIVE-LIKE BEHAVIOR FOLLOWING REPEATED ATTACHMENT-FIGURE SEPARATION IS ASSOCIATED WITH ALTERED EXPRESSION OF HYPOTHALAMIC NEUROIMMUNE SIGNALING MOLECULES,

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Michael Hennessy, Wright State University; Patricia Schiml, Wright State University; Joshua Sensenbaugh, Wright State University; Darci Gallimore, Wright State University; Alexis Garybush, Wright State University; Jamie Mondello, Binghamton University; Terrence Deak, Binghamton University

Disruption of attachment relations in early life is linked to greater vulnerability to depressive illness at later ages. Evidence suggests this process involves stress-induced activation of central inflammatory factors, though the specific mediators and processes involved are not known. We used a guinea pig model in which effects of separation appear more clearly due to separation from the attachment object than is the case with other laboratory rodents. As in previous studies, separation in a novel environment evoked a depressive-like behavioral response that sensitized with repeated separation. At the time of sensitization, we measured how previous separation altered expression of neuroimmune signaling molecules in response to challenge with a modest dose of LPS. We found that prior separation blunted the response of prostaglandin synthesizing enzymes (COX-2 and mPGES) and chemokines (CXCL-1 and MCP-1) 120 min following injection with LPS and isolation in a novel cage. The blunted response was not associated with a greater plasma cortisol elevation. In addition, injection of saline together with isolation elicited small, but significant elevations in several signaling molecules, particularly at 30 min. The results indicate that a sensitized depressive-like behavioral response is not associated with a global increase in expression of neuroimmune mediators to an inflammatory challenge. Together with earlier findings the results suggest a multi-step process in which inflammatory response to an initial separation affects downstream mediators to sensitize depressive-like behavior.

P2-32

PREFRONTAL AND CHOLINERGIC MECHANISMS OF IMPAIRED COGNITION AFTER DEVELOPMENTAL ALCOHOL EXPOSURE IN RATS, Nicholas Heroux,
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Fetal alcohol exposure severely disrupts learning and memory dependent on the hippocampus and prefrontal cortex in humans. Animal model research on FASD has extensively documented impairment of hippocampal neuroanatomy and function but animal research examining prefrontal-dependent cognition is sparse. We have found that a variant of contextual fear conditioning that is dependent on both the hippocampus and prefrontal cortex, the Context Preexposure Facilitation Effect (CPFE), is particularly sensitive to developmental alcohol exposure. In the CPFE, learning about the context, acquiring a context-shock association, and retrieving contextual fear is temporally separated across three days (context preexposure, immediate-shock training, and retention). In the current study, Long-Evans rats receiving oral intubation of ethanol (AE; 5.25g/kg/day, split into two daily doses) or sham-intubation (SI) from PND4-9 underwent the CPFE on PND31-33. Extending our previous reports, ethanol exposure abolished both post-shock and retention test freezing in the CPFE, suggesting a disruption in configural memory. Assays (qPCR) of immediate early gene expression revealed that ethanol disrupted prefrontal but not hippocampal expression of c-Fos, Arc, Egr-1, and Npas4 during context learning. Because the CPFE depends on intact prefrontal and hippocampal cholinergic function (Robinson-Drummer et al., 2016; 2017), we next tested whether or not i.p. administration of the acetylcholinesterase inhibitor, physostigmine, would rescue cognitive deficits in the CPFE. Physostigmine given prior to every phase of the CPFE rescued both post-shock and retention test freezing in ethanol-exposed rats. These findings implicate impaired prefrontal and cholinergic function in impaired context learning arising from 3rd-trimester equivalent alcohol exposure in the rat.

O1-1

THE INFLUENCE OF MATERNAL STRESS DURING PREGNANCY ON TODDLERS' SLEEP PROBLEMS: THE ROLE OF CORTICO-CEREBELLAR CONNECTIVITY IN UTERO, Marion van den Heuvel, *Tilburg University, Netherlands* E-mail: m.i.vdnheuvel@tilburguniversity.edu

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Background. Child sleep disorders are increasingly prevalent in the USA and identifying early predictors of sleep problems, starting in utero, is of critical importance for early prevention. Here, we investigated whether toddlers prenatally exposed to maternal psychological stress experience increased sleep problems in an at-risk sample from Detroit, MI. Next, we investigated whether altered fetal functional connectivity mediates this association. Since the cerebellum is particularly sensitive to prenatal influences and cerebellar dysfunction is frequently implicated in sleep disorders, we focus on cortico-cerebellar connectivity. Method. Pregnant women (N=64) underwent fetal fMRI scanning and completed questionnaires about psychological distress. These scales showed high loadings and good fit to a one-factor model. Functional connectivity (FC) was investigated for three cerebellar hubs, identified previously (van den Heuvel et al., 2018), in a regression model with maternal stress. At 3-year follow-up, mothers reported on child sleep issues using the Child Behavioral Checklist. Results. Higher maternal prenatal stress was associated with increased sleep issues ($r=.295$, $p < 0 .018$). Additionally, conjunction maps of all three hubs ($k=15$, $p < 0 .05$) showed a significant association between maternal prenatal stress and decreased cerebellar-insula connectivity. These effects remained significant after controlling for birth outcomes, child sex, and postnatal maternal anxiety. However, bootstrap analyses did not confirm mediation. Conclusion. Our results indicate that sleep disturbances in early childhood may have fetal origins. However, fetal cerebellar-insula FC did not mediate the association between prenatal exposure to maternal stress and postnatal sleep problems. The search for underlying mechanisms should be continued and extended to other brain areas.

P1-57

USING THE REFERENT SELECTION TASK TO TEST MUTUAL EXCLUSIVITY IN MONOLINGUAL AND BILINGUAL 2-YEAR-OLDS, Joscelin Rocha Hidalgo, *Georgetown University, United States* E-mail: jr1679@georgetown.edu

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Novel words can be mapped to objects by assuming that there is one word for each object; termed mutual exclusivity. This is not an optimal strategy for bilinguals because there are multiple words for each object. To test mutual exclusivity in monolinguals and bilinguals the present study replicated Samuelson and Horst (2008) referent selection task. We presented 37 monolingual and 17 bilingual 2-year-olds with three objects, two known familiar objects (e.g., a cup and a duck) and one novel item (e.g., a slinky). In half of the 8 test trials, we asked children to get the familiar toy and during the other trials we asked children to get the novel object (e.g., “get the zylow”). Both monolingual (M= 3.24, SD = 1.16) and bilingual (M= 3.41, SD = 1.06) children successfully chose the novel item (i.e., the slinky) when the novel word was introduced (i.e., “zylow”). Retention of novel label-object pairings were also assessed after a 5-minute delay. For 3 trials, the target novel object was presented among two other novel objects previously shown. Both monolinguals and bilinguals failed to retain the novel object-word mappings and performed at chance. Our results replicate and extend those of Samuelson and Horst by suggesting that learning of novel object-word mappings occurs at a high rate for both monolingual and bilingual infants but retention is poor in both groups even after short delays. These findings suggest that monolingual and bilingual 2-year-olds may initially use the mutual exclusivity assumption to disambiguate words in similar ways.

P2-33

ALTERED CORTICOLIMBIC CONNECTIVITY ACROSS DEVELOPMENT IN A RAT MODEL OF EARLY ADVERSITY: EVIDENCE FROM FMRI AND NEUROANATOMICAL TRACING SUGGEST SEX-DEPENDENT EFFECTS OF EARLY EXPERIENCE, Jennifer Honeycutt, *Northeastern University, United States*
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Adverse early life experiences significantly alter behavioral and neural trajectories, and disruptions during early developmental periods set the course for aberrant brain maturation. Indeed, children with a history of early life stress (ELS) often exhibit deleterious effects, manifesting as maladaptive behaviors, cognitive impairment, and increased risk of mental illness later in life. Evidence in ELS human populations points to a role of atypical corticolimbic circuit development leading to changes in connectivity between limbic (i.e. amygdala) and the prefrontal cortex (PFC). Importantly, children with a history of ELS show patterns of precocially mature corticolimbic functional connectivity (FC) comparable to adolescent patterns. While these findings indicate influences of early adversity on circuit maturation, the underlying neurobioloy remains poorly understood. Work from our group utilizing a rat model of ELS reveal sex- and age-dependent effects on amygdala-derived axonal innervation of the PFC. Specifically, we reported that juvenile ELS females show patterns of innervation comparable to adolescents/adults, with ELS-dependent changes in males not appearing until later. To explore whether these changes confer alterations in corticolimbic connectivity, we used resting state FC and anisotropy to compare ELS and control rats across development. Here, we present data delineating sex- and age-dependent effects which help explain how females with a history of adversity may be more vulnerable to later psychiatric illness. Furthermore, we present data suggesting that these alterations may be predictive of anxiety-like behaviors mediated by corticolimbic circuitry. Our data provides evidence for a critical role of early experience, and provides mechanistic insight into the etiology of adversity-induced vulnerability.

P1-29

REFLECTIVE FUNCTIONING PREDICTS LOWER CARDIOVASCULAR REACTIVITY AND RECOVERY IN SCHOOL-AGED CHILDREN, Kajung Hong, *University of California, Irvine, United States* E-mail: kajung.hong@gmail.com

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Reflective functioning (RF), a capacity to understand one's own and other's underlying emotions, thoughts, and needs, is posited to play a regulatory role in emotionally provoking situations. Even though recognition of one's own internal experiences is thought to enhance one's abilities to process difficult emotional experience, no study has empirically tested the link between RF and emotion regulation. The current study examines the link between RF and physiological measures of emotion reactivity and regulation in children. We tested the association by looking at school-aged children's (N = 76; 8 to 12 years old) cardiovascular responses (respiratory sinus arrhythmia) to a standardized paradigm designed to evoke reactions regarding the experience and expression of attachment-related needs. Children also completed a semi-structured attachment interview, which was later coded for RF as well as attachment insecurity (attachment dismissal and preoccupation. Our findings were largely consistent with the theory, in that higher RF was associated with less cardiovascular reactivity (higher levels of RSA) during the stressor task and better recovery following the task. Moreover, these links were especially strong for children with greater attachment preoccupation, which suggests RF's protective factor among children who are at higher attachment risks. These findings contribute to developmental theory, in demonstrating that RF is closely linked to physiological emotion regulation in children.

P1-30

PARENTAL DEPRESSIVE SYMPTOMS AND REFLECTIVE FUNCTIONING PREDICTING QUALITY OF RELATIONAL SAVORING: ASSOCIATIONS WITH CHILDREN'S BASELINE PHYSIOLOGICAL AROUSAL, Kajung Hong, *University of California, Irvine, United States* E-mail: kajung.hong@gmail.com

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Relational savoring is the recollection and prolonging of positive, connected moments in close relationships, such as parent-child relationships. This study examines correlates of parental quality of relational savoring and its association with children's baseline physiological arousal indexed by respiratory sinus arrhythmia (RSA). In a longitudinal study, mothers with children of 8 to 12 years old reported their depressive symptoms and completed the Parent Development Interview (PDI; T1). The interview was coded
for parental reflective functioning, a measure of parents' capacity to understand their own and their child's underlying mental states. After 2 years, mothers' savoring of a positive, relational memory was recorded and coded for positive and relational quality using a standardized protocol. Meanwhile, data on children's baseline RSA were collected at this time. The results demonstrated that fewer depressive symptoms and greater parental reflective functioning at T1 were significantly associated with higher quality of relational savoring at T2. Higher quality parental relational savoring was in turn associated with higher levels of children's baseline RSA, which may suggest a more flexible or adaptive parasympathetic nervous system. Results of a moderated mediation analysis suggested that among mothers who have low levels of reflective functioning, the quality of relational savoring mediates the relationship between parental depressive symptoms and children's baseline physiological arousal at T2. These findings indicate that parents with higher depressive symptoms and lower reflective functioning may experience difficulty exploring positive emotions, which may have trickle-down effects on children's physiological arousal during non-threatening situations.

P1-31

INVOLVEMENT OF MEDIAL PREFRONTAL NMDA RECEPTORS IN THE ACQUISITION OF THE CONTEXT REPRESENTATION AND CONTEXT-SHOCK ASSOCIATION IN THE CPFE., Colin Horgan, *University of Delaware Department of Psychological and Brain Sciences, United States* E-mail: coljhor@udel.edu

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The Context Preexposure Facilitation Effect (CPFE) is a variant of contextual fear conditioning in which exploration of the context, acquisition of a context-shock association, and retrieval of contextual fear are separated across three phases. Our lab has previously shown that disrupting cholinergic activity or inactivating the mPFC prior to any phase of the CPFE significantly impairs 24hr retention freezing in adolescent rats (Heroux et al., 2017; Robinson-Drummer et al., 2017). Furthermore, context preexposure and immediate-shock training induces the expression of the plasticity-associated immediate early genes c-Fos, Arc, Egr-1, and Npas4 within the mPFC (Heroux et al., 2018). To further examine the role of synaptic plasticity within the mPFC, we locally infused the NMDAR antagonist MK-801 into the mPFC of adolescent (PD31) Long Evans rats either prior to the preexposure or immediate-shock training phases of the CPFE. Prefrontal infusion of MK-801 prior to preexposure partially knocked down retention test freezing, with animals freezing significantly lower than vehicle (SAL) controls, but higher than Alt-Preexposure (Alt-Pre) control groups. MK-801 infused prior to immediate-shock training produced no differences in retention freezing compared to vehicle controls, with both groups freezing above Alt-Pre animals. These results indicate that NMDAR-dependent synaptic plasticity within the mPFC partially supports - but is not critical for - acquisition of the context representation. Furthermore, prefrontal NMDAR-dependent plasticity is not required for the consolidation of contextual fear in the CPFE. Future experiments will further elucidate the role that mPFC plasticity plays during context preexposure within the CPFE.

P2-34

HISTORY OF MOOD DISORDER DETERMINES ASSOCIATIONS BETWEEN PERINATAL REPRODUCTIVE HORMONES AND RISK FOR POSTPARTUM DEPRESSION, Mariann Howland, *University of California, Irvine, United States* E-mail: mahowlan@uci.edu

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The prenatal and postpartum periods of the female lifespan are characterized by dramatic endocrine changes, which function to maintain pregnancy, enact parturition and prepare the maternal brain for the tasks of motherhood. While these endocrine alterations are normative, they are also implicated in the etiology of perinatal mood disorders, particularly postpartum depression (PPD). Studies examining sensitivity to the effects of reproductive hormone changes as a risk factor for PPD have not considered the potential role of history of mood disorder, which is itself an established risk factor for PPD. The current study examines whether history of mood disorder moderates associations between prenatal reproductive hormones and PPD symptoms. Total progesterone production from 3-15 weeks' gestation, 23-35 weeks' gestation, and 0-2 months postpartum was estimated through assay of hair samples. PPD symptoms were assessed at 2-months postpartum with the Edinburgh Postnatal Depression Scale. Initial analyses examined early gestation progesterone levels in women with ($n = 90$) and without ($n = 20$) a history of mood disorder (analysis of the latter two time intervals will be included in the final presentation). Higher progesterone levels were associated with higher levels of PPD symptoms in women without a history of mood disorder ($r = .26$, $p = .01$) and with lower levels of PPD symptoms in women with a history of mood disorder ($r = -.43$, $p = .05$). Findings suggest that perinatal reproductive hormones are associated with differential patterns of risk and resilience for PPD that are dependent upon previous history of mood disorder.

P1-32

THE EFFECTS OF SLEEP PATTERNS, BEHAVIOR, CHARACTERISTICS AND SLEEP ENVIRONMENT ON THE ACADEMIC PERFORMANCE AND HEALTH OF SELECTED GRADES 7 TO 10 STUDENTS, **Katrina Marie Jolejole**, *University of the Philippines Los Baños, Philippines* E-mail: kbjolejole@up.edu.ph

Katrina Marie Jolejole, University of the Philippines Los Baños; Ria Sanchez, University of the Philippines Los Baños; Rufo Gil Albor, University of the Philippines Los Baños; Nephtaly Joel Botor, University of the Philippines Los Baños

This quantitative study aimed to explore the effects of sleep patterns on school-age children and adolescents. Specifically, it aimed to determine the effects of sleep patterns on academic performance and health; and to determine the effects of behavior, characteristics and sleep environment on sleep patterns, academic performance and health, respectively. The respondents were 226 grades 7 to 10 students from a local privates school. The respondents' behavior, characteristics and sleep environment were determined using a questionnaire. The Body Mass Index of the respondents were used as indicators of health; whether they are obese, overweight, normal, or underweight. Two-stage hierarchical multivariate regressions were performed to analyze the data. Findings reveal that as one ages, his or her sleep patterns decreases (β =0.17); an extra hour of sleep increases the General Weighted Average (β =5.09); GWA decreases when one spends more time in social media (β =2.45); and prevalence of obesity lowers for every extra hour of sleep (β =2.41). Overall, insufficient sleep has been associated with decreased learning efficiency and increased risk of becoming obese or overweight in the students in the sample. More variables such as gender, socio-economic background, physical activity, and hormonal changes need to be considered to provide a more accurate representation of the effects of sleep patterns on academic performance and health and the effects of behavior, characteristics and sleep environment on sleep patterns, academic performance and health, respectively.

P2-35

MATERNAL SEPARATION ALTERS DISTRIBUTION OF ISOLATION USV TYPES, Jasmine Kaidbey, *Columbia University, United States* E-mail: jhk2185@cumc.columbia.edu

Jasmine Kaidbey, Columbia University ; Manon Ranger, Columbia University; Michael M. Myers, New York State Psychiatric Institute; Muhammad Anwar, Columbia University; Alexandra Schulz, Columbia University; Robert Ludwig, Columbia University Medical Center; Martha Welch, Columbia University Medical Center

Maternal separation (MS) has many long term effects on rodent pup and human infant development. Its effects on rodent acoustic characteristics are unknown. Here we examine ultrasonic vocalization (USV) as a proximal marker of its effects. Previously, it was thought that rat pups only vocalize between 40-70 kHz. Recently, it was shown that USVs can be classified into two frequency bands: 35-45kHz and 60-80kHz. We hypothesize that daily MS will affect the rate or proportion of USVs in response to isolation. Fourteen litters of Sprague-Dawley pups were divided into MS (3h/day x10) and control. On day 12, USVs were recorded (Avisoft) during two 3min isolations, one before and one after a brief reunion with their dam. USV analyses were done using Raven. The rate of USV production was not significantly different between groups. Both groups had two distinct bands of calls, one peaking at 35-45kHz, a second at 50-100kHz. Within groups, there was no change in frequency distribution (proportion low vs. high frequency) before and after reunion with the dam. MS pups had a higher proportion of high frequency calls, and a lesser proportion of low frequency calls in both isolations, reaching significance in the second (MS:34.9±4.7% vs. controls: 56.9±4%, $p=0.0059$). In summary, MS changes how pups respond to the stress of isolation. Specifically, MS alters the frequency type of calls, resulting in a greater proportion of high frequency calls. High pitch human infant cries are associated with neurobehavioral and autonomic dysregulation; similarly, we speculate our findings reflect greater stress dysregulation.

P1-33

REWARD LEARNING BIASES SELECTIVE ATTENTION AMONG 9-12-MONTH-OLD INFANTS, Brianna Keenan, *Tulane University, United States* E-mail: bkeenan@tulane.edu

Brianna Keenan, Tulane University; Julie Markant, Tulane University

Researchers have traditionally categorized attention mechanisms based on those that are driven by perceptual saliency (i.e., exogenous) and those that are based on goal-relevant information (i.e., endogenous). However, recent adult studies have identified a third mechanism, known as value-driven attentional capture (VDAC). These studies have shown that attention is biased towards a previously rewarded stimulus so that it is more likely to be subsequently attended, even when no longer task-relevant. It is currently unknown whether this VDAC mechanism develops within the first year of life. We tested 9-12-month old infants (N=15, anticipated N=50) on a modified VDAC task. During the initial reward learning phase, infants searched for a target color among a six-item array of circles. Infants saw a high- or low-value social reward (i.e., a happy or neutral face) immediately after looking at the target color. During the test phase, infants viewed novel arrays of six shapes, with one animated target shape and five static distractor shapes. Critically, during half of the test trials, one of the distractors appeared in the previously rewarded color (Reward-Present trials). We used eye tracking to measure how quickly infants detected the moving target. Preliminary results show that the presence of the previously rewarded distractor slowed responses to the moving target, but only in the high reward condition. These results are consistent with the adult VDAC literature and suggest the need for a revised model of attention development that integrates endogenous, exogenous, and value-driven attentional capture mechanisms.

P1-34

CHILDREN'S LEARNING FROM DISTRACTION VARIES BY SELECTIVE ATTENTION ABILITY, Jill King, *Tulane University, United States* E-mail: jking17@tulane.edu

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Declining selective attention skills during aging results in poorer distractor suppression, allowing older adults to learn from relevant distractors to enhance memory. This study examined whether young children's memory can similarly benefit from task-relevant distraction. In Experiment 1, children 4-8 years completed a task with three phases: memory encoding, visual search, and retrieval. Children viewed multiple objects during encoding. Next, children searched for a target amongst 0, 5, 10, or 15 distractors. Half of the objects from encoding were included as "relevant" distractors. The remaining half were not re-presented during the search phase. During retrieval children's memory was tested for all objects presented during encoding. We examined response time (RT) to detect the target during search, with slower RT indicating less efficient selective attention, and the difference in recognition memory sensitivity (d') for the relevant distractors versus the non-search encoding objects. Seven- to eight-year-old children showed more efficient visual search and better memory for relevant distractors compared to non-search encoding images. Search behavior following target detection was the strongest predictor of these older children's memory benefit for relevant distractors. In Experiment 2 we tested 7-8-year-old children on the same task but prevented them from searching the array following target detection. This abolished children's memory benefit for relevant distractors, suggesting that any learning from relevant distractors in Experiment 1 occurred after target detection. Thus, older children's more mature selective attention abilities support efficient target detection and may make it more difficult to learn from relevant distraction.

P1-35

VOCAL PROSODY IN CAREGIVER-INFANT PHYSIOLOGICAL AND EMOTIONAL INTERACTION DYNAMICS: APPLICATION OF A NEW MEASURE, Jacek Kolacz,
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Caregiver-infant interactions are mutually co-regulated across physiological, emotional, and behavioral domains, and dyadic differences in these patterns contribute to children's development. Vocal prosody may be a powerful mediator for co-regulation via cueing of autonomic and emotional states of interaction partners (Porges & Lewis, 2010; Welch & Ludwig, 2017). Vocal roughness, or chaotic and unstable dynamics in frequency and time, is a signal of mobilization in non-human mammals (Kolacz, Lewis, & Porges, 2018), but objective measurements of this feature has not yet been applied to the study of human caregiver-infant pairs. In this study, data were collected from 60 caregivers and their 4-6 month-old infants during the Face-to-Face Still Face (Tronick et al., 1978). Caregivers' vocal roughness, vocal tension producing unsteady fluctuations in pitch and rhythm, was measured by the depth of the auditory modulation power spectrum, a 2-dimensional fast Fourier transform of the audio spectrogram (adapted from Singh & Theunissen, 2003). Infant parasympathetic regulation was assessed by respiratory sinus arrhythmia (RSA). Infants' behavioral distress was assessed by vocal, facial, and body movement measures. Caregivers' higher vocal roughness at the beginning of reunion predicted greater odds of infant parasympathetic decrease (OR = 2.10 [95% CI: 1.06, 4.71], p = .046) and increased infant behavioral distress (OR = 2.21 [95% CI: 1.11, 4.81], p = .031) toward the end of reunion. Our results suggest that caregiver vocal acoustic roughness may serve as an index of co-regulatory interpersonal behavioral coordination, possibly due cueing of infant emotional-autonomic states.

O2-4

INTERRUPTION OF INTERACTIONS BY TEXTING IMPAIRS LEARNING IN 19-MONTH-OLD-INFANTS, **Carolin Konrad**, *Ruhr-Universität Bochum, Germany* E-mail: carolin.konrad@rub.de

Carolin Konrad, Ruhr-Universität Bochum; Rachel Barr, Georgetown University; Melanie Berger, Ruhr-Universität Bochum; Gina Hassel, Ruhr-Universität Bochum

Cell phone use during interactions results in repeated disconnections between social partners. Two-year-olds were less likely to learn a novel word if learning was interrupted by a phone call. Furthermore, the interruption may be perceived as a 'still face'. Here, we explored whether learning was affected when the teaching phase was interrupted by texting.

Fifty-three 19-month-old infants were randomly assigned to one of three experimental conditions or a baseline-control-condition. After a 5-min warm-up phase, parents demonstrated four times to their children how to make a rattle. Parents received a text and responded to questions on the phone during the interruption period. In the interruption-first-condition, the interaction was interrupted for 30-sec before the teaching phase. In the one-interruption-condition, parents were interrupted for 30-sec in the middle of the teaching phase. In the three-interruption-condition, parents were interrupted after each demonstration for 10-sec. Afterwards, children had 60-sec to reproduce any target actions.

Children reacted with negative affect during the interruption period, but quickly recovered when interaction was resumed. Children in the three experimental conditions performed significantly more target actions than the baseline-control-condition who did not see any demonstrations, indicating that all children learned the target actions. However, children in the interruption-first-condition learned significantly fewer target actions than in the other interruption conditions.

Results highlight that texting before a teaching task can impair subsequent learning. Children may not weigh the teaching task as important or lose interest when parents concentrate on a cell phone before the task, perhaps setting the context for learned irrelevance.

P1-36

EXTINCTION LEARNING IN HUMAN INFANTS, Carolin Konrad, *Ruhr-Universität Bochum, Germany* E-mail: carolin.konrad@rub.de

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Extinction allows organisms to adapt to a changing environment. Infant as well as juvenile rats display extinction, but only juvenile rats show renewal, which is assumed to be due to immaturity of the hippocampal circuit. During human development, recent research suggests that the period between 18-24 months of age reflects a major milestone in hippocampal development (Gomez & Edgin, 2016). However, systematic studies on developmental changes in extinction of aversive conditioned responses in human infants do not exist. Therefore, we investigated the emergence of the renewal effect during the transition from human infancy to early childhood.

Fifteen infants (age-groups: 12, 18, 24 months) were assessed so far using a 3-day classical delay conditioning and extinction task. A mildly aversive airpuff was used as unconditioned stimulus (US) and a tone as conditioned stimulus (CS) (Ivkovich et al., 2002). Context was manipulated by changing the illumination of the room. On day 1 during acquisition, infants received 36 US-CS pairings in context A. On day 2, infants received 12 acquisition trials in context A to consolidate association learning, followed by 48 extinction trials (tone alone presentations) in context B. Renewal was assessed on day 3 and incorporated 12 CS alone trials presented in both the acquisition context and the extinction context. Eyeblink-responses were videotaped and coded offline.

Six infants did not meet the learning criterion during acquisition. Learners showed a significant increase in conditional responses during acquisition and a significant decrease during extinction. First inspection of the renewal data indicate context-dependent extinction learning.

P2-36

MATERNAL EARLY PREGNANCY BODY MASS INDEX AND DIURNAL CORTISOL IN YOUNG ADULT OFFSPRING, Satu Kumpulainen, *University of Helsinki, Finland* E-mail: satu.m.kumpulainen@helsinki.fi

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Background: Maternal early pregnancy overweight and obesity are associated with mental and physical health adversities in the offspring. One key mechanism suggested to underpin these associations is prenatal glucocorticoid-mediated programming of the offspring hypothalamic-pituitary-adrenocortical (HPA)-axis. However, evidence linking maternal overweight and obesity with offspring HPA-axis activity is scarce. We studied if maternal early pregnancy body mass index (BMI) is associated with diurnal salivary cortisol, a marker of HPA-axis activity, in young adult offspring.

Methods: At age 25.3 (SD=0.6) years, 653 Arvo Ylppö Longitudinal Study participants collected saliva samples for cortisol analyses, at awakening, 15 and 30 minutes thereafter, 10:30AM, 12:00PM, 5:30PM and at bedtime. Maternal early pregnancy BMI (kg/m2) was derived from health care records.

Results: Per each one SD unit higher maternal early pregnancy BMI (1SD=3.3kg/m2), offspring salivary cortisol from awakening to 30 minutes thereafter was lower by -6.20% (95% Confidence Interval 10.59, 1.60, p=0.009); at awakening it was -7.50% lower (-12.54, -2.18, p=0.007), the peak post awakening was -5.73% lower (-9.88, -1.49, p=0.010) and the awakening area under the curve with respect to ground was -11.40% lower (-19.51, -2.57, p=0.013). These associations were independent on the offspring's own young adulthood BMI, and other important covariates.

Conclusion: Our findings show that young adult offspring born to mothers with higher early pregnancy BMI show lower salivary cortisol at and in response to awakening. These findings suggest that maternal early pregnancy BMI may have long-term programing effects on the offspring HPA-axis activity.

P1-37

EVIDENCE FOR DISTINCT P300 AND LPP ERP COMPONENTS IN MOTHERS PROCESSING INFANT EMOTIONAL EXPRESSIONS, Sierra Kuzava, *Stony Brook University, United States* E-mail: sierra.kuzava@stonybrook.edu

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Numerous event-related potential (ERP) studies have examined mothers' responses to infant emotional expressions to understand the neurobiological mechanisms that contribute to parenting. Several studies have demonstrated that late-occurring P300 and late positive potential (LPP) components are enhanced to infant emotional faces in mothers. However, this literature frequently treats the P300 and LPP components interchangeably, as both are late positive deflections reflecting sustained attention to emotional stimuli. The current study used principle components analysis (PCA) to examine whether there are unique sources of variance corresponding to the P300 and LPP components elicited during an infant emotion recognition task. Participants included 86 mothers of 6- to 12-month-old infants. Mothers' ERPs were recorded while they identified infant laughing, crying, and neutral expressions. Temporospatial PCA identified three factors at centro-parietal sites, peaking at approximately 200, 300, and 800 ms post-stimulus. These factors corresponded to the P200, P300, and LPP components. The P200 factor was characterized by enhanced response to crying expressions compared to laughing and neutral expressions. The P300 factor was characterized by enhanced response to crying expressions compared to laughing and neutral expressions, and enhanced response to laughing compared to neutral expressions. The LPP factor, however, was characterized by suppressed response to infant crying expressions compared to laughing and neutral expressions. The P300 and LPP may represent distinct stages of infant emotion processing among mothers, with enhanced response to infant distress characteristic of earlier processing. Suppressed response to crying expressions at the latest stages may reflect maternal emotion regulation.

O1-4

REGIONAL, AGE, AND SEX-SPECIFIC EFFECTS OF EARLY LIFE STRESS ON CENTRAL OXYTOCIN IN LONG-EVANS RATS, Hannah Lapp, *University of Massachusetts, Boston, United States* E-mail: hannah.lapp001@umb.edu

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Mother-infant interactions during early life are fundamental in shaping neurobiological circuits underlying social-emotional behavior across the lifespan. Oxytocin (OT) has not only been implicated in adult hypothalamic-pituitary-adrenal (HPA) regulation, but is thought to facilitate typical mother-infant interactions in young rats. We investigated the impact of low bedding/nesting material, a model of chronic early life stress that induces fragmented maternal care, on the development of central OT systems related to HPA regulation. Long-Evans dams received standard bedding or reduced bedding on postnatal day (P) 2-14 and maternal behavior was assessed. Immediate (P15) and enduring (P70-80) outcomes in offspring include number of OT-expressing (OT-ir) cells in hypothalamic paraventricular (PVN) subnuclei (magnocellular, parvocellular) and oxytocin receptor immunoreactive (OTR-ir) cells in the PVN, amygdala (central amygdala, basolateral amygdala), and hippocampus (CA3, dentate gyrus). There was no effect of early experience on total PVN OT-ir cells at P15 ($p>.05$). In adulthood, control males and females showed similar levels of total OT-ir cells in the PVN, and early life stress increased OT-ir cells in females and decreased OT-ir cells in males (all $p<.05$). Adult females had more OTR-ir cells in the PVN and CA3 compared to males, with no effect of early experience ($p<.05$). Finally, early life stress increased the number of OTR-ir cells in the basolateral amygdala in adult females, but not males ($p<.05$). These data demonstrate sex-specific effects of early life stress on central OT that vary by region and developmental stage with possible implications for HPA regulation and social behavior across the lifespan.

P2-37

FEAR SPECIFIC ATTENTIONAL BIASES IN PRESCHOOL AGED CHILDREN,

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Background: Prioritized processing of salient and biologically relevant information shapes functional specialization throughout early development. Little is known about the minimal amount of information needed to bias visual attention.

Method: One hundred and two typically developing children aged 36-66 months participated in a variant of a Posner spatial cuing task, in which the competing cues were briefly presented (24 ms) within the parafoveal visual field and backward masked (126 ms). Facilitation and cost due to cue-target congruent/incongruent trial-types were captured via eye tracking (Tobii TX 300). Cue combinations included 1) a fearful face and a gaussian filtered scrambled version of the fearful face; 2) a fearful face and the same fearful face inverted; 3) a fearful face and the same identify showing a neutral expression. Cue combinations were randomly assigned between-subjects, such that approximately a third of the participants viewed each presentation.

Results: Repeated measures 2 (salient cue location – always the fearful face) by 2 (target location) ANOVA's revealed significant cue X target interactions in the fear vs scrambled condition ($F(1, 33)=87.11$, $p<.001$) and neutral conditions ($F(1,28)=38.11$, $p<.001$). Analysis of the inverted condition is ongoing.

Conclusion: Preschool aged children show an attentional bias for fear-specific facial information, even when that information is presented for 24 ms and backward masked. These results suggest the minimal amount of information needed to bias visual attention reported to date, and may represent a marker task of amygdala circuit function in preschool aged children.

P2-84

THE ROLE OF BOUNDARIES IN SPATIAL COGNITION: A COMPARATIVE APPROACH, Sang Ah Lee, *Korea Advanced Institute of Science and Technology, Korea, Republic of* E-mail: sangah.lee@kaist.ac.kr

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Due to its striking similarity across species, its richness in representation, and its well-defined neural basis, spatial cognition provides a unique window into the origins of complex behaviors and memory. In this talk, I will discuss one of the major inputs to spatial representation – environmental boundaries. I will start by reviewing evidence of boundary-based navigation behavior in young children and argue that the cognitive mechanisms underlying such behaviors are shared across vertebrates. I will then present a recent study of electrophysiological signatures of boundary coding in the human subiculum, the region of the hippocampal formation in which boundary cells have been found in rodents. Through direct intracranial EEG recordings from subjects navigating in a virtual environment, our findings support the hypothesis that neural representation of environmental boundaries is an evolutionarily ancient process that serves as the foundation for spatial cognition and memory.

P2-38

RECOVERY MATTERS: INVESTIGATING THE FULL PHYSIOLOGICAL RESPONSE PROFILE IN RELATION TO MARKERS OF PSYCHOPATHOLOGY,

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Keira Leneman, University of Minnesota; Alyssa Palmer, University of Minnesota; Daniel Berry, Institute of Child Development, University of Minnesota; Rebecca Distefano, University of Minnesota; Amanda Grenell, University of Minnesota

Flexible modulation of the Autonomic Nervous System (ANS) allows us to adapt to changing environmental demands. Several theoretical models highlight the particular importance of the parasympathetic branch of the ANS in this process (e.g., Porges et al., 1996; Thayer & Lane, 2009)—often measured via respiratory sinus arrhythmia (RSA), an indicator vagal control of the heart. Decreasing RSA to challenge tasks and maintaining high baseline RSA levels has been proposed as a biological pillar of self-regulation and social engagement (Porges et al., 1996). Lower baseline RSA and either hypo- or hyper-reactivity has been linked theoretically and empirically to psychopathology (e.g, Beauchaine et al., 2007). The majority of the extant work, however, has implicitly ignored profiles of PNS return to equilibrium. This recovery process is a vital aspect of PNS dynamics and has been receiving increased attention (Obradovic & Finch, 2016; Ji et al., 2015). In a pilot sample of 4- to 6-year-olds (n = 24), we investigated parasympathetic responsivity across a sequence of tasks designed to elicit PNS reactivity and recovery. Using piecewise growth models to estimate children's RSA trajectories across the tasks, we found that the expected RSA decrease (from baseline) in the context of a frustrating task was evident, irrespective of children's parent-reported behavioral problems. In contrast, there were noteworthy differences in RSA recovery; Children with lower levels of parent-reported externalizing tended to more rapidly recover toward baseline levels. These results highlight the importance of incorporating recovery into the measurement and analysis of physiological responsivity.

AS-4

Senior Investigator Award: EXPLORING THE PRENATAL ORIGINS OF PERCEPTUAL AND SOCIAL DEVELOPMENT, **Robert Lickliter**, Florida International University, Miami, United States

Little is known regarding the role of prenatal experience in the emergence and facilitation of perceptual or social development. Our lack of knowledge in this area is due in part to the restricted experimental manipulations possible with mammalian fetuses. In this talk I review my lab's research program using avian embryos and hatchlings to explore how developmental influences during the prenatal period guide and constrain postnatal perceptual and social development. I discuss the importance of linking the prenatal environment to postnatal outcomes in terms of how biologists and psychologists conceptualize "innate" or "instinctive" biases, preferences, and skills in infancy and beyond.

P2-39

EPIGENETIC CHANGES IN HPA AXIS ASSOCIATED WITH INSTITUTIONAL REARING AND BEHAVIOR PROBLEMS IN YOUNG CHILDREN, Rebecca Lipschutz, *University of Houston, United States* E-mail: rslipschutz@uh.edu

Rebecca Lipschutz, University of Houston; Johanna Bick, ; Oxana Naumova, University of Houston, TIMES; Elena Grigorenko, University of Houston; Marina Zhukova, University St. Petersburg; Irina Ovchinnikova , University St. Petersburg

Early environmental conditions are known to influence epigenetic patterns in the HPA axis. The present study examined associations between institutional rearing, DNA methylation in the HPA axis and child behavioral outcomes. We tested the association between institutionalization duration and methylation at CpG sites in HPA axis related genes, CRH (Corticotropin Releasing Hormone), a hormone secreted by the hypothalamus, and its receptor CRHR1 (Corticotropin Releasing Hormone Receptor 1), NC3R1 (Glucocorticoid Nuclear Receptor Variant 1), a glucocorticoid receptor, and FKBP5 (FK506 Binding Protein 5) a protein that modulates glucocorticoid receptor activity. Analyses revealed institutionalization duration was significantly associated with 8 CpG sites in CRH and CRHR1 (*p*s < .05). Longer institutionalization was associated with increased methylation in CpG sites CRH cg03405789, cg08215831, cg21240762, cg21878188 and CRHR1 cg24394631, cg27503360, and decreased methylation in CRH cg16664570 and CRHR1 cg16642545. The CpG sites associated with institutionalization duration were tested for associations with child behavior. Of the 8 CpG sites tested, 3 CpG sites were found to predict more negative child outcomes (*p*s < .05). Increased methylation in CRH cg21240762 predicted increased child dysregulation and irritability, and increased methylation in CRH cg21878188 and CRHR1 cg24394631 predicted decreased positive affect, communication and social skills. Overall, results show longer durations of institutionalization in early childhood were associated with increased methylation at CpG sites on CRH and CRHR1 that also predicted increased behavior problems in children. Thus, epigenetic changes in the HPA axis may indicate a mechanism by which early caregiving experiences are biologically embedded and impact children's behavior.

P2-40

FRONTAL EEG ASYMMETRY MODERATES THE ASSOCIATIONS BETWEEN NEGATIVE TEMPERAMENT AND BEHAVIORAL PROBLEMS DURING MIDDLE CHILDHOOD, **Ran Liu**, *Virginia Tech, United States* E-mail: ranl@vt.edu

Ran Liu, Virginia Tech; Martha Ann Bell, Virginia Tech

Evidence from numerous longitudinal studies has demonstrated that shyness and impulsivity significantly predict internalizing problems (IP) and externalizing problems (EP) respectively (e.g., Leve, Kim, & Pears, 2005). One important moderator that may affect the associations, however, has received less attention during middle childhood: frontal EEG asymmetry (FA). We focus on how FA moderates the shyness-IP and the impulsivity-EP relationship. 186 children (94 boys, 92 girls) participated in the study. At age 6, temperament was measured using the Children's Behavior Questionnaire. At age 9, behavioral problems were measured via the Child Behavior Checklist, and baseline (i.e., neutral film) EEG was recorded for 2 minutes. FA was calculated by subtracting left ln EEG power (F3) from right ln EEG power (F4; Fox, 1994). We followed recommendations (McClelland & Judd, 1993) to probe interaction terms at p-values of .10 and lower. FA significantly moderated the association between shyness and IP controlling for EP ($b = -5.85$, $\beta = -.44$, $p = .07$). Specifically, shyness significantly predicted IP only when children had right FA ($b = 2.36$, $p = .00$) but not left FA ($b = .26$, $p = .74$). FA significantly moderated the association between impulsivity and EP controlling for IP ($b = 5.48$, $\beta = .47$, $p = .09$). Specifically, impulsivity significantly predicted EP only when children had left FA ($b = 3.10$, $p = .00$) but not right FA ($b = 1.13$, $p = .15$). This suggests that FA functions differently with different risk factors in predicting behavioral problems.

P1-23

INFANT FRONTAL EEG, MATERNAL SENSITIVITY, AND TODDLER INHIBITORY CONTROL PREDICT PRESCHOOL BEHAVIORAL REGULATION, **Tatiana Garcia-Meza**, *Virginia Tech, United States* E-mail: tgarcia@vt.edu

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When children exhibit early difficulties with behavioral regulation (i.e., non-compliance and frustration), they are more likely to develop externalizing (Kuczynski & Kochanska, 1990) and internalizing (Kochanska & Aksan, 1995) behaviors, as well as have problems with academic achievement (Howse et al., 2003) and peer relationships (Ladd, 1990). Multiple processes, including parental behaviors, child brain functioning, and child cognition, contribute to the development of behavioral regulation. For example, when mothers display fewer controlling behaviors and are more sensitive (MS), toddlers subsequently are more compliant (Braungart-Rieker et al., 1997). Also, frontal EEG coherence during infancy is predictive of toddler inhibitory control (IC; Whedon et al., 2016) and greater right frontal activation during infancy is indirectly associated with greater behavioral regulation at age 3 through attentional control (Swingler et al., 2016). We observed 266 mother-child dyads longitudinally. At age 4, behavioral regulation was coded during an interaction task with mother. We hypothesized that infant EEG coherence, toddler MS, and age 3 IC would predict age 4 behavioral regulation. We hypothesized indirect effects from infant EEG and MS to behavioral regulation through IC. We tested our hypotheses with MPlus using full information maximum likelihood (FIML). The hypothesized model fit the data, $\chi 2$ (1, N= 266) = 1.53, p = .2164, CFI = .98, RMSEA = .045 [CI = .00, .02, SRMR = .015]. Infant right frontal EEG coherence (p = .043) and toddler MS (p = .052) indirectly predicted behavioral regulation through IC. Findings suggest multiple influences as children develop self-regulation.

P1-39

SLEEP DURATION IN PRESCHOOLERS RELATES TO BASELINE EEG BETA POWER AND EMOTIONAL DYSREGULATION., Diana Lopera-Perez, *Boston University, Universidad del Norte, United States* E-mail: dlopera@bu.edu

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Both too much and too little sleep have a negative impact on brain structure (Kocevska et al., 2016). Sleep is also critical to emotion regulation. Little is known about the relationship of sleep duration, emotion dysregulation, and spontaneous neural activity in early childhood, a period of rapid neural development. We assessed 83 children (35 girls, M = 4.16 years), collecting two minutes of baseline EEG across four frequency bands (4-6 Hz, 6-9 Hz, 21-29 Hz, 30-48 Hz). Parents reported on child habitual nighttime sleep duration and emotion dysregulation, indexed by the anger and frustration subscale of the Child Behavior Questionnaire. Using repeated measures ANOVA, we found an interaction of sleep duration with hemisphere and region in the 21-29 Hz beta band ($F(2.86, 191.51)=2.85$, $p = .041$). Follow-up analyses indicated this was specific to the right hemisphere ($F(3.06, 205.12) = 2.65$, $p = .049$), where longer sleep duration related to lower beta activation in frontal ($r = –.280$, $p = .02$), central ($r=–.383$, $p = .001$), temporal ($r = –.273$, $p = .023$), and parietal ($r = –.247$, $p = .041$) regions, which suggests less mature neural activity. Longer parent-reported sleep duration may reflect lack of sleep efficiency, explaining its connection to less mature neural activity. Emotion dysregulation was associated with shorter nighttime sleep duration, ($r = –.331$,$p = .005$), consistent with studies of adults showing insufficient sleep impacts emotional processing, but was independent of baseline EEG. Direct measures of sleep efficiency and multimodal assessment of emotional dysregulation could provide further insight into the interplay of sleep and emotion with spontaneous neural activation in early childhood.

P1-81

CREATING A COMPUTER-ASSISTED METHODOLOGY FOR DEVELOPMENTAL ANALYSES ON MULTITASKING COSTS IN SPEED AND ACCURACY, **Joseph Lou**, *Oxford Academy, United States* E-mail: joseph.d.lou@gmail.com

Joseph Lou, Oxford Academy

Due to limitations in previous methods, there has been no systematic, developmental analysis on task-switching costs in speed and accuracy during multitasking. The purpose of this study was to develop a computer-assisted methodology by creating a web-based Multitasking Test (MTT) program to test a large sample of diverse participants on task-switching costs across age and gender groups. The MTT program allowed subjects (N = 1,004) to conduct 6 pattern-matching tasks with playing cards (with 20 trials per task) including 3 simple and 3 complex tasks. Data from subjects aged 6-45 were analyzed, and results indicated that (a) high schoolers, who have been reported to multitask the most, took 95% more time and made 120% more errors when multitasking than when performing single tasks separately; (b) the 22-25 age group performed the best among all groups, consistent with previous neuroscience findings that the human brain does not reach maturity until 24 years old; (c) there were significant gender differences ($p < .001$) in switching costs in speed for complex tasks, potentially explained by gender differences in the structural connectome of human brains. This study presents an innovative, computer-assisted methodological design and demonstrates how multitasking has switching costs across all age and gender groups regardless of prior experiences and education level. In addition to presenting strong empirical data that support the Cognitive Load Theory, it also provides a reliable multitasking paradigm for further studies in cognitive science, developmental psychology, and neuroscience.

P1-40

SPATIAL STRUCTURE OF MOBILE INFANTS' VISUAL EXPERIENCES IN NATURAL INTERACTION WITH CAREGIVERS AND OBJECTS, Chuan Luo,
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Chuan Luo, University of California Riverside; John Franchak, UC Riverside

Previous studies have demonstrated that posture affects infants' visual input. While prone, infants look less at faces and toys compared with when they are sitting or upright (Franchak et al., in press; Kretch et al., 2014). The current study expands on past work by investigating the spatial structure of infants' visual experiences in different postures. How does posture alter the location of faces and toys in infants' field of view? Where are faces/toys located in infants' field of view when infants choose to look at faces/toys? In the current study, 12-month-olds wore head-mounted eye trackers and played freely with caregivers and toys in a room. Infants' first-person field of view and eye movements were recorded. Human coders identified the location of faces and toys in field of view videos, and eye movement data determined when infants looked at each face/toy location (looking episodes). Results showed that faces and toys had relatively higher position in the view when infants were prone but were better centered in view when infants were sitting and upright. Across postures, faces were generally distributed at the top of view while toys were at the bottom. However, both types of targets were better centered during looking episodes compared to non-looking episodes regardless of posture. These findings revealed that although posture constrains infants' visual experiences, infants' decisions to look at targets compensate for postural constraints by bringing information to the center of view.

P1-41

ARMS FREE SITTERS PERFORM MORE BIMANUAL OBJECT COMBINATIONS, THAN PROP SITTERS, Emily Marcinowski, *Virginia Commonwealth University, United States* E-mail: ecmarcinowski@gmail.com

Emily Marcinowski, Virginia Commonwealth University; Julie Campbell, Illinois State University; Duangporn Pattanakul, Illinois State University; Stacey Dusing, Virginia Commonwealth University

The development of sitting changes how infants interact with their environment. Infants who can sit without use of their arms can explore objects more effectively using their hands, than infants who must sit using their hands for stabilization. Bimanual object combination, or actions where multiple objects are manipulated together using both hands, provides infants with sensory information on object relations unique from single object or unimanual manipulation. The purpose of this analysis was to determine if arms-free and prop sitters differ in their use of bimanual object combinations. Arms-free sitters are predicted to perform more bimanual object combinations across time, than prop sitters. Infants younger than 7 months (n=36) were recruited at sitting emergence. Infants were grouped into their sitting stage at the baseline visit (prop, arms-free). Across 6 visits (baseline, 3 weeks later, 6-8 weeks later, 3 months later, 6 months later, 12 months later), infants were video-recorded interacting with 6 building sets. Coders marked frequencies of object combinations and which hand(s) performed each combination. Preliminary analyses using multilevel modeling (n=30) on the first 3 visits found that arms-free sitters performed more bimanual object combinations at the 6-8 week visit ($\beta 0=2.14$, $p=0.02$), than prop sitters. No group differences were found for the baseline or 3 weeks visits ($ps>0.05$). Future analyses will use the full sample of infants, explore how hand use for object combination changes in the year following sitting emergence, and test whether these groups still exhibit unique trajectories. [IES grant (NCT02593825)-SCD; CHOR grant (647408)-SCD,ECM; VCU Postdoc grant-ECM]

P2-43

EFFECTS OF SOCIAL-EMOTIONAL DEPRIVATION AND EARLY INTERVENTION ON INFANT DNA METHYLATION, Christiana Martin, *University of Delaware, United States* E-mail: cmartin@psych.udel.edu

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Early deprivation affects the development of regulatory systems, including systems that regulate stress and emotions. Institutional care represents a particularly extreme form of deprivation that has been shown to have pernicious effects on children's regulatory systems. Enhancing the caregiving environment can potentially mitigate the adverse effects of risk on infant self-regulation, but little is known about alterations to gene regulation following removal from institutional care. The current study examines the impact of improved caregiving environment on DNA methylation in infants who experienced orphanage care in St. Petersburg, Russia. Participants include 30 infants who were transitioned from orphanage care to foster care, 30 infants who remained in orphanage care, and 30 infants who were raised in their biological families. Infants placed with Russian foster families received either an intervention designed to increase caregiver sensitivity or a control intervention, and DNA methylation was measured from saliva samples collected pre- and post-intervention when children were between 8 and 48 months of age. Samples were also collected at equivalent intervals for orphanage care and biological family participants. Methylation was assessed via direct bisulfite sequencing of CpG sites within BDNF, FKBP5, and NR3C1. Data collection is ongoing. We hypothesize that children in foster care will demonstrate alterations in DNA methylation of BDNF, FKBP5, and NR3C1 between pre- and post-intervention time points compared to their peers who remained in the orphanage and children raised in biological families.

P2-44

RELATIONSHIP BETWEEN STEREOTYPIC MOVEMENT DISORDER AND OBSESSIVE COMPULSIVE DISORDER, Karli Martin, *Albizu University, United States* E-mail: kmartin200@sunmail.albizu.edu

Karli Martin, Albizu University; Isaac Tourgeman, Albizu University

The current study sought to explore the relationship between Stereotypic Movement Disorder (SMD) and Obsessive- Compulsive Disorder (OCD), with emphasis on manifestation of repetitive behaviors. A systematic review of the literature was conducted. Key words included “stereotypic movement disorder”, “brain structures”, “treatment”, “obsessive compulsive disorder”, “diagnosis”, “diagnostic criteria”, “primary stereotypies”, and “neuropsychology”. Inclusion criteria was peer review and academic journal or textbook. Studies were excluded if they focused on tic disorder or movement disorder not related to SMD. Twelve studies were retained. In total, 146 children and adolescents were involved in the empirical articles reviewed, ranging from 4 to 18 years of age. The disorders were explored through self- report measures, interviews, and neuroimaging. Across the studies the following themes were revealed: those with SMD engage in repetitive behaviors in order to relieve a level of anxiety, with onset around 17 to 24 months, and individuals can learn to control their behavior through behavioral intervention, similar to OCD. Neurological findings across both disorders in the orbitofrontal cortex, cortico-striato-thalamo-cortical (CSTC) circuitry, anterior cingulate, and the basal ganglia were revealed. Similarities across brain regions identified suggested a deeper relationship between the SMD and OCD. Findings also indicated that stereotypic behaviors act as coping mechanism that may present before any identifiable anxiety or obsession. However, It remains possible that SMD may be diagnosed in a child displaying stereotypic movements as a means to alleviate tension, with a subsequent diagnosis of OCD later in life as an obsession becomes more apparent.

P1-42

HUMAN AND MONKEY INFANT ATTENTION TO DYNAMIC SOCIAL AND ABSTRACT STIMULI, SARAH MAYLOTT, *University of Miami, United States* E-mail: smaylott@bellsouth.net

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Social stimuli are vital sources of information for primates. Human infants show a decline in social looking between 3-6 months old, but a rise at 6-12 months old. The current study longitudinally examined the developmental trajectories of social attention in human and macaque infants, providing a baseline for this pattern of social development.

Human infants aged 2-13 months (N = 69) and macaque infants aged 1-6 months (Macaca mulatta; N = 55) viewed two side-by-side 30-second videos—one social (conspecifics interacting) and one non-social (spinning disk)—while we tracked their visual attention with eye-tracking. We measured their proportion of attention to the social video out of the total time looking to both videos.

For both human and macaque infants, Social preference changed with age (ps < .001). However, every 1-month increase in human infants' Age showed a 0.10 decrease in Social preference, whereas every 1-month increase in macaque infants' Age showed a 0.09 increase in Social preference. Moreover, human infants displayed a quadratic effect of Age ($p < .001$), meaning that the rate of decrease in Social preference was slowing over time. This nonlinear trajectory, compared to macaques' positive linear development, suggests that humans may develop social attention in a more complex manner.

Social attention might not develop in isolation and may be influenced by motor development. A dynamic view of development could explain why we observed different patterns in macaque infants, who develop motor skills around four times faster than human infants.

P2-45

POLYGENIC RISK MODERATES INFLUENCE OF MATERNAL PRENATAL STRESS ON OFFSPRING INTERNALIZING SYMPTOMS AT AGE 20, **Brooke McKenna**, *Emory University, United States* E-mail: brooke.gavin.mckenna@emory.edu

Brooke McKenna, Emory University; Patricia Brennan, Emory University; Constance Hammen, UCLA

Background: Offspring of mothers with major depressive disorder (MDD) are at an elevated risk for internalizing psychopathology. This intergenerational transmission can be partially attributed to genetic liability, and the biological influences of maternal prenatal depression may also play an important role. Animal studies indicate that the influence of prenatal stress exposure varies by offspring's genetic risk, but we still know little about these moderating effects.

Objective: The present study aims to examine the interaction of maternal prenatal stress with offspring polygenic risk to predict offspring internalizing symptomatology at age 20.

Methods: 369 mother-child dyads participated in a prospective, longitudinal study spanning from pregnancy until offspring were 20 years of age. Maternal stress was measured with the Reeder Stress Inventory and offspring internalizing symptomatology was examined using the ASEBA Adult Self-Report. Polygenic risk was defined by a multilocus genetic profile score (MGPS) reflecting accumulated risk from four candidate risk genes: CRHR1, FKBP5, NR3C1, and BDNF.

Results: Maternal prenatal stress was significantly associated with offspring internalizing symptoms at age 20 ($p=0.01$). This relationship was moderated by MGPS ($p=0.03$), such that offspring with high genetic risk were more likely to exhibit internalizing symptoms following maternal prenatal stress than offspring with low genetic risk. No individual risk gene exhibited a significant moderating effect.

Conclusion: The predictive utility of polygenic risk outweighs the utility of individual candidate genes. By employing a mulitlocus approach, we identified an interaction between prenatal stress and genetic risk to predict internalizing symptoms in early adulthood.

P1-43

THE POWER OF INTERSTIMULUS INTERVAL: USE OF PREPULSE INHIBITION FOR THE ASSESSMENT OF TEMPORAL PROCESSING IN RODENTS, Kristen McLaurin, *University of South Carolina, United States* E-mail: mclaurik@email.sc.edu

Kristen McLaurin, University of South Carolina; Charles Mactutus, University of South Carolina; Rosemarie M. Booze, University of South Carolina; Hailong Li, University of South Carolina

Temporal processing deficits have been implicated as a potential elemental dimension of higher-level cognitive processes commonly observed in neurocognitive disorders. Despite the popularization of prepulse inhibition (PPI) in recent years, current protocols promote using a percent of control measure, precluding the assessment of temporal processing. However, the classical approach for the analysis of PPI, relying upon the manipulation of interstimulus interval (ISI; i.e., the time between the prepulse and the startle stimulus) has multiple advantages over the popularized approach. Here, we use cross-modal PPI to demonstrate the utility of the classical ISI approach to delineate effects of sensory modality, biological sex, psychostimulant exposure, and age. Examination of cross-modal PPI revealed a non-monotonic function that is quadratic in nature. Assessment of sensory modality, biological sex and psychostimulant exposure reveal the utility of the classical ISI approach to establish the shape of the ISI function, including increases (sharper curve inflections) or decreases (flattening of the response amplitude curve) in startle amplitude. Additionally, shifts in peak response inhibition are often revealed, evidenced by a prominent shift dependent upon sensory modality (i.e., auditory prestimulus: 100 msec; visual prestimulus: 50 msec). Calculation of the area of the inflection of the auditory startle response amplitude curve allows for the direct assessment of the progression of temporal processing across development. Thus, the classical approach affords a critical opportunity to evaluate temporal processing, which may serve as an innovative diagnostic screening tool and predictive biomarker for neurocognitive disorders. Funded by NIH grants DA013137, HD043680, MH106392, NS100624.

O1-3

PRENATAL MATERNAL STRESS PREDICTS TODDLER CORTISOL PROFILES AND CHILDHOOD ANXIETY SYMPTOMS: THE QF2011 FLOOD STUDY, **Mia Mclean**, *The University of Queensland, Australia* E-mail: mia.mclean@uqconnect.edu.au

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Researchers have linked prenatal maternal stress (PNMS) to childhood anxiety symptoms. Disturbances to environmental factors during pregnancy including PNMS exposure, are hypothesized to influence fetal biological systems including the hypothalamo-pituitary-adrenal (HPA)-axis, enhancing susceptibility to emotional problems, such as anxiety. To date, no study has determined whether alterations to HPA-axis function explains the link between PNMS and childhood anxiety development.

The Queensland Flood study (QF2011) investigated whether the association between aspects of flood-related PNMS and child anxiety symptoms at 4- and 6-years was explained by toddler (16 month) HPA-axis dysregulation; and whether the association was moderated by timing of the stressor and child sex.

Soon after the event, women who were pregnant during the 2011 Queensland flood completed recruitment questionnaires (N=230) regarding their objective hardship (e.g. loss of personal property), their subjective emotional reactions (post-traumatic like symptoms) and cognitive appraisal of the disaster. Toddler HPA-axis functioning was measured by a diurnal salivary cortisol profile (N=89). At 4- (N=114) and 6-years (N=124), mothers completed the Spence Preschool Anxiety Scale.

Preliminary results of mediation analyses showed that greater maternal subjective PNMS exposure predicted greater cortisol secretion across the day in the toddlers, which predicted greater anxiety symptoms at 4-, but not 6- years. Greater subjective PNMS exposure also predicted greater cortisol awakening responses in toddlers, leading to greater 4- but not 6-year anxiety symptoms. Associations were not moderated by timing of the stressor or child sex.

This is the first study to establish the involvement of the HPA-axis in the development of early childhood anxiety following disaster-related PNMS exposure.

P1-44

DEVELOPMENT OF INTERSENSORY PERCEPTION OF SOCIAL EVENTS: LONGITUDINAL TRAJECTORIES ACROSS 6-24 MONTHS OF AGE, Myriah McNew, *Florida International University, United States* E-mail: mmcne009@fiu.edu

Myriah McNew, Florida International University; Lorraine Bahrick, Florida International University; James Todd, Florida International University; Elizabeth Edgar, Florida International University

Intersensory perception—coordinating stimulation across multiple sensory modalities— guides attention to unitary multimodal events and provides a foundation for language and social development (Bahrick & Lickliter, 2012). Intersensory perception develops rapidly across infancy. However, until recently, the development of intersensory skills has been characterized by group-level data (intermodal preference, habituation). Thus, relative competencies of individual children and developmental pathways to outcomes remain poorly understood.

The Intersensory Processing Efficiency Protocol (IPEP; Bahrick et al., 2018) was developed to address this gap. It is a fine-grained, individual-difference measure of intersensory processing appropriate for nonverbal participants. Participants view a 2x3 grid of 6 dynamic visual events (women speaking), one in synchrony with its natural soundtrack (target event) across 24 trials. The present study assessed developmental trajectories of intersensory accuracy (locating and fixating target event) using SEM-based latent growth curve modeling.

The IPEP was administered to 94 infants longitudinally at 6, 12, 18, and 24 months of age. Two measures of intersensory accuracy were calculated: matching (proportion of total looking time to target; PTLT) and selection (proportion of trials on which the target was fixated; PTTF). Results indicated significant increases in accuracy across age. Intersensory matching exhibited significant quadratic growth, b = .009, SE = .004, p = .043, and intersensory selection exhibited significant linear growth, b = .042, SE = .007, p4.06, ps>.13).

Findings provide some of the first evidence of longitudinal growth in intersensory processing across infancy. Future research will use individual trajectories to predict children's social and language outcomes.

P2-46

INATTENTION AND HYPERACTIVITY SYMPTOMS IN ADOLESCENT MOTHERS. DO THEY INCREASE RISK OF TEENAGE PREGNANCY?, Francisco Meillon, *Universidad Panamericana, Mexico* E-mail: fjmeillon@gmail.com

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Background: Adolescent pregnancy is one of the health issues that remain unattended in undeveloped countries, such as Mexico. ADHD implies inattention and hyperactivity-impulsivity behaviour. These, in adolescence, can lead to risk conducts such as early sexual relations that can end up in teen pregnancy. Objective: To compare inattention and hyperactivity among adolescents with (case group) and without (control group) history of pregnancy. Method: Transversal study where sociodemographic record and questionnaire Scale for Attention Deficit (ADD) for Neuropsi battery were applied. The DDA was answered by adolescents, a close relative (parent or spouse), and a teacher for the ones that still go to school). After that, a statistical analysis was made with the Student t test and logistic regression analysis between inattention and hyperactivity symptoms, sociodemographic variables and teen pregnancy. Results: Sixty female subjects were recruited (30 case group and 30 control group), 17.4 years' average (DE±1.3) case group and a16.9 (DE±0.1) years (control group). From the outsider point of view (parents and teachers), the case adolescents show more symptoms of inattention (p=0.023) and a higher global score of inattention and hyperactivity (p=0.025). Global scores of outsider point of view of the DDA were significant associated with teen pregnancy (OR=1.11, IC95%= 1.01-1.24, p=0.036). Conclusions: Inattention and hyperactivity symptoms could be another associated factor with teenage pregnancy.

P1-45

LINKS BETWEEN PARENT AND CHILD RESPONDING TO EMOTIONAL CUES,

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The ability to regulate emotions is critical to psychological health in both children and adults. Cognitive reappraisal is one such affective regulation strategy that utilizes deliberate reinterpretation of an affective stimulus to alter its emotional impact. A recent large cohort study of adult twins found that cognitive reappraisal is only moderately heritable and not predicted by shared environmental factors, raising questions about the role that parents play in their children's acquisition of emotion regulation strategies. However, these findings have been under-explored, particularly in developmental samples, as cognitive reappraisal skills undergo protracted development across childhood and adolescence. We examined the relationship between parent and child affective response to emotionally salient stimuli in a sample of previously institutionalized (PI) and non-PI youth during a cognitive reappraisal task. 27 parent-child dyads (14 PI youth, 17 females, age range 9.92-17.92, SD age 2.3 years) participated in a cognitive reappraisal task designed to assess emotion regulation across development. Average parent affective rating across all trial types was strongly correlated with average child affective rating ($r^2=.344$, $p < .001$), suggesting a potential relationship between parental emotional response to negative and neutral stimuli and equivalent responses in their children. Future inquiry in this sample will include investigation of concurrently collected fMRI data and interactions between cognitive reappraisal in parent-child dyads from the PI and non-PI groups in order to examine variable contributions of biological and environmental influences (including early life stress) on adaptive emotional behaviors during development.

S3-5

AGE DIFFERENCES IN THE IMPACT OF SAFETY SIGNALS ON FEAR EXPRESSION AND REGULATION, Heidi Meyer, *Weill Cornell Medicine, United States* E-mail: hem2022@med.cornell.edu

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Evidence from both humans and animals has indicated that adolescents are sensitive to threat, and that fear is easily generalized and retained during this developmental stage. Moreover, although the emergence of anxiety disorders is highly prevalent in developing populations, conventional behavioral treatments are ineffective for a notable percentage of adolescents. An understanding of the development of fear acquisition and regulation is therefore necessary to optimize alternate behavioral treatments better suited for this period. Previously, mitigating elevations in fear responding during adolescence has only been possible through increased exposure to extinction protocols, or pharmacological intervention. However, safety learning may provide a unique avenue to address this issue. Safety signals are stimuli that predict the explicit absence of an aversive outcome and can modulate fear responding through a process known as conditioned inhibition. Our lab has recently carried out a series of studies in mice considering the ontogeny of safety learning and the extent to which safety signals are capable of modulating, or inhibiting, fear during adolescence. Notably, our lab has recently obtained evidence that exposure to safety signals can augment the rate of extinction learning in adolescents, inducing marked improvements in fear regulation relative to conventional extinction training. In addition, our data suggest age differences in how the ‘safe’ properties of a safety signal are formed and maintained. By utilizing techniques that assess brain circuit-specific activity in tandem with behavioral assays, we have also begun to investigate the mechanism by which safety signals gate the expression of fear behaviors.

P1-46

INFANT HANDEDNESS: DEVELOPMENTAL CASCADE OR SERIAL HOMOLOGY?, George Michel, *University of North Carolina-Greensboro, United States* E-mail: gfmichel@uncg.edu

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Infants can exhibit hand preferences for a wide variety of manual actions: acquiring objects, manipulating them, manual gestures like pointing, tool-use. Although the preferences appear at different ages, they are relatively consistent across skills and could be the manifestation of a single underlying factor (a serial homology). Or, each preference could be the consequence of a preceding preference (a cascade). Four trajectories of manual preference development for object acquisition have been identified in 380 infants during the 6 to 14-month age period: early right, early left, late right, and no preference. Although these trajectories are not related to concurrent locomotion or neuromotor development, the trajectories for object acquisition predict the trajectories of hand preferences for unimanual object manipulation (banging, shaking, rotating). The present study examines the relation of the 6-14-month trajectories of hand preference for object acquisition to the development of a hand preference for role-differentiated bimanual manipulation of objects (RDBM) at 13 and 14 months (first appearance of reliable hand preferences for this skill). Hand preferences were assessed monthly using 25 actions to identify both an object acquisition preference and a RDBM preference (using separate toys and presentations). All actions were video-recorded for coding hand-use. Hand preference for object acquisition at 13 and 14 months weakly predicted concurrent hand preferences for RDBM. However, the trajectory of hand preference for object acquisition better predicted RDBM hand preferences, a result that is more consistent with hand preference development exhibiting a cascading pattern rather than a pattern of serial homology.

O1-2

DEVELOPMENTAL EXPOSURE TO FLUOXETINE (PROZAC) INCREASES ANXIETY- AND DEPRESSIVE-LIKE BEHAVIOURS AT ADOLESCENCE AND ALTERS GLUTAMATERGIC MARKERS IN THE PREFRONTAL CORTEX AND HIPPOCAMPUS, **Sam Millard**, *Illawarra Health and Medical Research Institute, University of Wollongong, Australia* E-mail: sjlm995@uowmail.edu.au

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~10% of pregnancies are prescribed antidepressants, most commonly the selective serotonin reuptake inhibitor (SSRI). Human studies suggest that SSRI treatment during pregnancy may increase offspring risk for neurodevelopmental disorders. Human studies however are confounded by the difficulty of separating the effects of maternal depression from that of SSRI exposure.The aim of this study was to evaluate the effects of maternal Fluoxetine treatment on offspring behaviours and neurobiology of relevance to neurodevelopmental disorders, using a rodent model of depression. Sprague-Dawley (SD) and Wistar-Kyoto (WKY; depression model) dams were treated with Fluoxetine (10mg/kg/day) or vehicle, from gestational day 0 until postnatal day 14. Once offspring reached adolescence, behaviour was assessed using the elevated plus maze (EPM) and forced swim test (FST) (n=14/group), after which brains were collected for immunoblot analysis.Fluoxetine-exposed offspring exhibited increased anxiety- and depressive-like behaviours in measured parameters of both the EPM and FST. Additionally, Fluoxetine exposed offspring exhibited reduced relative protein levels of NMDA receptor subunits, NR1 (-12%, $p < 0$ .05) and NR2A (-13%, $p < 0$ .05) in the prefrontal cortex and reduced levels of PSD95 in both the PFC (-17%, $p < 0$ .05) and hippocampus (-18%, $p < 0$ .05) at adolescence. The effects of maternal fluoxetine treatment on offspring were largely independent of strain.Our results demonstrate that maternal SSRI exposure has the potential to alter the neurobiology and behaviour of exposed offspring at adolescence, irrespective of the presence of innate depressive phenotypes. Further studies in various models of maternal depression are required to establish the effects of Fluoxetine exposure on the developing brain.

P2-47

DIFFERENTIAL INVOLVEMENT OF AMYGDALAR NMDA RECEPTORS ACROSS VARIANTS OF CONTEXTUAL FEAR CONDITIONING IN ADOLESCENT RATS, Lauren Miller, *University of Delaware, United States* E-mail: lmiiller@udel.edu

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In standard contextual fear conditioning (sCFC), learning of the context and formation of the context-shock association occur in the same training session whereas in the context preexposure facilitation effect (CPFE) learning the context (preexposure) and the context-shock association (training) are separated by 24 hours. In both procedures conditioned freezing can be measured immediately (post-shock test) or during a 24-hour retention test. In adult rats, disrupting basolateral amygdala (BLA) activity or plasticity during training on sCFC impairs both post-shock and retention freezing (Maren et al., 1996). This manipulation on the training day of the CPFE disrupts retention freezing but effects on post-shock freezing are unknown (Matus-Amat et. al., 2007). Experiment 1 extended this literature from adult to adolescent rats and to the role of BLA activity and plasticity in post-shock freezing during the CPFE. Intra-BLA infusions of muscimol prior to the training day of the CPFE disrupted both post-shock and retention freezing in postnatal day (PD) 31-33 rats. In the second two experiments, intra-BLA infusions of APV prior to training day of sCFC disrupted retention but not post-shock freezing, while infusions of APV prior to training of the CPFE disrupt both post-shock and retention freezing. Our findings suggest that the BLA plasticity plays a different role in the CPFE vs. sCFC. Its role in the CPFE is similar in both adolescent and adult rats, while the role of the BLA in post-shock freezing during sCFC may differ across age or across studies that employ different procedures or parameters.

S5-1

VARIABILITY OF SLEEP IN PRESCHOOLERS: IMPACTS OF SLEEP BEHAVIORS ON BRAIN PROCESSING AND BEHAVIORAL TASK PERFORMANCE, **Dennis Molfese**, *University of Nebraska–Lincoln, United States*
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Regular sleep periods are related to young children's cognitive processing and behavioral task performance. However, some sleep schedules are disrupted by family activities creating bedtime delays (delayed sleep) and in other cases children get longer sleep times (extended sleep), such as sleeping later on weekends. Variabilities in sleep compared to a child's typical sleep are thought to be sources of behavioral disruptions. We report findings from related sleep studies with toddlers and young children. Sleep has been less studied in young children, compared to sleep studies of older children, youth and adults. Our first project characterized sleep habits of toddlers (30-months to 42-months) by measuring bedtime, sleep onset, sleep offset, sleep duration [time from sleep onset to sleep offset], nighttime wakefulness, and sleep efficiency [true sleep / sleep duration] based on parent reports and actigraph measures. Parents over-report toddler's sleep duration and sleep efficiency, and under-report toddler's evening sleep onset and nighttime wakefulness. These reporting biases may have methodological and parenting implications. Further, delayed sleep (e.g., bedtime, sleep onset) specifically was found to impact cognitive task performance over time. The second study examined purposeful variations in amounts of sleep to determine impacts of brain processing during executive function tasks in children 5 to 8 years of age. Sleep loss (1 hour less sleep per night for 1 week) impacted brain activation patterns; more brain areas and longer processing time was needed to perform the Stroop test. Extended sleep revealed a more complex pattern of results with implications for sleep schedules.Funding: The National Institute for Child Health and Human Development (grant number HD073202).

P1-47

WHETHER MOVEMENTS RECORDED WITH THE ACTIGRAPHS ARE PREDICTED BY SUPINE HEAD ORIENTATION PREFERENCE?, Leanne Mordan, *Illinois State University, United States* E-mail: lemorda@ilstu.edu

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Supine Head Orientation Preference (SHOP) is the tendency to turn one's head toward either side of the body, and hold the head in that position for a significant period of time. Actigraphs are small, wearable devices which able to record movements of the body. Actigraphs have been used previously in infant studies to record the frequency of the number of limb movements within a given time period (Atun-Einy, Tonetti, Boreggiani, Natale, & Scher, 2017). This project investigates the relationship between arm movements as measured by actigraphs and infant SHOP from 4 to 16 weeks of age. Six infants, in supine position, were placed inside of a small tent, in order to block overhead distractions. Infants' heads were held at midline for 60 seconds, and then movement was recorded for 60 seconds after, during which infants were allowed to move freely. This procedure was repeated 4 times at each visit (4 and 8 weeks of age). Researchers coded head movements when the chin passed the nipple line. Actigraph recordings of infants' arm movements were recorded for 10 minutes while infants were seated in a semi-reclined seat at 4, 8, 12, and 16 weeks of age. No interaction occurred during actigraph recordings. Z-scores for SHOP and arm movements were determined according to criteria specified by Michel (1981) using the frequency of right and left SHOP and arm movements. Regression analyses indicate that SHOP z-scores predict changes in lateralized arm movement. Results support the cascade theory of development as proposed by Michel (1983).

P1-28

SIMILARITY AND DIFFERENTIATION ACROSS THE DEVELOPING CONNECTOME AND LINKS TO EFFECTIVE EMOTION REGULATION, Joao Guassi Moreira, *University of California, Los Angeles, United States* E-mail: jguassimoreira@ucla.edu

Joao Guassi Moreira, University of California, Los Angeles; Katie McLaughlin, University of Washington, Seattle; Jennifer Silvers, UCLA

The acquisition of effective emotion regulation (ER) strategies is a critical developmental task. Prior research shows that connectivity during emotion regulation undergoes significant developmental changes to support effective ER. However, work on this topic has not investigated how similarity and differentiation of whole brain networks—which reflect developmental principles of specialization and generalizability—between regulation and passive emotional responding affect successful ER in development. We set out to explore whether distinct and similar network states between ER and passive emotional responding were related to successful ER. We collected data on 70 youth (ages 8-17, avg=12.6) who underwent fMRI scanning while completing an ER task. Five whole-brain networks were identified: an ER network specific to our task (ERN; defined via meta-analysis), the default mode network (DMN), the frontoparietal network (FPN), the salience network (SaN), the ventral attention network (VAN), and the dorsal attention network (DAN) (latter four defined via NeuroSynth). Representational Similarity Analysis (RSA) was performed on network-specific connectivity matrices—obtained by correlating beta-series of nodes within a network—for engaging in ER and passive emotional responding. Greater distinctiveness (i.e., less similarity) between ER and passive emotional responding in the ER network was related with more successful ER (ρ = -.22), whereas distinctiveness did not predict more successful ER in the other networks. These results suggest the acquisition of ER is contingent upon task-specific networks (e.g., ERN) becoming differentiated between task states.

P2-48

MATERNAL CARE CONTROLS THE DEVELOPMENT OF FEAR LEARNING IN ADOLESCENT NONHUMAN PRIMATES: RELATIONSHIP WITH PREFRONTAL 5HT1A RECEPTOR BINDING & GUT MICROBIOME, Elyse Morin, *Emory University, United States* E-mail: elyse.morin@emory.edu

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Childhood maltreatment is a risk for psychopathology. Consistent with human studies, our lab has reported that maternal maltreatment (MALT) leads to increased emotional reactivity and anxiety in macaques. It is unclear if this is due to enhanced fear learning or impaired ability to modulate fear. Using this rhesus model of MALT, consisting of abuse and rejection, we assessed the long-term effects of ELS on fear learning in 25 adolescent macaques (4.5-5.5 yrs; 14 MALT-8M,6F, and 11 raised by competent mothers-5M,6F-). It was hypothesized that MALT animals would have higher baseline and fear-conditioned acoustic startle, and difficulty discriminating fear/safety. An AX+/BX- paradigm measured baseline startle as an indicator of anxiety, fear-potentiated startle, attenuation of startle with safety signals, and extinction. Baseline startle in MALT animals, particularly females, remained high, suggesting impaired desensitization. Fear potentiated startle was significantly lower in females, and MALT females showed transfer of fear to the safety cue. This suggests developmental alterations in fear learning related to MALT, especially in females, leading to difficulties in discrimination learning and generalized fear. Due to its role in anxiety, prefrontal serotonin (5HT) 1A receptors were examined using PET imaging. Reduced 5HT1A binding potentials were predictive of increased startle, consistent with human studies on anxiety/depression. An exploratory analysis examined gut microbiota, based on previous studies showing ELS-induced changes, and early alterations in gut flora chronically modulate brain 5HT levels. We found differentially abundant genera, including treponema, acidaminococcus, and lactobacillus, which we are investigating in relation to 5HT deficits detected in MALT animals.

P1-48

EPIGENETIC MARKERS OF ERLY EXPERIENCES AND DYADIC ENGAGEMENT DURING INFANCY., Isabelle Mueller, *University of Massachusetts Boston, United States* E-mail: isabelle.mueller001@umb.edu

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An infant's ability to cope with everyday stressors becomes more robust during the first year and is an important achievement during infancy. Throughout this period, interactions with primary caregivers are a vital learning environment, a primary developmental context, and source of external regulation for the child. Successful interactions are characterized by a dynamic flow of matching states of parent-infant expressions and intentions, followed by the occurrence of mismatching states, and subsequent repairs. These interactive repair processes are of vital developmental importance; the experience that negative affective states can successfully and reliably be transformed into positive states results in a sense of self-efficacy in infants and helps them learn effective strategies for regulation. In this study we follow epigenetic changes on the glucocorticoid receptor (GR) gene in 125 infants from birth to 4-months of age. At 4-months all infants and their mothers participated in a natural play session and the still-face, an established infant stress paradigm, in the lab. The interaction was coded for dyadic engagement, interactive repair, and infant stress response.

Statistical analysis shows that methylation of GR on CpG-13 at 4-months (but not at birth) correlates with infant disengagement and the overall interactive repair latency of the dyad. Further, repair latency and infant self-soothing abilities during the still-face paradigm were significantly associated. Our results indicate that the quality of the early dyadic interaction and the dyads ability to repair mismatched may impact methylation of GR and thus have long term effects on infant stress reactivity.

P2-49

PATERNAL ALCOHOL EXPOSURE REDUCES REINSTATEMENT OF ALCOHOL SEEKING IN RAT OFFSPRING, Steven Nieto, *University of Houston, United States*

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Familial transmission of alcohol use disorder reflects genetic and environmental factors. For decades, studies in rodents demonstrated that paternal alcohol exposure produces cognitive and physiological abnormalities in offspring. The mechanisms of these effects may reflect epigenetic modifications transmitted through the male germ line. While mouse studies show that paternal alcohol exposure alters sensitivity to alcohol in offspring,no studies have examined whether paternal alcohol exposure impacts operant alcohol self-administration behaviors in offspring. We exposed male Wistar rats to a chronic intermittent ethanol procedure (CIE) in alcohol vapor chambers (16 h/day; 5 days/week; 6 weeks) or to room air. Eight weeks later, rats were mated with alcohol-naive females and adult offspring (F1) were trained to lever press for increasing alcohol concentrations (2.5%, 5%, & 10%, v/v). Following acquisition, extinction sessions were conducted over several weeks under both fixed and progressive ratio schedules. Cue-induced reinstatement tests were followed by a week of reinitiation sessions, wherein alcohol (5%) was available as a reinforcer. We found that alcohol-sired offspring of both sexes pressed the active lever less during extinction sessions and cue-induced reinstatement tests relative to control-sired offspring. During reinitiation, alcohol-sired offspring pressed the active lever less and received fewer alcohol deliveries compared to control-sired offspring. Overall, these results indicate that paternal alcohol exposure prior to conception induces long-lasting effects that are protective against alcohol-motivated behaviors in offspring.

P2-42

EARLY LIFE STRESS IS ASSOCIATED WITH PRECOCIOUS AMYGDALA DEVELOPMENT AND DELAYED PREFRONTAL DEVELOPMENT, **Gabriela Manzano Nieves**, *Brown University, United States* E-mail: gabriela_manzano_nieves@brown.edu

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Early life stress (ELS) is associated with an increased risk for later development of emotional pathology such as depression and anxiety. The origins of pathology are thought to be rooted in atypical development of circuits regulating emotional responding, including the amygdala. Here we used a mouse model of ELS, in the form of maternal bedding restriction, and tested the effect on amygdala development, and the development of freezing behavior in a tone-associated fear conditioning paradigm. Previous work has established that tone-associated freezing develops as early 15 days of age and stays relatively stable across early development. Here, we found that mice reared under ELS conditions show an unexpected and significant decrease in freezing behavior at 21 days of age. This decrease in freezing behavior was associated with a precocious maturation and increased density and activity of Parvalbumin (PV)-positive cells in the basal amygdala (BA). To test if the spike in PV-cells was related to suppressed freezing behavior, we optogenetics to silence this population of cells in the BA during acquisition and testing phase in the conditioning paradigm. We found that silencing BA PV cell restored normal levels of freezing behavior in ELS reared mice. To understand how medial prefrontal (mPFC) projections may be influencing the fear response we assessed mPFC to BA projection density. We found that ELS delays the emergence of these projections. These results have implications for understanding the effects of ELS on the ontogeny of circuit development and its impact on the development conditioned fear.

P1-49

THE RELATIVE DEVELOPMENT AND TRAJECTORY OF EXECUTIVE FUNCTIONS ACROSS THE LIFESPAN, Jennifer Nosker, *Fielding Graduate University, United States* E-mail: jnosker@email.fielding.edu

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It has been well established that the frontal lobe/executive functions are among the last to develop. The relative rate of development among differing executive functions in childhood is unknown and the maintenance of cognitive abilities and rate of decline in adulthood requires further study. Utilizing a national sample, the mean age abilities of 8 to 85-year-olds were compared to the performance of 16-years-olds on the Delis-Kaplan Executive Function System to determine the rate of executive function acquisition, retention, and decline. An artificial index of the sum of the ten scales was constructed to establish a General Executive Function score.

The Executive Function index showed a relatively linear development throughout childhood until the age of 16 years-old, which, given what is known of the development of the frontal lobes, was not expected. Executive functions also appear to decline linearly, with some cognitive abilities deteriorating as early as 25 years-old; however, tasks involving verbal modality, deductive reasoning, and cognitive flexibility (Verbal Fluency and Word Context) maintain until age 85. Crystalline abilities appear to hold in later years and problem-solving abilities, measured by the test 20 Questions, also holds relatively well throughout the lifespan with minimal decline in the last few decades.

Diverse acquisition of executive functions is not observed throughout childhood, which diverges from what is known of the biological development of the critical areas/cortices. Conversely, a diverse decline in cognitive abilities is observed and expected from the known biological aging process.

P2-50

POST-PARTUM ANXIETY: EXPLORING THE DIFFERENCES BETWEEN PRIMIPAROUS AND MULTIPAROUS WOMEN ACROSS SOME PSYCHOSOCIAL FACTORS, **Ajoke Olatunji**, *Federal university oye ekiti, Nigeria* E-mail: jokolatunji@gmail.com

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Post-partum anxiety is a major public health issue among nursing mothers from diverse cultures.

This study examined the level of postnatal anxiety between primiparous (a woman that gave birth for the first time) and multiparous (woman having more than one previous births). The study also investigated on the influence of age, marital status and religion of the participants on their level of post-partum anxiety.

One hundred and twenty nursing mothers were randomly selected for the study. This consisted of sixty-eight primiparous women and fifty-two multiparous women. The population consisted of both married and single mothers drawn from various hospitals and maternity homes within Ado-Ekiti, South-Western Nigeria.

The State-Trait Anxiety Inventory was used to measure their postpartum anxiety. This study used both the Independent t-test and Chi-square for the analysis of the data collected for the purpose of the study.

Four hypotheses were tested and the results revealed that there is no significant difference in the anxiety level expressed between primiparous and multiparous women $t\ (118) = .109\ p > .05$. It was also found that age $x2\ (26) = 2.133;\ p < .05$, marital status $x2\ (26) = 2.133;\ p < .05$, and religion $x2\ (26) = 2.133;\ p < .05$ all have significant influence on anxiety among primiparous and multiparous women in Ekiti State.

It was concluded in the study that a range of brain and hormonal factors could contribute to post- partum anxiety depending on each individual aside the psychosocial factors that are responsible.

S4-3

INFANT TRAUMA WITH A CAREGIVER: ACUTE NEUROBEHAVIORAL MECHANISMS AND A ROLE FOR AMYGDALA DOPAMINE, Maya Opendak,
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Previous research has identified correlations between early-life trauma and maladaptive outcomes, but the developmental mechanisms initiating the pathway to pathology remain elusive. Using two complementary rodent models of infant trauma with a caregiver, we observed an attenuation of infant neurobehavioral attachment responses to the maternal odor over time. Whereas maternal presence buffered the effects of acute trauma (shock) on pups' amygdala activation, ultrasonic vocalizations, and HPA response, repeated trauma in the presence of the mother led to reversal of these buffering effects and long-term neurobehavioral impairments. After five days of trauma with the mother, pups exhibited blunted amygdala response to the maternal odor as well as impaired attachment behaviors towards her in a social test. This was accompanied by changes in amygdala structure and function, including neurogenesis, DNA methylation, and expression of c Fos and D1 receptors. Furthermore, pups shocked with the mother showed an increase in amygdala dopamine, a reversal of the decrease observed in pups shocked alone. Blockade of amygdala dopamine during trauma with the mother restored typical attachment behavior. Taken together, these data suggest that the effects of early-life abuse may involve devaluation of the caregiver and dopamine may provide a novel therapeutic target for infant abuse.

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O3-2

DEVELOPMENTAL PSYCHOPATHOLOGY AFTER MALTREATMENT AND DISORDERED ATTACHMENT WITHIN THE STRANGE SITUATION TEST: INSIGHTS FROM AN ANIMAL MODEL, Maya Opendak, *New York University Langone Medical Center, United States* E-mail: m.opendak@gmail.com

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Infants rely on the mother to provide them with the sensory stimulation needed for normal brain development. Maltreatment by the mother initiates a pathway to pathology, much of which remains dormant until later life. However, immediate effects can be detected in the maltreated infant by using the Strange Situation Test (SST), which progressively stresses the child to uncover atypical responses to the caregiver. Here we adapted this test for use in rat pups to aid in identifying pups' atypical neurobehavioral features within a maltreatment-associated dyad. Using the Scarcity-Adversity Model of maltreatment induced by low bedding (SAM-LB) for nest building from postnatal days (PN)8-12, we observed features of disordered attachment in the SST. Recording of cortical oscillations using local field potentials (LFP) showed that the mother had reduced ability to modulate the infant's rhythmic brain activity during SST, compared to pups with no maltreatment experience. Next, we considered the progression of pups' atypical behavior and cortical oscillations by recording LFP in both pup and mother during brief periods of SAM (between PN10-17). Neocortical telemetry LFP electrodes were implanted in PN10 pup-mother dyads and LFP was recorded during 1 hr periods of SAM or typical rearing in the same animal. With progressing SAM, the dynamic range of LFP induced by mother-pup interactions decreased, with both pup and mother showing impaired LFP responses to specific interactions, such as nursing and grooming. These results suggest that when a mother is stressed, she has impaired ability to modulate both her own and pups' neural function.

O3-7

THE EFFECTS OF SOCIODEMOGRAPHIC RISK, ADVERSITY, AND HOMELESSNESS ON RESPIRATORY SINUS ARRHYTHMIA, Alyssa Palmer,
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Early experiences of sociodemographic risk and adversity can impact the organization of children's developing physiological stress systems as well as their subsequent mental and physical health outcomes (Miller et al., 2011). For example, sociodemographic risk factors often associated with poverty (e.g. parental unemployment, low levels of education obtainment, and single-parent households) have been related to atypical parasympathetic functioning among children. Atypical parasympathetic functioning can be indicated by lower RSA during rest and blunted RSA withdrawal to a psychosocial stressor (Evans & Kim, 2007). Further, retrospective studies with adults indicate that high levels of adverse childhood experiences (ACEs; e.g. abuse, neglect, death of a parent) are associated with atypical RSA profiles (Dale et al., 2009; Arditi-Babchuk et al., 2009). However, no studies to our knowledge have examined the joint and differential associations of sociodemographic risk and ACEs on physiological functioning in young children. The current study addressed this gap by testing associations of sociodemographic risk, ACEs, and RSA among 4-6-year-olds (n = 80). The sample included both low to middle-income children (n = 41) and children residing in an emergency homeless shelter (n = 39). Results implicate sociodemographic risk, but not ACEs, in reduced RSA during rest. Additionally, children showed an expected decrease in RSA during an emotionally frustrating task, irrespective of sociodemographic risk or ACEs.

P2-51

SEX DIFFERENCES IN DORSAL AND VENTRAL HIPPOCAMPUS INVOLVEMENT DURING EXTINCTION IN JUVENILE RATS., Chun Hui Park, *The University of Melbourne/The Florey Institute of Neuroscience and Mental Health, Australia* E-mail: j.park14@student.unimelb.edu.au

Chun Hui Park, The University of Melbourne/The Florey Institute of Neuroscience and Mental Health; Despina Ganella, The Florey Institute of Neuroscience and Mental Health; Jee Hyun Kim, The Florey Institute of Neuroscience and Mental Health

Exposure therapies have been widely used to treat clinical anxiety disorders. Its underlying process, ‘extinction’, is the decrease in fear by repeatedly presenting the fearful stimulus without any adverse outcome. In adult rodents, extinction memory is hippocampus-dependent. It remains unknown whether the hippocampus is involved in extinction in juvenile rodents. Further, juvenile female rats display context-specific extinction memory while juvenile male rats do not (Park, Ganella and Kim, 2017), indicating that the involvement of the hippocampus at this age may be sex-dependent. This study aims to investigate the contribution of the ventral and dorsal hippocampus in juvenile male and female rats (postnatal day 17 ±1). All rats were fear conditioned with three white-noise - footshock pairings. The next day, the GABAA agonist muscimol was bilaterally infused into ventral or dorsal hippocampus prior to extinction training (60 white-noise trials). Rats were tested for extinction either recall in the extinction or the conditioning context (i.e., renewal test). Preliminary results indicate male rats display renewal following inactivation of the ventral hippocampus, suggesting the ventral hippocampus serves to inhibit contextual learning during extinction in juvenile males. No effect was observed in juvenile female rats. Dorsal hippocampus results remain to be determined. The preliminary results are promising and these findings may reveal a whole new scientific platform to investigate, the pre-pubertal sex differences in the brain and behaviour.

P1-51

THE EFFECTS OF PARENTAL INSTRUCTION QUALITY AND PHYSIOLOGICAL RECOVERY ON CHILDREN'S ACADEMIC ACHIEVEMENT, Karishma Patel,
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Parents' abilities to effectively engage their child, set limits, and convey understanding contribute to the development of academic competence and achievement (Englund, 2004). Likewise, children's physiological self-regulatory capacities have been shown to influence competence in varied domains (Gueron-Sela, 2017). In particular, children's physiologic capacity to recover from a challenge may support academic achievement given the need to rebound from setbacks in the pursuit of academic success.

This study examined the interactive influences of parent's observed instructional quality during a difficult task at age 4 and children's parasympathetic recovery to a startle challenge at age 6, which was indexed by respiratory sinus arrhythmia (RSA), on later academic achievement as assessed with the Woodcock Johnson at age 8. The sample include 250 child-caregiver dyads (49.3% girls; 46% Latinx), all analyses controlled for IQ, sex, ethnicity, and socio-economic status.

Results indicated that children with relatively poor recovery RSA (i.e., less rebound towards baseline following startle) evidenced increased sensitivity to parental instructional quality, such that children with high quality parental instruction evidenced higher achievement scores than those with low quality instruction ($b = 5.142$, $p < 0$ .001). Interestingly, children who evidenced strong recovery post-startle earned higher achievement scores, regardless of parental instructional quality.

This study is among the first to document the importance of children's physiological recovery capacities as a moderator of associations between parenting and academic achievement. These findings highlight the potential for applied efforts to foster positive child adjustment through mind-body interventions and community education, while demonstrating the need to examine autonomic recovery processes in future research.

O3-6

CHRONIC CHEMOGENETIC ACTIVATION OF FOREBRAIN EXCITATORY NEURONS IN POSTNATAL LIFE EVOKES LONG-LASTING BEHAVIORAL CHANGES, **Sthitapranjya Pati**, *Tata Institute of Fundamental Research, India* E-mail: sthita.pati@gmail.com

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Early life adverse experience is associated with increased risk of psychopathology in humans. Several rodent models phenocopy the persistent behavioral effects observed in humans in addition to enhanced serotonin 2A (5-HT2A) function in adulthood. The emergence of anxiety and depressive-like behavior in the models of early-life stress are blocked by co-administering a 5HT2A/2C receptor antagonist. Further, administration of selective 5HT2A/2C receptor agonist (±)-2,5-Dimethoxy-4-iodoamphetamine hydrochloride (DOI) in postnatal life is sufficient to evoke a persistent increase in anxiety. Consistent with the pharmacological studies, the developmental knockout of 5HT2Areceptor reduces anxiety-like behavior, which can be restored to normal levels by the forebrain-specific rescue of the receptor. The 5HT2A receptor is a G-protein coupled receptor that is coupled to Gqα mediated downstream signaling and causes neuronal depolarization. Other Gq-coupled receptors like M1/M5 muscarinic acetylcholine receptors and α1-adrenergic receptors also show altered function in animals with a history of early life stress. We hypothesized that increased activation of cortical excitatory neurons by activating Gqα mediated signaling during the postnatal critical window is sufficient to bring about the long-lasting increase in anxiety and depressive-like behavior in adulthood. We used a chemogenetic approach where we expressed the excitatory Designer Receptors Exclusively Activated by Designer Drugs (DREADD) hM3Dq in CamKIIα-positive cortical excitatory neurons using a bigenic mouse line (CamKIIα-tTA:: tetO hM3Dq). We fed the pups the hM3Dq ligand, clozapine-N-oxide (CNO; 1 mg/kg) from postnatal day 2 to 14 (PNCNO) and performed various behavioral tests in adulthood. The PNCNO-treated animals displayed significantly enhanced anxiety-like behavior in open-field test, elevated plus maze

P1-52

THE RELATION BETWEEN INFANT SUPINE HEAD ORIENTATION PREFERENCE, ARM/HAND MOVEMENTS, AND HAND PREFERENCE FOR OBJECT ACQUISITION, **Duangporn Pattanakul**, *Illinois State University, United States* E-mail: dpattanakul@gmail.com

Duangporn Pattanakul, Illinois State University; Julie Campbell, Illinois State University

Early asymmetries in hand-use can concatenate into hand preferences via self-generated experiences (Michel, 1983). Previous research found that infants with a right supine head orientation preference (SHOP) exhibited a right hand preference for a visually guided reaching task at 19 weeks of age (Goodwin & Michel, 1981). The purpose of this study is to examine the relation between SHOP, arm/hand movements, and hand preference for object acquisition. Six infants were observed for SHOP at 4 and 8 weeks of age. Following the SHOP procedure, infants were observed for arm and hand movements for ten minutes while sitting in a semi-upright position. Frequency of arm movements and self-touches were summed separately for the right and left arm/hand. Hand preference for object acquisition was assessed when infants were 6, 7.5, 9, and 11.5 months. Thirty-four toys were presented to infants either one toy on the table (19), one toy suspended in the air (5), a pair of identical toys on the table (7), or a pair of identical toys suspended in the air (3). Identical toys were presented in line with the infant's shoulders, and single toys were presented to the infant's midline on the table. Hand preference for object acquisition was calculated using the handedness Index scores: HI = (R-L)/(R+L)1/2. A two-way ANOVA (SHOP: right, left, no preference) by arm/hand movements (right, left, no preference) was conducted to test whether these factors predict hand preference. Results indicated that infants with right SHOP and right arm/hand movements develop a right hand preference.

S2-5

RUNNING AWAY FROM LONELINESS: CAN EXERCISE IMPROVE ANXIETY STEMMING FROM SOCIAL ISOLATION?, Christina Perry, *Florey Institute of Neuroscience and Mental Health, Australia* E-mail: christina.perry@florey.edu.au

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For young people, friendship is often everything; and social isolation is the single biggest predictor of enduring anxiety from childhood into adolescence. Conversely physical activity during adolescence predicts low anxiety, and hence may be a protective factor against early life stress. In this study we used a preclinical model to investigate the interactive effects of social isolation and voluntary exercise on fear conditioning and extinction. Rats were housed from P21 either in isolation or in groups of three, in chambers that contained a running wheel. For half the wheel was locked to prevent running, for the remainder the wheel was available. At P42, all rats were trained to fear a tone, which was paired with a 1mA shock in dedicated conditioning chambers. The day after conditioning, all rats received two daily extinction sessions in an alternate context; where the tone was presented repeatedly, but without the shock. Recall test occurred four days later. Rats were again presented with the tone in the same chambers as extinction. Isolated rats showed impaired fear extinction, and this effect was rescued by exercise. Isolated rats also showed greater fear (freezing) at recall test, and freezing was reduced in rats that were allowed to run, regardless of housing conditions (isolated vs grouped). These findings provide insight environmental factors -both etiological and protective- that mediate in anxiety during adolescence. Furthermore, they show the value of lifestyle interventions to treat anxiety in vulnerable individuals.

P2-52

ADOLESCENT SEX DIFFERENCES IN FEAR EXTINCTION, Christina Perry,
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Anxiety disorders frequently emerge during the adolescent period. Animal models suggest that this may be due to an inability to inhibit aversive memories, because adolescents show impaired extinction retrieval following Pavlovian fear conditioning. Although anxiety disorders are more prevalent in the female population, almost all preclinical research is carried out using male subjects. In this study we examined fear extinction in male and female adolescent rats (P35 ± 2 on conditioning day). Intact (Experiment 1), or gonadectomised (Experiment 2) rats received 6 pairings of a tone conditioned stimulus (CS) with a 0.6mA footshock (unconditioned stimulus, US). The next day, rats were placed in contextually distinct chambers, and presented with the CS 60 times without the US. At test, rats were replaced in the extinction context and given a further 60 CS-no US presentations. Fear measured via time spent freezing during CS presentation. Estrus cycling was determined via vaginal lavage each day after training. For Experiment 1, females in metestrus, diestrus and proestrus showed delayed fear extinction and poor extinction retrieval when compared with males, immature females and females in estrus. For Experiment 2, gonadectomy caused enhanced extinction in female rats, but delayed extinction in male rats. These data not only confirm that fear extinction levels are modulated by estrus cycle in female rats, but also provide evidence that testosterone has a protective role in persistence of learned fear in adolescence. This has important implications for understanding the development and epidemiology of anxiety disorders.

P2-54

COREGULATION OF RESPIRATORY SINUS ARRHYTHMIA DURING MOTHER-CHILD INTERACTION., Nicole Perry, *University of Minnesota, United States* E-mail: nicoleebperry@gmail.com

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Recent bio-behavioral models posit that repeated exposure to the coordination of physiological states between children and their caregivers sets the framework for the development of children's independent self-regulation (Feldman, 2012). However, we know relatively little about the dyadic physiological processes that occur while parents and children are engaged in emotion eliciting tasks. We utilized a multivariate latent curve model (LCM) with structured residuals (Curran et al., 2013) to simultaneously isolate between-person and within-person components of the relation between maternal respiratory sinus arrythmia (RSA) and child RSA over 10 30s epochs of a mother-child frustration task (i.e., drawing a picture while each controlled one knob of an Etch-a-Sketch). ECG data collected from children (n =137; 54% male; mean age 6.52 years) and their mothers were analyzed using IBI Analysis System software developed by James Long Company (Caroga Lake, NY). We sought to test whether the direction of effects was unidirectional or bidirectional across the task. We hypothesized that mothers RSA may initially predict children's RSA in a unidirectional way, but that as the task progressed, and dyadic co-regulation occurred, bidirectional effects would emerge. Autoregressive paths indicated stability in mothers' RSA but not children's RSA. Interestingly, bidirectional associations emerged from epoch 8 through epoch 10. These findings provide support that even after considering between group mean-level differences, dynamic physiological associations occur at the level of the individual dyad. Specifically, results suggest that mothers and children become physiologically in sync with one another during interaction, but this synchrony may not occur immediately.

P2-55

EMOTION REGULATION AND CORTISOL REACTIVTY DURING A SOCIAL EVALUATIVE STRESSOR: A STUDY OF INTERNATIONALLY-ADOPTED YOUTH, Nicole Perry, *University of Minnesota, United States* E-mail: nicoleebperry@gmail.com

Nicole Perry, University of Minnesota; Anna Parenteau, University of Minnesota Twin Cities; Bonny Donzella, University of Minnesota Twin Cities; Megan Gunnar, University of Minnesota

In the current study we compared emotion regulation abilities between post-institutionalized (PI; N = 124) and non-adopted (NA; N = 172) children and adolescents (7-15 years-old). We coded emotion regulation, indexed by children's positive engagement relative to expressed anxiety, and assessed cortisol reactivity during the speech portion of Trier Social Stress Test (TSST-C). Parents reported on their children's social, academic, and behavioral adjustment. Results suggested that emotion regulation abilities increased with age, but this increase was greater for NA than PI youth. Specifically, when participants are 13 years and older, NA youth had significantly higher emotion regulation than PI youth. Moreover, NA children had higher cortisol reactivity to the TSST-C when they had lower emotion regulation. In contrast, PI children exhibited greater cortisol reactivity when they showed greater emotion regulation in the TSST-C. Finally, greater emotion regulation predicted fewer behavior problems for the PI youth but not for the NA youth. Results suggest that emotion regulation may be particularly beneficial for PI youth but it may come at a greater physiological cost.

P2-53

A CROSS-SPECIES EXAMINATION OF THE BIO-BEHAVIORAL IMPACT OF POVERTY ON EXECUTIVE FUNCTION, Rosemarie Perry, *New York University, United States* E-mail: rosemarie.perry@nyu.edu

Rosemarie Perry, New York University; Stephen Braren, New York University; Gabriella Pollonini, NYU; Meriah DeJoseph, University of Minnesota; Cristina Alberini, New York University; Regina Sullivan, Nathan Kline Institute & NYU School Medicine; Clancy Blair, NYU

Children in high-poverty homes lag behind their higher income peers in neurocognitive indicators of school readiness, such as executive function (EF). However, the mechanisms by which poverty can increase the risk of EF difficulties are unclear. Here we present findings from a cross-species human and rodent study, exploring relations between early-life environments of scarcity-adversity and EF bio-behavioral outcomes in peri-adolescence. Human data come from the Family Life Project, a population-based longitudinal sample (n=1292), which oversampled for impoverished families. In peri-adolescence, EF was assessed using a battery of working memory, inhibition and attention shifting tasks. Rodent data come from a model of early-life scarcity, where rodent mothers were provided with insufficient materials so they could not build a proper nest for their pups. Human results demonstrated a link between early-life poverty exposure and EF impairments in peri-adolescence. Rodent results revealed that scarcity-reared peri-adolescent rodents displayed EF impairments, with evidence of upregulated glucocorticoid receptor levels in the medial prefrontal cortex. Following an intervention in which scarcity-reared rats were co-housed with a control rat, scarcity-reared rats did not demonstrate deficits in EF. Overall, human and rodent results indicate process similarities in terms of scarcity-adversity and EF outcomes. Results provide implications for how early-life scarcity disrupts cognitive skills, which are vital to classroom learning and academic achievement.

P1-65

MATERNAL PRE-PREGNANCY BMI IS ASSOCIATED WITH FETAL BRAIN DEVELOPMENT AND TODDLER SOCIAL ABILITIES, Marisa Spann, *Columbia University Medical Center, United States* E-mail: mns2125@cumc.columbia.edu

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Higher maternal pre-pregnancy body mass index (BMI) is associated with poorer cognition, and increased risk of neuropsychiatric disorders in offspring. The mechanisms by which maternal pre-pregnancy BMI influences prenatal brain development are unknown. We investigated pre-pregnancy BMI in relation to patterns of neurobehavioral development from the fetal to toddler period, and brain functional connectivity during the neonatal period. Seventy-two 3rd trimester pregnant women, aged 14 to 19, were recruited. Their pre-pregnancy BMI was determined from chart extraction of weight and height. At 34-37 weeks of gestation, the women underwent diagnostic evaluations and fetal assessments included heart rate (FHR). At 14 months postmenstrual age the children participated in the Bayley Scales of Infant and Toddler Development, Third Edition (BSID-III). For 45 neonates, resting-state functional MRI were acquired and standard preprocessing was performed. Intrinsic connectivity distribution (ICD) was performed to measure global connectivity on the voxel level. Controlling for infant sex and age at scan, linear regression was used to relate pre-pregnancy BMI to neonatal ICD. Pre-pregnancy BMI was significantly associated with estimated fetal growth ($t=2.75$, $p = 0.008$). Pre-pregnancy BMI correlated positively with FHR ($r=0.39$; $p= 0.02$) during the 3rd trimester, and the BSID- III Self-Direction ($r=0.61$, $p=0.001$) and Socialization ($r=0.45$, $p=0.02$) scales at 14 months. A positive correlation between pre-pregnancy BMI and global neonatal connectivity in the left thalamus was observed. Using the thalamic region as a seed, higher pre-pregnancy BMI was associated with greater local thalamic connectivity and lower fronto-thalamic connectivity. Similar to findings in adults in which BMI and the thalamus are associated, we observed this association across a generation – between maternal pre-pregnancy BMI and neonatal thalamic functional connectivity. Future research incorporating additional metabolic measures that may contribute to maternal BMI and prenatal brain development is needed to explain the role of pre-pregnancy BMI on neurodevelopment.

P2-56

PRENATAL CORTISOL EXPOSURES PREDICT FETAL AND INFANT RESPONSE TO CHALLENGE, Gage Peterson, *Chapman University, United States*
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Gage Peterson, Chapman University; Elysia Davis, University of Denver; Curt Sandman, University of California, Irvine; Laura Glynn, Chapman University; Laurel Hicks, University of Denver; Amy Anderson, University of Denver; Mariann Howland, University of California, Irvine

Fetal programming research indicates that exposures to maternal cortisol are positively associated with fetal movement responses to stimulation (Glynn & Sandman, 2012). Greater fetal movement may be an early indicator of enhanced reactivity and therefore predict postnatal reactivity to challenge.

This study examined associations between prenatal maternal cortisol, fetal movement responses to vibro-acoustic stimulation, and infant cortisol responses to inoculation among 73 mother-infant pairs. Maternal plasma cortisol was assessed at 15, 19, 25, and 31 weeks' gestation. Fetal movement was measured at 31 weeks' gestation. Infant salivary cortisol levels were assessed before and after routine 12-month inoculations. Infant cortisol response was characterized as change from baseline to 20 minutes post-inoculation.

More exaggerated fetal movement responses predicted greater infant cortisol responses to inoculation ($r = .26$; $p < .05$). This association was moderated by sex-observed among girls, not boys ($r = .43$ vs. $r = .11$). Additionally, higher maternal cortisol at 19 and 25 weeks' gestation predicted a larger infant cortisol response ($r = .39$; $p < .05$ & $r = .23$; $p = .05$). This effect was also observed among girls ($r = .63$& $r = .43$), not boys ($r = -.08$ & $r = .09$). Fetal movement responses partially mediated the association between 25 week maternal cortisol and infant cortisol response among females (standardized indirect effect =.12, 95% CI = .01 - .28).

These findings indicate the programming influences of prenatal maternal cortisol on fetal neurological development, which may serve as a foundation for later neurobehavioral reactivity.

P1-53

THE RELATION BETWEEN MATERNAL AND CHILD NEUROBIOLOGICAL MARKERS OF EMOTION PROCESSES: EXAMINING THE ROLE OF PARENTING BEHAVIORS, **Randi Phelps**, *Miami University, United States* E-mail: phelpsr2@miamioh.edu

Randi Phelps, Miami University; Anne Kalomiris, Miami University; Robin Thomas, Miami University; Elizabeth Kiel, Miami University

Maternal left (i.e., approach) and right (i.e., avoidance) alpha asymmetry (Coan & Allen, 2003), can influence maternal emotional availability, and possibly parenting behaviors (Killeen & Teti, 2012). Parenting associated with maternal asymmetry may shape neurobiological functioning in children. Error-related negativity (ERN) in children is associated with anxiety across the lifespan (Bress et al., 2015) and is influenced by parenting behaviors (Brooker & Buss, 2014; Meyer et al., 2015). We examined the relation between maternal asymmetry and child ERN, and parenting behaviors indirectly linking them.

At child age 2, alpha asymmetry was assessed in 99 mothers (M= -0.08). At child age 4, mothers reported on accommodation of their child's anxiety symptoms (Family Accommodation Scale; Lebowitz et al., 2012). Children (current n = 32; expected n = 70) are asked to complete a flanker task the summer prior to kindergarten (~ age 5) to assess event-related potentials (generated separately) for error (ERN) and correct (CRN) trials.

ERN trials are more negative than the CRN trials at Fz ($t[31]=3.23$, $p = .003$) and Cz ($t[31]=3.11$, $p = .004$). All analyses control for CRN. Maternal left asymmetry is associated with smaller ERN (i.e., less anxiety risk; Cz:$b = 4.66$, $p = .079$; Fz: $b = 5.65$, $p = .033$). Primary analyses reveal that maternal right asymmetry is significantly associated with more accommodation of anxiety ($b = 0.83$, $p = .008$), and when controlling for maternal asymmetry, accommodation tends to relate to a larger ERN (Cz:$b = -5.98$, $p = .078$; Fz: $b = -6.69$, $p = .048$). The mediating role of this and other parenting behaviors (e.g., overprotection) will be investigated with a larger sample and discussed in the developmental psychophysiology literature.

P2-57

PHARMACOLOGICAL PREVENTION OF ABERRANT DNA METHYLATION INDUCED BY PERINATAL MALTREATMENT, Natalia Phillips, *University of Delaware, United States* E-mail: nlhusby@udel.edu

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Poor parental care alters gene methylation patterns, and these altered patterns are followed by maladaptive behavioral development. Our lab demonstrated that rat pups exposed to brief bouts of caregiver maltreatment display aberrant methylation of brain-derived neurotrophic factor (Bdnf) gene in the prefrontal cortex (PFC) across the lifespan, but their aberrant methylation can be rescued in adulthood via daily central administration of a DNA methyltransferase inhibitor (DNMTi), zebularine. The present study investigated whether the DNMTi 5-aza-deoxycytidine (5-azaD, delivered systemically) can prevent aberrant methylation of Bdnf in the PFC of Long-Evans pups if delivered at the time of maltreatment. Pups were exposed to either normal care from their biological mom or from a nurturing foster dam, or maltreatment from a stressed foster dam for 30 minutes/day from PND 1-7. PFC tissue was collected on PND8. Results indicate that a 0.5 mg/kg dose of 5-azaD normalized Bdnf methylation such that there were no differences between maltreated pups given 5-azaD and their control counterparts. Methylation levels in females given 0.5 mg/kg 5-azaD, however, exhibited some variability. Thus, we tested the effectiveness of a 1 mg/kg dose. We found that the 1 mg/kg dose of 5-azaD more effectively normalized Bdnf methylation in females. These data indicate that a pharmacological intervention can prevent changes in the epigenome invoked by maltreatment. Next, we plan to measure if this prevention of methylation persists and if it is associated with amelioration of adversity-induced behavioral phenotypes.
[NICHD (1R01HD087509-01 to TLR]

P1-54

EFFECTS OF NATIVITY ON THE RELATIONSHIP BETWEEN SLEEP QUALITY AND PARENT-REPORTED CHILD BEHAVIOR, **Tiffany Phu**, *University of Denver, United States* E-mail: tiffany.phu@du.edu

Tiffany Phu, University of Denver; Sarah Watamura, University of Denver

Introduction

Sleep has been linked to behavioral and emotional well-being for children (Cappuccio et al., 2008; Palmer & Alfano, 2017). However, less attention is given to how family context may impact the relationship between sleep and child outcomes. This study will examine the effects of sleep restriction on child well-being between children with parents born in the United States versus those who are foreign-born and Latina.

Method

Data derive from two projects examining sleep and stress physiology among children recruited from early childcare settings. Analyses include 151 children (age M=3.04, SD= 1.25; 54% male) with sleep actigraphy data and parent-reported CBCL measures. Children wore actigraphy watches for 1- 11 days (M=4.78, SD=2.89). Sleep quality was represented by the average value and variability of sleep duration, midpoint, and wake percentage (percent of time in bed spent awake). This study focused on children of Latina immigrants (CoLIs; n=66) and those of non-Latina parents (ConLIs n=85).

Results

Regression models tested the association between sleep and child behavior for CoLIs and ConLIs, controlling for child age and gender. For ConLIs, average sleep duration, standard deviation of sleep duration, and midpoint significantly predicted CBCL Total Problems. For CoLIs, only the standard deviation of wake percentage was significantly predictive of Total Problems.

Discussion

Different domains of sleep quality were predictive of parent-rated child behavior

between CoLIs and ConLIs, and lower sleep quality was more impactful in native U.S. families. Findings suggest that family context may be important when considering how sleep affects child well-being.

S2-2

HOT BABY: HOW EARLY LIFE INFLAMMATION PROGRAMS THE BRAIN,

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Quentin Pittman, University of Calgary

Babies often get sick during the first few months of their life, but we do not know if this experience in early development has long term effects on adult brain and behavior. As experimental rodents are often raised under conditions where sickness is virtually absent, this provides an opportunity to explore this question. By giving a low, non-toxic dose of lipopolysaccharide (ip LPS- a component of gram negative bacteria) we are able to cause a controlled inflammation mimicking a bacterial infection. While the effects of the inflammation are transient, and resemble those seen in much older animals, including the generation of cytokines within the brain, there are long lasting changes in behavior and neuronal properties seen only if the inflammation is given during early life. Changes to behavior that persist into adolescence and adulthood include sexually dimorphic alterations in conditioned fear extinction, adolescent social interactions and anxiety like behaviors. Even as adults, brain are more excitable, with increased susceptibility to convulsants and more prevalent EEG symptoms in models of epilepsy. Responses to second stressors may also be affected. Mechanistic changes that have been associated with early life inflammation include long term alterations in endocannabinoid signaling, expression of various neurotransmitters and their receptors and altered, sexually dimorphic electrophysiological properties of hippocampal neurons. It is well known that the adult brain is a product not only of our genes but also of early life experience; early life inflammation can now be recognized as one of the factors that affects brain development.

P2-58

TOO SHY TO SPEAK? DISTINGUISHING SELECTIVE MUTISM AND SOCIAL ANXIETY DISORDER IN CHILDREN, **Kristie Poole**, *McMaster University, Canada*
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Kristie Poole, McMaster University; Charles Cunningham, McMaster University; Angela McHolm, McMaster University; Louis Schmidt, McMaster Univ

Selective mutism (SM) is a rare anxiety disorder in which a child fails to speak in some situations (e.g., school) despite the ability to speak in other situations (e.g., home). Some theoretical work has conceptualized SM as a variant of social anxiety disorder (SAD) characterized by more severe levels of social anxiety (SA). We used a multi-method, multi-measure approach to empirically test differences in SA between the two disorders in children (N = 158; Mage = 8.76 years), using three groups: children with SM [all had co-morbid SAD (SM+SAD); n = 48], children with SAD only (SAD; n = 48), and healthy control children (n = 62). Children participated in a videotaped self-presentation task, following which observed SA behaviors were coded (verbal and non-verbal), and salivary cortisol reactivity to the self-presentation task was measured. We also collected parent- and teacher-report of children's SA. Results revealed that the SM+SAD and SAD groups had similar observed non-verbal SA behavior, cortisol reactivity, and parent-report SA, but the SM+SAD children had higher SA according to teacher-report and observer-rated verbal SA behavior. As expected, control children had the lowest cortisol reactivity and SA across all measures. These findings suggest that SM may be characterized by greater SA than SAD in certain social contexts (e.g., school), and is behaviorally distinguishable from SAD in terms of verbal SA. Children with SM and/or SAD appear to have similar physiological reactivity to a social challenge, suggesting possible similarities in terms of perceived social threat among these children.

P2-59

MATERNAL POSTPARTUM SSRI INFLUENCES OFFSPRING MICROBIOME AND NEUROINFLAMMATION IN A SEX-SPECIFIC MANNER, Wansu Qiu,
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Postpartum depression (PPD) affects 15% of mothers. Selective serotonin reuptake inhibitors (SSRIs) are prescribed to treat PPD. SSRI use during peripartum may be linked to increased Autism Spectrum Disorder (ASD) diagnoses in children. Studies have shown that certain bacteria within the gut can influence social and anxiety-like behaviour with similarities to those of ASD patients. Oxytocin (OT) is under investigation as a treatment for ASD, but OT is a large neuropeptide that has difficulty crossing the blood-brain barrier (BBB). TriozanTM is a nanoformulation that can facilitate OT to cross the BBB. Here, we hypothesize that in a rat model of PPD, maternal SSRI exposure will induce an ASD-like behaviour phenotype and dysbiosis within offspring animals, and OT treatment can negate the potential negative effects of maternal treatments. To simulate PPD and SSRI use dams were administered corticosterone and/or fluoxetine, a common SSRI, or vehicle during the postpartum. Offspring were then exposed to OT (0.5 mg/kg), OT+TriozanTM (0.25mg/mL; adjusted to 0.5mg/kg), or vehicle for 10 days (PD25-34). Stool samples were taken during offspring adulthood and we then performed chaperone-60 (CPN-60) sequencing of microbiome content. Offspring performed the 3-chambered social behaviour test and elevated-plus maze during adulthood. Preliminary data indicate an increase in the relative abundance of Parabacteroides distasonis and sex differences with fluoxetine treatment. In addition, maternal fluoxetine reduced levels of certain cytokines in the hippocampus with some modulated differently by sex and offspring treatment. The results indicate that maternal fluoxetine exposure has long-lasting effects on offspring neuroinflammation, behaviour and microbiome.

P2-60

ACUTE EARLY LIFE STRESS YIELDS INCUBATION OF FEAR, RESISTANCE TO EXTINCTION, AND DECREASED SOCIAL INTERACTION, Jennifer Quinn,
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Early life stress (ELS) yields increased vulnerability for the development of posttraumatic stress disorder (PTSD). This has been modeled in rodents by showing that adult fear learning with mild to moderate aversive stimuli is enhanced in adulthood following ELS exposure. In patients experiencing symptoms of PTSD, fear memory is resistant to extinction during exposure therapy, producing sustained exaggerated fear responses. The present experiments addressed whether acute ELS produces enhanced fear learning in adulthood (stress enhancement of fear learning; SEFL) that is resistant to extinction. We also assessed whether fear learning incubates over time in rats exposed to acute ELS. Finally, we addressed whether this same acute ELS exposure decreases social interaction later in life, and how this compares to rats exposed to chronic ELS using the limited nesting and bedding (LNB) model on PND2-9. Rats were exposed to zero or 15 footshocks on postnatal day 17 (PND17). In adolescence or adulthood, rats underwent fear conditioning in a novel context and/or were tested for interactive behaviors with another same-sex stimulus rat. We found that rats exposed to acute ELS on PND17 showed impaired between-session extinction, despite intact within-session extinction. In addition, acute ELS yielded incubation of fear over time. Finally, acute ELS-exposed rats showed decreased play behaviors during adolescent social interaction testing. This effect was comparable to rats that underwent chronic LNB stress exposure. These data demonstrate the profound, sustained impact of acute ELS exposure and provide strong construct validity for the acute infant SEFL model in the study of PTSD.

P2-61

THE EFFECTS OF JUVENILE STRESS ON BEHAVIORAL TAGGING AND ASSOCIATIVE PLASTICITY, Radha Raghuraman, *National University of Singapore, Singapore* E-mail: e0001913@u.nus.edu

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Mood disorders affect the lives and functioning of millions each year. A greater understanding of the neuronal circuits underlying mood in both normal and abnormal affective states has been identified as one of the critical needs in the field of mood disorders. Stress, particularly when uncontrollable, excessive and/or prolonged, can produce a myriad of emotional and cognitive alterations facilitating both adaptive and maladaptive changes that control the way in which neurons are wired that eventually affect behavior. Regulation of synaptic transmission, intracellular signal transduction, gene expression and even structural alterations are some of the mechanisms underlying these changes. The fact that the effects of stress is long lasting even long after the elimination of the actual stressors, places a special emphasis on the regulation of transcription factors and patterns of gene expression that could underlie these changes. In our studies, the effects of stress during juvenility (JS) brings about depressive-like behavior in adulthood affecting emotional and cognitive aspects. Our preliminary gene expression profile has provided us insights on the activation and a heightened expression of epigenetic factors in these stress models, especially on the factors such as G9a/GLP. Electrophysiology results and in-vivo behavioral experiments also prove that there is an altered long-term potentiation in juvenile stressed rats and the modulation of this epigenetic complex from these rats showed alleviation of long term potentiation. Thus, our studies investigate the differential mechanisms behind the regulation of stress in learning and memory models.

P2-62

PRENATAL ALCOHOL EXPOSURE AND EARLY-LIFE ADVERSITY: UNIQUE AND INTERACTIVE EFFECTS ON EMOTIONAL REGULATION AND IMMUNE FUNCTION, **Charlis Raineki**, *University of British Columbia, Canada* E-mail: charlisraineki@gmail.com

Charlis Raineki, University of British Columbia; Tamara Bodnar, University of British Columbia; Parker Holman, University of British Columbia; Joanne Weinberg, University of British Columbia

Prenatal alcohol exposure (PAE) and early-life adversity (ELA) negatively alter development. Here, we examined whether PAE increases vulnerability to immune dysregulation in response to ELA, which may further alter brain development and lead to psychopathologies. PAE and control litters were exposed either to limited bedding (postnatal day [PN] 8-12) to model ELA or normal bedding. Male and female offspring were tested in the open field (OF) and forced swim test (FST) at PN30 or PN45. Peripheral (serum) and central (amygdala and prefrontal cortex) immune function (cytokines and CRP) were evaluated following FST. In females, PAE induced anxiety-like behavior, regardless of age. ELA induced depressive-like behavior at PN45 in both male and female controls but not in PAE animals. Immune alterations following PAE and/or ELA were more prevalent in males than in females. In males, PAE increased serum levels of TNF-aand KC/GRO at PN45 and PAE males exposed to ELA showed reduced serum levels of TNF-aat PN30. In addition, exposure to ELA increased serum levels of IL-5 in both groups of males at PN30. Finally, control males exposed to ELA showed reduced serum levels of IL-5 at PN45 and increased levels of IL-4 at PN30. By contrast, PAE females showed only reduced serum levels of IL-6, regardless of age. Our results indicate that PAE and ELA have unique and interactive effects on emotional regulation and immune function. Immune system alterations could be an underlying mechanisms of the emotional dysregulation observed following PAE and/or ELA.

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P2-63

EARLY MATERNAL DEPRIVATION DECREASES PREFRONTAL EEG POWER IN RAT PUPS, Manon Ranger, *Columbia University, United States* E-mail: mr3691@cumc.columbia.edu

Manon Ranger, Columbia University; Michael M. Myers, New York State Psychiatric Institute; Muhammad Anwar, Columbia University; Jasmine Kaidbey, Columbia University ; Philip Grieve, Columbia University; Alexandra Schulz, Columbia University; Judith Austin, Columbia University; Robert Ludwig, Columbia University Medical Center; Martha Welch, Columbia University Medical Center

Preterm birth is coupled with periods of prolonged physical and emotional separation of mothers and infants during neonatal care. Our randomized control Family Nurture Intervention (FNI) trial showed lower EEG power in standard care infants compared to FNI infants. Early-life stress, such as maternal separation, is known to impair neurodevelopment. Here we examine effects of maternal deprivation on prefrontal EEG activity in neonatal rats as an early marker of these long-term adverse effects.

Sprague-Dawley rat pups were separated daily from their mother and littermates from postnatal day (PND) 2-10 for 3h (MS) or normally reared (Control). On PND 10, 2 pups/litter were implanted with wireless telemetry devices connected to an EEG electrode on prefrontal dura. PND 11-14, EEG activity was recorded daily in freely moving pups in the home cage. EEG power was computed for 13 frequency bands (0-100 Hz). We examined 60-sec epochs of EEG recordings in two sleeping conditions: pups were (A) attached to nipple immediately preceding a milk ejection, (B) huddled with littermates while dam was out of nest (n=9-12 MS; 8-9 Controls).

MS pups showed significant reductions in EEG power when they were attached to nipple compared to Controls: 11.9Hz ($p<0.02$), 12-15Hz ($p = 0.035$), 18-20Hz ($p = 0.023$). In contrast, no significant difference in EEG power was found between groups when pups were sleeping with littermates and the dam was out of nest.

Daily maternal and littermate deprivation significantly decreased brain electrical activity in rat pups, as compared to controls but only when pups were sleeping with

their mothers and attached to nipple. This difference was most significant in the lower frequency bands which are important indicators of cortical maturation.

S1-3

MATERNAL INTERLEUKIN-6 CONCENTRATION DURING PREGNANCY IS ASSOCIATED WITH VARIATION IN FRONTOLIMBIC WHITE MATTER AND COGNITIVE DEVELOPMENT IN EARLY LIFE., Jerod Rasmussen, *UC Irvine, United States* E-mail: jerod.rasmussen@gmail.com

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The majority of research related to prenatal maternal inflammation has been conducted in animal models. We test the hypothesis, in humans, that elevated maternal concentration of the proinflammatory cytokine interleukin-6 (IL-6) during pregnancy will be associated with variation in white matter microstructural properties in neonates. Participants were recruited in early pregnancy and maternal blood sampled in each trimester. Neonates underwent brain MRI (N=86, gestational age at birth=39.3+/-1.7 weeks, scan age=26.1+/-12.1 days) and again at age 12-months (N=32, scan age=54.0±3.1 weeks). Diffusion Tensor Imaging (DTI) focused on characterization of diffusion properties along the fronto-limbic white matter pathway (uncinate fasciculus, UF). A subset of infants' cognitive and socioemotional development was characterized using the Bayley Scales of Infant Development. Principal component analysis and tract-based linear regression were used to test the association between average (across pregnancy) maternal IL-6 and neonatal fractional anisotropy (FA). Confounding factors were tested in post-hoc analyses. Maternal IL-6 concentration was inversely associated with neonatal FA (bi-lateral, $p<0.01$) in the central isthmus portion of the UF proximal to the amygdala. Maternal IL-6 concentration was positively associated with rate of FA increase across the first year of life (bi-lateral, $p<0.05$), and inversely associated with offspring cognition at age 12-months. The latter association was mediated by FA growth across the first

year of postnatal life. Findings from the current study support the premise that susceptibility for cognitive impairment and potentially psychiatric disorders may be affected in utero, and that maternal inflammation may constitute an intrauterine condition of particular importance in this context.

P2-64

EARLY LIFE ADVERSITY WITH HEIGHT STUNTING IS ASSOCIATED WITH CARDIOMETABOLIC RISK IN ADOLESCENTS INDEPENDENT OF BMI, Brie Reid, *University of Minnesota, United States* E-mail: reidx189@umn.edu

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Objective(s): To evaluate cardiovascular and metabolic functioning in youth adopted internationally from orphanages/institutions (post-institutionalized, PI) who were height-stunted at adoption.

Study Design: A total of 30 PI youth (ages 9 to 18 years, body mass index (BMI) percentile 7.2 to 90.4) who were height-stunted at adoption were compared to age- and BMI-percentile- matched youth (n=90).

Methods: Measurements included: total body fat and visceral adipose tissue (dual X-ray absorptiometry), arterial stiffness (augmentation index and pulse wave velocity), cardiac autonomic function (heart rate variability), blood pressure, and fasting lipids, glucose, and insulin. Linear regression analyses were computed controlling for parent education, age, trunk tissue fat, height-for-age, sex and race.

Results: Compared to controls of the same age, sex and BMI, PI had higher systolic blood pressure ($p = 0.018$), augmentation index ($p=0.033$), total cholesterol ($p=0.047$), LDL cholesterol ($p=0.03$), triglycerides ($p=0.048$), insulin ($p=0.005$), and HOMA-IR ($p=0.01$). PI had lower low-frequency to high-frequency ratio ($p = 0.008$) indicating lower sympathetic tone. PI had lower total lean mass ($p=0.016$), lower gynoid lean mass ($p = 0.039$), and a higher proportion of trunk tissue fat ($p = 0.017$). PI and controls did not differ on any other body composition measures.

Conclusion(s): Early life stress, as represented by height-stunted growth in institutional care, may be associated with early pathways to cardiovascular and metabolic risk in youth even after moving into well-resourced homes early in life and in the absence of increased adiposity. These findings suggest that PI youth with a history of height stunting may need to be closely monitored for emergent cardiometabolic risk factors

P1-55

ASSOCIATIONS BETWEEN CHILDHOOD SLEEP AND NEURAL CORRELATES OF EMOTION RESPONSIVITY AND REGULATION, Brooke Reidy, *Emory University, United States* E-mail: breidy@emory.edu

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A growing body of literature demonstrates associations between sleep and emotional functioning. Adult functional neuroimaging (fMRI) studies have shown that reduced sleep duration is associated with altered amygdala and reward circuitry activation when processing emotional stimuli, as well as altered amygdala and prefrontal activation in the context of emotion regulation tasks. Recent research in our lab suggests similar associations exist between maternal reported sleep duration and brain activity in school-aged boys. Using a community sample of 32 school-aged children (ages 7-10), the current study extended this work by examining associations between sleep and fMRI activation to emotional faces during two affectively laden executive functioning (response inhibition, working memory) tasks. Sleep was assessed by maternal report as well as actigraphy measures of quality, duration and variability. In contrast to our predictions, significant associations were not found between actigraphy measures of child sleep duration and fMRI measures of emotional responsivity and regulation. Only maternal reported sleep problems over the past six months were associated with left insula and left inferior frontal gyrus activation when viewing fearful faces in the context of a working memory task. Given this, the current study provides limited evidence linking childhood sleep problems and neural activation measures of emotion responsivity / regulation. More persistent sleep problems may be more robust in terms of their associations with fMRI measures of emotional functioning in healthy children.

P1-56

DOMAIN-SPECIFICITY IN THE INTERGENERATIONAL TRANSMISSION OF EXECUTIVE FUNCTIONS, **Andrew Ribner**, *New York University, United States* E-mail: aribner@nyu.edu

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Individual differences in executive function are moderately stable throughout early childhood. Further, there is evidence that some amount of children's EF is transmitted from mothers, as there is modest stability in the relation between mom and children's EF from ages 2 to 4. To date, no investigations have examined the relation between mothers' and children's EF prior to age 2, and few have examined the role of fathers' EF.

We use a sample of N=435 children of first-time parents recruited prenatally in the US (N=114), the UK (N=197), and the Netherlands (N=124). When children were 14 months, children completed a measure of each inhibition, working memory, and planning and shifting. Factor scores for working memory and shifting were obtained, and latency to touch in seconds was used for inhibition. Both parents completed two measures of EF on laptop computers: Hearts and Flowers (a measure of inhibition) and Tower of Hanoi (a measure of planning).

Child inhibition, working memory, and shifting scores were simultaneously regressed on mom and dad inhibition and planning. Child skills were uncorrelated with one another (all ps>.3). Dad inhibition and planning were unassociated with any child skills. Mom inhibition was associated with child inhibition (β=0.15, p<.006), and mom planning was associated with child shifting (β=0.11, p=.043); however, there were no other significant associations. These findings suggest some specificity in the intergenerational transmission of EF, and that transmission may be limited to biological mothers. Further analyses will investigate relations between parent EF and child EF at age 2.

P2-65

MATERNAL REGULATION OF THREAT, DOPAMINE, AND VTA-AMYGDALA CONNECTIVITY IN DEVELOPING RAT PUPS, Patrese Robinson-Drummer, *New York University Medical Center, United States* E-mail: patrese.robinson-drummer@nyumc.org

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Emotional regulation is organized during early life and programed through maternal regulation of infant behavior and physiology. This regulation system is active during ongoing mother-infant interactions but is most salient when the infant experiences a threat, such as a painful stimulus, with caregiver presence reducing stress hormones and distress. Research indicates that maternal regulation of the infant extends to the brain, although the neurobiology and mechanisms are largely unknown. Here we examine infant rats' learning about threat with and without maternal presence. Infant rats were given paired novel (conditioned stimulus; CS) odor-0.5mA shock conditioning either in the presence of the mother or alone. Odor-shock conditioning produced learning in pups as indicated by avoidance of the CS in the Y-maze test. However, maternal presence during learning blocked pup learning such that CS avoidance did not differ from chance in pups conditioned with their mothers. Neural activity analyses indicate that learning-induced increases in amygdala activity was significantly reduced by maternal presence. A similar pattern was observed in the source of amygdala dopamine, the ventral tegmental area (VTA). In a separate group of pups, amygdala microdialysis during conditioning revealed that shock decreased DA while maternal presence increased DA. Western blot analysis revealed conditioning in maternal presence also modulated Dopamine D1 receptors. These results extend previous reports by indicating a modulation of VTA activity by maternal presence that regulates amygdala dopaminergic activity. These results suggest that maternal regulation of the infant brain involves modulation of the pups' dopamine system by the mother.

P1-58

ASSOCIATIONS BETWEEN NEONATAL ELECTROCORTICAL POWER DURING SLEEP AND NEURODEVELOPMENTAL OUTCOME IN TODDLERS, Daianna Rodriguez, *New York State Psychiatric Institute, United States* E-mail: daianna.rodriguez@nyspi.columbia.edu

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Although the etiology of autism spectrum disorder (ASD) is unclear, there is abundant evidence of structural, functional, and morphological brain abnormalities. Abnormal EEG power has been demonstrated concurrently in individuals with ASD, but few studies have investigated neonatal EEG and subsequent neurodevelopmental disorder risk. The aim of the present study was to investigate newborn indices of brain development as predictors of neurodevelopmental outcome at 36 months of age. Neonatal electroencephalography (EEG) was collected from healthy term newborns enrolled in the Prenatal Alcohol and SIDS and Stillbirth (PASS) Network in the Western Cape province of South Africa. After controlling for covariates of interest and correction for multiple comparisons, higher Brief Infant-Toddler Social and Emotional Assessment ASD Risk Scores were associated with lower EEG power during active sleep in the left frontal polar region in the Theta (2-8Hz), Alpha (10-12Hz), Beta(13-21Hz), and Low Gamma (22-36Hz) frequency bands [Theta $F(5,69)=.37$, $p<.001$, adj. $R2 = .14$; Alpha: $F(5,69)=3.49$, $p<.001$, adj. $R2 =.15$; Beta $F(5,69)=3.16$, $p<.01$, adj. $R2 = .13$; Low Gamma $F(5,69)=3.07$, $p<.01$, adj. $R2 = .13$]. Using the same procedure, significant associations were also found between expressive language ability measured by the Bayley and EEG power during quiet sleep in left occipital Theta, Alpha, Beta, and Low Gamma frequency bands [Theta $F(5,33)=7.23$, $p<.001$, adj. $R2 = .67$; Alpha $F(5,30)=5.41$, $p<.001$, adj. $R2 = .59$; Beta $F(5,33)=7.86$, $p<.005$, adj. $R2 = .78$; Low gamma $F(5,15)=9.15$, $p<.001$, adj. $R2 = .73$]. Our preliminary results demonstrate robust associations for expressive language ability and modest associations between early neural biomarkers for autism risk.

P1-59

SOCIAL EXCLUSION EFFECTS OF REJECTION SENSITIVITY ON RISK TAKING DECISIONS, **Garrett Ross**, *University of Oregon, United States* E-mail: gross5@uoregon.edu

Garrett Ross, University of Oregon

Social injuries such as social exclusion are thought to influence behavior to varying degrees. This pre-registered analysis attempted to understand the potential augmenting and attenuating factors impacting risk-taking behavior in the context of social exclusion. Specifically, we tested the moderating effects of rejection sensitivity on the relationship between childhood adversity and behavior on a risky-decision laboratory task in 133 adolescents (70 females) in Lane County, ages 11-17 at the time of enrollment. The sample included 46 adolescents (19 females) with either current or past Child Welfare System involvement, 76 adolescents (41 females) in the community, and 10 females with previous juvenile justice involvement.

We combined a modified version of an existing decision-making task (the Stoplight Task; Chein et al., 2011), with a social exclusion task (Cyberball; Williams et al., 2000). The participants played the decision-making task before and after being socially excluded, where the change in risk-taking was the difference in proportion Go decisions in each condition. Mean-centered scores from the Adverse Childhood Experiences Survey (ACES) and the anxious expectation subscale of the Rejection Sensitivity Questionnaire (RSQ) were used as interacting predictor variables in a multiple regression model.

Overall, the proportion of Go decisions increased following social exclusion, but it appeared that RSQ scores attenuated this effect somewhat. The difference in the proportion of Go decisions was negatively correlated with ACES scores for individuals with high RSQ scores, but positively correlated for individuals with low RSQ scores.

P2-66

ASSOCIATIONS OF PRENATAL MATERNAL EXPOSURE TO SSRIS AND FUNCTIONAL CONNECTIVITY ORGANIZATION UNDERLYING EMOTION PERCEPTION IN 8 MONTH OLD INFANTS – PRELIMINARY RESULTS, **Naama Rotem-Kohavi**, *University of British Columbia, Canada* E-mail: nrk@alumni.ubc.ca

Naama Rotem-Kohavi, University of British Columbia; Naznin Virji-Babul, University of British Columbia; Tim Oberlander, University of British Columbia

Perceiving emotions is critical for developing social skills in infancy. Mother's mood during and following pregnancy has been associated with long-term effects on infant's emotional development. Selective Serotonin Reuptake Inhibitors (SSRIs) commonly used to treat prenatal depression have also been associated with infant's emotional development risks. We have previously shown the functional brain organization in typically-developing infants while viewing emotional faces, using graph theory analysis (GTA) applied to electroencephalography (EEG) data. In this study, we took a similar approach to test the functional organization for viewing emotional faces in 8 month old prenatally SSRI-exposed (n=9) and non-exposed (n=16) infants. We recorded EEG brain responses while infants observed dynamic sad and happy faces and applied GTA to model the brain's functional organization differences between groups. To control for maternal mood we used Edinburgh Postnatal Depression Scale (EPDS) during the third trimester and Beck Depression at 8 months as covariates. We found an exposure x emotion interaction ($p=0.04$ mixed ANOVA) stemming from higher global modularity - reflecting higher stability of sub-networks within the global network for viewing sad faces among prenatally SSRI-exposed versus non-exposed infants ($p=0.02$). Also, we found an EPDS x emotion interaction ($p=0.013$), such that for sad emotions, in non-exposed infants higher levels of prenatal depression associates with lower sub-network stability while SSRI-exposed-infants showed no association. For happy emotions, higher EPDS was associated with increased sub-network stability in both groups. Our preliminary results suggest that different prenatal maternal environments might be associated with different developmental trajectories for emotional faces perception.

P2-67

GRAPH ANALYSIS OF RESTING STATE FMRI FOLLOWING MATERNAL SSRI EXPOSURE IN THE NEONATAL BRAIN, Naama Rotem-Kohavi, *University of British Columbia, Canada* E-mail: nrk@alumni.ubc.ca

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Selective Serotonin Reuptake Inhibitors (SSRIs) are commonly used to treat depression during pregnancy, however few studies have examined relationships between SSRI exposure and early functional neurodevelopment. Recent findings suggest that prenatally SSRI-exposed newborns have increased white-matter structural connectivity in the thalamus, anterior-cingulate-cortex (ACC), insula and amygdala. However, associations between in-utero SSRI-exposure and the functional connectivity organization in the infant brain have not been studied yet. The objective of this study is to examine prenatal maternal SSRI exposure effects on neonatal functional global and regional organization of brain regions that have previously shown altered structural connectivity using graph theory analysis (GTA). We recruited healthy (n=17), SSRI-treated (n=20) and depressed-not-treated (HAM-D scores of ≥8) (n=16) pregnant women. At postnatal day 6, infants underwent fMRI scan during natural sleep. We applied GTA to the resting-state time-series to characterize global and regional functional properties. Our results revealed qualitative group differences in the subdivision of the global network into sub-networks. While control newborns showed 4 sub-networks, SSRI-exposed (SSRI) and newborns of depressed mothers (DEPR) showed 3 sub-networks. We also found significantly higher hub-value (which measures the connectedness of a region with its neighbors), in the left thalamus and left ACC ($p=0.035$ and $p=0.04$ respectively, Bonferroni corrected, controlling for sex and age at MRI) in the SSRI group compared to the DEPR group. Our results suggest functional organization alterations of regions of thalamus and ACC known to serve as hubs in the

developing brain adding to emerging evidence associating in-utero SSRI and neonatal neurodevelopment alterations.

P2-82

INTERSENSORY REDUNDANCY, SELECTIVE ATTENTION, AND NEURAL CORRELATES OF PERCEPTUAL PROCESSING IN INFANCY, Kelly Roth,
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Kelly Roth, University of Tennessee Knoxville; Robert Lickliter, Florida International University; Greg Reynolds, University of Tennessee; James Todd, Florida International University; Lorraine Bahrick, Florida International University

According to the Intersensory Redundancy Hypothesis (Bahrick & Lickliter, 2000, 2012), the synchronous and redundant presentation of multimodal stimuli selectively recruits infant attention to and facilitates processing of amodal information. The current study utilized high-density EEG to test the hypothesis that intersensory redundancy leads to prioritization of selective attention and perceptual processing of amodal information over modality-specific information provided by multimodal stimuli. Five-month-old infants (N=8) were tested in an event-related potential (ERP) procedure with a training phase and testing phase. In the training phase, infants were exposed to 20 repetitions of a video clip of a woman reciting a phrase conveying either positive or negative affect. In the testing phase, infants were shown three different stimulus types (familiar, novel-affect, novel-face). On familiar trials, infants saw the same video clip they viewed during training. On novel-affect trials, infants saw the training actress conveying the opposite affect of that used in the training clip. On novel-face trials, the video clip displayed a novel actress conveying the same affect conveyed during training. Our analysis of the late slow wave (LSW) ERP component associated with infant recognition memory supported the prediction that the intersensory redundancy provided by audiovisual speech would lead infants to process the amodal property of affect during training over the modality-specific

facial characteristics of the actress. At temporal electrodes, infants demonstrated significant differences in the amplitude of the LSW on novel-affect trials in comparison to familiar trials. In contrast, no differences were found for novel-face trials in comparison to familiar trials.

P1-61

USING FNIRS TO INVESTIGATE IMITATION LEARNING FOLLOWING LIVE AND VIDEOCHAT INTERACTIONS DURING EARLY CHILDHOOD, Sylvia Rusnak, *Georgetown University, United States* E-mail: snr30@georgetown.edu

Sylvia Rusnak, Georgetown University; Andrei Medvedev, Georgetown University; Frank Fishburn, University of Pittsburgh; Francys Subiaul, George Washington University; Rachel Barr, Georgetown University

Children's learning within live, face-to-face and videochat interactions is supported by *contingency*, the timely and appropriate back and forth manner of response (Roseberry, Golinkoff, & Hirsh-Pasek, 2014). However, it is unknown how the brain processes information during these interactions and whether learning differs via live or videochat interactions. Imitation tasks were used to examine learning in live and video contexts, and functional near infrared spectroscopy (fNIRS) was used to measure neural activation during these tasks. In this within-subjects study, 10 4.5- to 8-year-old children performed two spatial imitation tasks (Subiaul et al., 2015, 2014; Sawaf et al., 2017) while wearing a 60-channel NIRS cap. Children participated in two conditions (live, videochat), separated by two months. In each task, an experimenter demonstrated a sequence of actions (of 2-items to remember or 4-items to remember) and then the child was tested. Behavioral performance was not different between live or videochat in either task at 2-items. However, at 4-items, in one task children performed worse ($p < 0.05$) but not the other task during videochat compared to live. Both tasks activated frontal and parietal areas, with greater activation in live compared to videochat in general ($p < 0.05$). These preliminary findings suggest that better performance after live demonstrations may be related to

higher levels of activation at retrieval than after a videochat demonstration. However, there were task-related differences in activation that require further investigation. Data collection with 3- to 8-year-olds is ongoing.

S2-4

EFFECT OF JUVENILE STRESS ON ASSOCIATIVE PLASTICITY AND MEMORY,

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Mood disorders affect the lives and functioning of millions each year. A greater understanding of the neuronal circuits underlying mood in both normal and abnormal affective states has been identified as one of the critical needs in the field of mood disorders. Stress, particularly when uncontrollable, excessive and/or prolonged, can produce a myriad of emotional and cognitive alterations facilitating both adaptive and maladaptive changes that control the way in which neurons are wired that eventually affect behavior. Regulation of synaptic transmission, intracellular signal transduction, gene expression and even structural alterations are some of the mechanisms underlying these changes. The fact that the effects of stress is long lasting even long after the elimination of the actual stressors, places a special emphasis on the regulation of transcription factors and patterns of gene expression that could underlie these changes. In our studies, the effects of stress during juvenility brings about depressive-like behavior in adulthood affecting emotional and cognitive aspects. Our preliminary gene expression profile has provided us insights on the activation and a heightened expression of epigenetic factors in these stress models, especially on the factors such as G9a/GLP. Electrophysiology results also prove that there is an altered long-term potentiation in juvenile stressed rats and the modulation of this epigenetic complex on the slices from these rats showed alleviation of long term potentiation. Thus, our studies investigate the differential mechanisms behind the regulation of stress in learning and memory models.

P2-68

MATERNAL PRENATAL OXYTOCIN AND ANXIOUS ATTACHMENT STYLE ARE POSITIVELY ASSOCIATED WITH SYMPTOMS OF DEPRESSION AND ANXIETY,

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The current study focuses on oxytocin, a neuropeptide that plays a significant role in maternal reproduction and has been linked with perinatal mood disorder risk. We examined plasma oxytocin levels in conjunction with attachment style, depressive symptoms, and anxiety in 55 pregnant women. Given controversy in the literature regarding oxytocin measurement, we also sought to make a methodological contribution by comparing two different commonly used methods for measuring oxytocin: with and without extraction prior to immunoassay. Because the antibodies used to perform immunoassay can bind to other peptides in plasma, some researchers perform sample extraction to remove these additional substances prior to analysis.

During a laboratory visit that included an interaction with the baby's father, we administered a questionnaire measure of depressive symptoms and two measures of anxiety (state anxiety and pregnancy-specific anxiety). Immediately following this visit, women underwent a blood draw for plasma oxytocin assay.

Oxytocin levels measured without extraction were much higher than levels measured with extraction, and the two oxytocin measures were not significantly correlated with each other. However, both extracted and unextracted oxytocin were positively associated with women's symptoms of depression in a model that controlled for pregnancy stage and women's BMI. Only extracted oxytocin was associated with anxiety. Anxious attachment style was also positively associated with depressive symptoms and pregnancy anxiety. Moreover, unextracted oxytocin moderated the effect of anxious attachment style on depressive symptoms.

In summary, both elevated plasma oxytocin levels and anxious attachment styles in expectant mothers might indicate prenatal mood disorder risk.

S1-4

A TALE OF TWO IMMUNE MARKERS: MATERNAL IMMUNE ACTIVATION DURING THE 3RD TRIMESTER IS ASSOCIATED WITH NEONATAL FUNCTIONAL CONNECTIVITY AND FETAL TO TODDLER BEHAVIOR, **Dustin Scheinost**, *Yale School of Medicine, United States* E-mail: dustin.scheinost@yale.edu

Dustin Scheinost, Yale School of Medicine

We tested the hypothesis that higher levels of MIA as measured by maternal interleukin (IL)-6 and C-reactive protein (CRP) during the 3rd trimester will be associated with functional connectivity of the core nodes of the salience network, insula and dorsal anterior cingulate (dACC), in neonates. In turn, the strength of connectivity will be associated with fetal and infant behavioral measures. Thirty-two pregnant women participated. During the 3rd trimester, the women underwent blood draws and heart rate variability (FHRV) assessments. IL-6 and CRP were measured using the enzyme-linked immunosorbent assay. For the offspring, resting-state functional MRI data during the neonatal period and the Bayley Scales of Infant and Toddler Development (BSID-III) at 14 months were acquired. Standard seed connectivity from the dACC, and the right/left insula was performed. IL-6 and CRP was correlated with connectivity while controlling for postmenstrual age (PMA) at scan and sex. Regions in which the strength of neonatal connectivity in the salience network correlated with maternal prenatal IL-6 or CRP levels included the medial prefrontal cortex (mPFC), temporoparietal junction, and basal ganglia. Maternal CRP level correlated inversely with FHRV acquired at the same gestational age. Maternal CRP and IL-6 levels correlated positively with the BSID-III cognitive scale. Finally, neonatal connectivity between the dACC and mPFC correlated with both FHRV and the BSID-III cognitive score. The brain regions of the salience network are critical for performing many cognitive behaviors and emotion regulation, and are consistently implicated in neuropsychiatric disorders, suggesting a pathway for MIA to increase psychiatric risk.

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P2-69

PARENTAL WARMTH AND RESPONSIVITY IS ASSOCIATED WITH DIFFERENTIAL METHYLATION PATTERNS FOR INFANTS AND TODDLERS FROM LOW INCOME, HIGH RISK FAMILIES, Lisa Schlueter, *Children's Hospital Los Angeles, Saban Research Institute, United States* E-mail: ljschlueter@gmail.com

Lisa Schlueter, Children's Hospital Los Angeles, Saban Research Institute; Sarah Watamura, University of Denver

Key environmental signals in the fetal and early postnatal period, specifically threat, instability, and less supportive caregiving, appear to initiate an accelerated maturational timeline that favors short-term survival over long-term health. These effects may occur in part through epigenetic processes that regulate gene expression. Epigenetics thus provides a promising and key mechanistic link in the gene by environment interplay that ultimately results in individual differences in development and disease. For the current study, salivary DNA from 34 young children (age M = 24.58, SD = 9.85, 41.2% female) and their mothers (age M = 33.88, SD = 5.60) was submitted to an epigenome-wide association study (EWAS) using the Illumina EPIC 850K array. The mother-child pairs were selected from a sample of families facing significant environmental and social adversity but differing in the quality of their parenting based on detailed observations. Differences in methylation by CpG site for a group of children experiencing either high or low parental warmth and sensitivity was submitted to analysis using Partek Genomic Suite Software. Despite the small sample size beta values suggest that children from these two groupings differ significantly at multiple loci of interest, with greater individual variability in mothers vs. infants, as would be expected. These findings are part of a larger effort to establish early genome-wide DNA methylation differences associated with early caregiving. Possible interpretations for CpGs with suggestive methylation differences (32) will be discussed, and specific hypothesized methylation sites from prior literature will be presented, even when well below a reasonable significance threshold.

O3-4

INTERPLAY BETWEEN SLEEP, BEHAVIORAL MATURATIONAL STATUS AND GUT BACTERIA IN INFANT DEVELOPMENT, Sarah Schoch, *University Hospital Zurich, Switzerland* E-mail: sarah.schoch@usz.ch

Sarah Schoch, University Hospital Zurich; Salome Kurth, University Hospital Zurich; Josué Castro-Mejia, University of Copenhagen; Bingfeng Leng, BGI Shenzheng; Witold Kot, Aarhus University; Lukasz Krych, University of Copenhagen; Dennis Nielsen, University of Copenhagen

Introduction

The first year in human life is characterized by rapid maturation in sleep, behavior and gut bacteria (GB) composition. Increasing evidence suggests that GB and sleep regulation are both linked to behavioral maturational status. In adults and animals GB have been linked to sleep, but this connection has not been examined in early human life.

Methods

Healthy infants were longitudinally assessed with actigraphy (n=83 3 mo, n=76 6 mo, n=36 12 mo). By adapting a published algorithm and integrating 24-h diaries we quantified Total Sleep Duration, Fragmentation, Bedtime variability and % Night Sleep. Genomic DNA from feces was subjected to 16S rRNA V3 gene amplicon sequencing (Illumina NextSeq) and we analyzed β-diversity using distance-based redundancy analysis. Behavioral status was quantified (Ages & Stages Questionnaire composite of motor, language, problem solving and social development).

Results

No sleep-GB associations were found at 3 mo. At 6 mo % Night Sleep was linked to β-diversity ($p=0.03$, decreased Bifidobacterium). Most associations were found at 12 mo. Fragmentation was linked to β-diversity ($p=0.03$): positively with prevalence of Bacteroides and negatively with Lachnospiraceae. Fragmentation was also linked to behavioral status ($r=-0.32$, $p=0.06$). Bedtime Variability was associated with β-diversity ($p = 0.02$) specifically with increased Bifidobacterium longum and decreased Bifidobacterium spp.

Conclusions

Findings uncover a complex, dynamic interplay between sleep, behavioral status and GB throughout the first year of life. We propose that the developmental trajectories of the three domains are intertwined, such that more mature sleep is associated with more mature GB profiles and more advanced behavioral status.

P2-70

GETTING TO KNOW YOU: SELF-REPORTED SOCIAL ANXIETY AT AGE 12 PREDICTS RESPIRATORY SINUS ARRHYTHMIA DURING AN UNFAMILIAR SOCIAL INTERACTION AT AGE 15, Kaylee Seddio, *University of Maryland - College Park, United States* E-mail: kayleeseddio@gmail.com

Kaylee Seddio, University of Maryland - College Park; Sabine Huber, University of Maryland; Gabriela Suarez, University of Maryland - College Park; Nathan Fox, University of Maryland

According to Porges' Polyvagal Theory, the social engagement system (parasympathetic nervous system; PNS) functions via the myelinated vagus to inhibit the influence of the sympathetic nervous system (SNS) on the heart, promoting a relaxed behavioral state during instances of social interaction; however, for individuals who are socially anxious, autonomic reactivity is dependent upon the context and familiarity of the social interaction. In a longitudinal study examining behavioral inhibition (BI) in children 15 years of age (n=30), we collected ambulatory electrocardiography data to examine sympathetic reactivity (heart rate; HR) and parasympathetic reactivity (respiratory sinus arrhythmia; RSA) during a series of socially stressful laboratory tasks. One of the stressors, known as the Get to Know You (GTKY) task, included a five-minute period where participants interacted with two unfamiliar peers. Linear regressions were calculated in order to assess the predictive power of anxiety reported at 12-years on autonomic reactivity during GTKY at 15-years. Results produced a significant regression equation where social anxiety predicted RSA [$F(1, 24)=9.208$, $p< .01$, $R2 = .277$] at 15-years during GTKY. These findings indicate that the parasympathetic nervous system engaged, allowing for an adjustment in response to the stressful environment. However, heart rate did not yield any significant findings related to anxiety. This suggests an imbalance in autonomic activity where sympathetic engagement was not down regulated by parasympathetic activity. Moreover, these findings demonstrate that chronic stress in behaviorally inhibited adolescents can lead to maladaptive changes in autonomic reactivity.

P1-62

DEVELOPMENTAL NEUROGENESIS AND APOPTOSIS ARE ALTERED BY PERINATAL PHTHALATE EXPOSURE IN THE RAT MEDIAL PREFRONTAL CORTEX, Elli Sellinger, *University of Illinois Urbana-Champaign, United States* E-mail: ellenps2@illinois.edu

Elli Sellinger, University of Illinois Urbana-Champaign; Jari Willing, University of Illinois; Janice Juraska, University of Illinois; Carly Drzewiecki, University of Illinois

The developing brain is especially vulnerable to environmental insult, such as exposure to phthalates, a class of endocrine-disrupting chemicals used as plasticizers, solvents, and emulsifiers in a variety of products. As phthalates can readily cross the placenta and are transferred to offspring through lactation, exposure can occur during early development. Previous work indicates exposure to an environmentally relevant mixture of phthalates during early development leads to a decrease in neuron number in the adult rat medial prefrontal cortex (mPFC). Here, we investigate whether phthalate exposure disrupts neurogenesis or apoptosis. Pregnant and lactating rats consumed a cookie with a dose of 0mg/kg, 1mg/kg, or 5mg/kg of the same phthalate mixture from embryonic day (E) 2 through postnatal day (P)10. Brains were analyzed at P10 for levels of apoptosis through TUNEL labelling. A second group of pregnant rats received a dose of 0mg/kg, 1mg/kg, or 5mg/kg from E2 through parturition and were injected with BrdU, a thymidine analog marker of cell proliferation, at E16 and E17. The brains of the offspring were collected at P5. Exposure to the 5mg/kg phthalate dose during early development resulted in increased apoptosis across sexes at P10 as assessed through density of TUNEL labelled cells. Prenatal phthalate exposure at both doses significantly reduced BrdU labelling in the mPFC at P5. These results demonstrate a two-hit model in that phthalate exposure dysregulates early neuronal proliferation as well as apoptosis in the mPFC leading to lasting changes in neuron number.

P2-71

CONTEXTUAL FEAR MEMORY FORMATION PROMOTES PSD-95 PHOSPHORYLATION AND MODULATES AMPAR SUBUNITS DIFFERENTIALLY BETWEEN ADULT AND JUVENILE RATS, **Harry Shair**, *New York State Psychiatric Institute, United States* E-mail: hns1@cumc.columbia.edu

Harry Shair, New York State Psychiatric Institute; Roseanna Zanca, CUNY Hunter College; Shirley Sanay, New York State Psychiatric Institute; Edgar Rodriguez, Hunter College; Peter Serrano, Hunter College

Young organisms remember for shorter periods than adults, but the mechanisms for this ontogenetic difference are unknown. Previous work has revealed that the α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptor (AMPAr) subunits are trafficked into the synaptic membrane following spatial-memory retrieval. Additionally, phosphorylated PSD-95 (pS295) promotes AMPAr stabilization at the synapse. Using a novel, contextual fear conditioning technique, juvenile (P26) or adult (P90) rats were assigned to pedestal stress or no stress control. Animals were placed in an open field for 5 min at the base of a 6in square pedestal (4ft high). Stress subjects were then placed on this pedestal for 1hr. Controls were replaced in home cages. Animals were returned to the open field for 5min either 1d or 7d following training. At 1d, stressed animals of both ages demonstrated contextual memory (increased 'freezing' time). Controls did not. At 7d, only adult stressed animals increased freezing. Twenty minutes after the retrieval test, dorsal hippocampi (DH) and amygdalae were prepared for western blot analysis. 1d fear memory retrieval induced upregulation of PSD95 and pS295 in adult amygdalae, but not in juveniles. Juveniles upregulated PKMζ and GluA2/3 in the DH; adults did not. After the 7d retrieval test, adults upregulated GluA2 in amygdalae and increased PSD95 and pS295 in DH; juveniles did neither. These results suggest that adult fear memory formation involves sequential activation of the amygdala-hippocampal pathway, involving the stabilization of AMPA receptors through increased phosphorylation of PSD95 (pS295). Conversely, juvenile contextual fear memory (lasting less than 7d) does not engage amygdala activity.

O1-5

FETAL AUTONOMIC FUNCTION AND INFANT COGNITIVE OUTCOME; EFFECTS OF PRENATAL EXPOSURE TO ALCOHOL AND SMOKING, **Lauren Shuffrey**, *Columbia University Medical Center, United States* E-mail: lcg2129@tc.columbia.edu

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The present study reports the effects of prenatal exposure to alcohol and smoking on fetal heart rate (FHR) and heart rate variability (HRV) at in late gestation and cognitive ability during infancy. Data were obtained from 2,766 fetuses in the Western Cape Province of South Africa enrolled in the Prenatal Alcohol and SIDS and Stillbirth (PASS) Network. A standardized protocol assessed FHR and variability (SD-HR, IQR) at 34 – 38 weeks' gestation. Cognitive ability was assessed at 12 months of age in a subset of participants (n=557). After controlling for sex, age at fetal assessment, monthly income, and maternal depression, there was a main effect of maternal smoking and maternal alcohol consumption on FHR during active sleep (AS) [$F(1, 2027) = 4.61$, $p=.03$]. Pairwise comparisons revealed reduced FHR in fetuses whose mothers quit smoking late or continued to smoke throughout pregnancy [$F(1, 2027)=9.45$, $p=.002$]. Additional analyses revealed reduced HRV in fetuses whose mothers quit smoking late or continued to smoke throughout pregnancy [SD-HR: $F (1, 2027)=4.48$, $p = .03$; IQR:$F(1, 2027)=4.47$, $p = .03$]. Controlling for the above co-variates in addition to infant age at follow-up, we found

significant associations between FHR during AS (bpm), cumulative standard alcoholic drinks during pregnancy, and Mullen Early Composite Standard Scores at 12 months of age [FHR:(5, 540)=8.56, $p < .0001$; Drinks:(5, 540)= 7.23, $p < .001$. Associations between cumulative standard drinks during pregnancy, FHR during active sleep and fine motor, expressive language, and receptive language t-scores were also statistically significant, p's < .0005.

AS-3

David Kucharski Young Investigator Award: SOCIAL INFLUENCES ON NEURODEVELOPMENT OF LEARNING AND SELF-REGULATION, Jennifer Silvers, UCLA, Los Angeles, CA, United States E-mail: silvers@ucla.edu

Exposure to adverse social experiences early in life can dramatically alter the tempo and nature of neurodevelopment. In this talk, I will provide an overview of research from my lab investigating how early adverse social experiences tune the developing brain. This overview will include presenting data suggesting that early adversity primes the brain to learn about threats, but not to regulate emotional responses to them. I will further discuss emerging work examining social (e.g., positive relationships) and biological factors (e.g., inflammation) that may modify links between early social adversity and subsequent development.

S3-4

OBSERVATIONAL LEARNING AS A MECHANISM FOR TRANSGENERATIONAL TRANSMISSION OF FEAR, Jennifer Silvers, *UCLA, United States* E-mail: silvers@ucla.edu

Jennifer Silvers, UCLA; Nim Tottenham, Columbia University

We humans do a great deal of learning by observing others, including what to fear and what to trust in our environment. Observational fear learning may be especially important early in life when children turn to their parents to gather information about their world. Yet, the vast majority of empirical research on fear learning in children has thus far focused on firsthand classical conditioning, which may fail to capture one of the primary means by which children acquire fears. To address this gap in the literature, the present study examined observational fear learning in children and adolescents (n=33; age range: 6-17 years) as they watched videos of their parent and an unfamiliar adult undergo fear conditioning. Subsequent to this acquisition learning phase, participants viewed the CS+ and CS- they previously observed in the videos (test phase). Participants demonstrated robust observational fear learning, as indicated by changes in their self-reported liking of the CS+ (a geometric shape that was paired with an aversive noise 80% of the observed trials) and CS- (a geometric shape that was never paired with an aversive noise on the observed trials). Observational learning was enhanced for one's own parent, and this effect was particularly pronounced among children of high-anxiety parents. Parent anxiety also predicted differential prefrontal-amygdala connectivity in their children during observational learning, and this connectivity mediated the relationship between parent anxiety and learning. These results suggest that youth preferentially learn fears via observation of their parents and that learning is influenced by parental emotional traits.

S2-1

UNDERSTANDING THE CAREGIVERS UNIQUE ACCESS TO PROGRAMMING THE INFANT BRAIN: CAREGIVER PRESENCE MODIFIES NEURAL NETWORKS PROCESSING OF TRAUMA, Regina Sullivan, *Nathan Kline Institute & NYU School Medicine, United States* E-mail: regina.sullivan@nyumc.org

Regina Sullivan, Nathan Kline Institute & NYU School Medicine; Maya Opendak, New York University Langone Medical Center; Donald Wilson, NKI and NYU School of Medicine

The quality of parental care has enduring effects on brain circuits, including ubiquitous changes in gene expression, myriad neurotransmitters/hormone, molecular signaling and anatomy. Less is known about the immediate impact of parental care quality on neural processing or mechanisms that support maternal behavior's translation into neural signals to alter development. Here we present data indicating that the attachment figure has a unique ability to assess and regulate the infant's brain. We provide three examples of pup's unique processing of sensory stimuli with the caregiver vs. alone and further illustrate that the quality of the pup's attachment to the caregiver impacts this process. These maternal modulated brain signals have profound effects on pup's immediate behavior and influence the developmental trajectory. First, mother's social buffering of pup's stress response alters the offspring's neural and behavioral response to trauma. Second, extended experience of trauma experienced from or with the caregiver derails the caregiver's ability to blunt amygdala responsiveness via dopamine. Third, maternal control over the pup's brain occurs minute to minute within the nest during typical care and maltreatment: we show that the mother's presence modifies pup's cortical synchronization, although maternal behaviors (milk ejection, grooming) increases desynchronization, due to the pups noradrenergic system. This system is disrupted during maltreatment, and this disruption continues into adulthood if the maltreatment experience is prolonged. Understanding how the mother controls the pup's neural processing of sensory stimuli, and its further manipulation by the quality of attachment, will highlight mechanisms by which maternal care changes infant behavior and alters the developmental trajectories.

P1-66

AN EYE-TRACKING SERIAL REACTION TIME TASK AS A MEASURE OF PROCEDURAL LEARNING IN 9-MONTH-OLD INFANTS, Annette Sundqvist,
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In children and adults, the serial reaction time (SRT) task is widely used to probe implicit (non-conscious) sequence learning, which underlies many motor and cognitive skills. Learning in the task has been linked to procedural memory, an implicit memory system that is impaired in neurodevelopmental disorders such as developmental language disorder and dyslexia.

However, it has been difficult to test sequence learning and procedural memory in infants. We present results from a novel eye-tracking SRT paradigm in infants. Thirty-three 9-month old infants and 31 adults were given a visuo-spatial SRT task in which three blocks of 5-item sequences were followed by a block of randomly ordered items. The stimuli consisted of novel child-friendly pictures. Eye movement data, which was collected on a Tobii T120 eye tracker, was assessed for the latencies of saccades towards appearing stimuli.

A 2x2 ANOVA confirmed that infants and adults were significantly faster at the final sequence block than the random block ($F(1, 62) = 10.1$, $p < .001$, $\eta p2 = .14$) with no interaction between infants and adults ($F(1, 62) = .09$, $p = .77$, $\eta p2 = .001$).

This novel infant SRT paradigm thus enables the measurement of sequence learning in infants, and shows that infants indeed show sequence learning, which moreover does not differ from adults. Although sequence learning was not directly tied to the procedural memory system in the present study, previous such links, and the similar performance on infants and adults, suggest a reliance on this system in infants as well.

P1-67

THE RELATIONSHIP BETWEEN INFANT EQUIPMENT USE AND MOTOR MILESTONES DURING THE FIRST 18 MONTHS, Hillary Swann, *Idaho State University, United States* E-mail: swanhill@isu.edu

Hillary Swann, Idaho State University; Nicki Aubuchon-Endsley, Idaho State University; Bryan Gee, Idaho State University; Michele Brumley, Idaho State University

The influence of infant equipment (i.e., walkers, jumpers, exersaucers, high chairs, etc.) use on early motor development is not clear. Thus, the purpose of the current study is to characterize infant equipment use, and examine the relation between equipment use and motor milestones during the first 18 months. One hundred and twenty five pregnant women were recruited during their third trimester and returned at 10, 14, and 18 months postnatally. Participants completed maternal-report measures of infant equipment use and motor milestones at each postnatal session. Results indicate that infant equipment use occurred at each age, with less than 10% of moms reporting no equipment use at 18 months. Infants were placed into equipment while awake on a daily basis for a mean of 139±55 (SD) minutes at 10 months, 118±45 minutes at 14 months, and 107±49 minutes at 18 months. The relation between infant equipment use and motor milestones varied across age and equipment type. Specifically, at 10 months, exersaucer use was negatively correlated with all 4's crawling ($r = -.46$, $p < .05$) and unsupported standing ($r = -.38$, $p < .05$), such that infants who did not engage in all 4's crawling and unsupported standing had higher durations of exersaucer use. Similar relationships were seen at 10 months with high chair use and unsupported standing ($r = -.34$, $p < .05$), and at 14 months with walker use and quad posture ($r = -.43$, $p < .01$). Results suggest that greater use of equipment during infancy is related to fewer motor behaviors that represent developmentally-important milestones.

P2-72

FOSTER PARENT SENSITIVITY AND YOUNG CHILDREN'S DIURNAL CORTISOL RHYTHMS, Aline Szenczy, *Stony Brook University, United States* E-mail: aszenczy@udel.edu

Aline Szenczy, Stony Brook University; Kristin Bernard, Stony Brook University ; Lee Raby, University of Utah; Mallory Garnett, University of Delaware; Mary Dozier, University of Delaware

Young children in the foster care system are at risk for biological dysregulation due to their experiences of early adversity, including maltreatment and disruptions in care. In particular, early adversity may lead to disruptions in functioning of the hypothalamus pituitary adrenal (HPA) axis, which regulates a diurnal rhythm of cortisol. Whereas a typical diurnal cortisol pattern is characterized by a steep slope, with high levels at waking and low levels at bedtime, children who experience early adversity often show blunted diurnal cortisol rhythms, with atypically low waking levels and high bedtime levels. Given that dysregulated neuroendocrine functioning is associated with deleterious outcomes, including increased susceptibility to psychiatric disorders, poor executive functioning, and difficulties in emotion regulation, it is critical to identify protective factors that may enhance children's biological regulation. In the current study, we aimed to examine whether foster parent sensitivity was associated with young children's diurnal cortisol rhythms. Participants included 110 children in foster care (0.6 – 4.5 years, M=2.3 years) and their foster parents. Parental sensitivity was coded from video-recorded parent-child play interactions. Saliva samples were collected at waking and bedtime across three days and assayed for cortisol. Results showed that children whose foster parents demonstrated higher sensitivity showed more normal patterns of diurnal cortisol (i.e., higher waking cortisol) than children whose foster parents demonstrated lower sensitivity. These findings suggest that parental sensitivity may be a useful target for interventions, particularly those that aim to mitigate the dysregulating effects of early adversity among children in foster care.

P1-68

ORAL OXYTOCIN ALTERS BRAIN ACTIVATION AND BEHAVIORS OF DEVELOPING MICE IN A DOSE, AGE, AND SEX DEPENDENT MANNER., Manal Tabbaa, *Florida State University, United States* E-mail: tabbaa@psy.fsu.edu

Manal Tabbaa, Florida State University; Elizabeth Hammock, Florida State University

Oxytocin (OXT) regulates social behaviors and interacts with early life experience to shape adult responses. Recent data characterizing oxytocin receptor (OXTR) ligand binding in the oronasal cavity of pre-weanling mice suggest that OXT may affect sensory processing and subsequent development. To determine the acute brain response to oral OXT, a high or low dose of OXT or saline was applied to the mouths of postnatal day (P) 14 and P21 male and female OXTR:EGFP mice. We then quantified neuronal activation, fos, in trigeminal nuclei of the brainstem, which receive facial sensory information, and interconnected regions including the paraventricular nucleus of the hypothalamus (PVN). In a second study, we quantified the sensory dependent brain and behavioral response to oral OXT versus saline with unilateral whisker brushing in P14 and P21 males and females. Oral OXT increased the correlation of fos between trigeminal sensory and motor nuclei in P14 males and P21 males and females compared to saline. Further, oral OXT decreased the variation in fos activity in sensory and motor trigeminal nuclei in males and females of both ages. Oral OXT also increased fos activity in the PVN of P14 males compared to saline. In study 2, fos and orofacial and locomotor behaviors were altered after oral OXT and unilateral whisker brushing compared to saline with a significant interaction between treatment and sex on oral behavior, locomotor, and resting activity. Altogether, these data implicate an age and sex dependent coordination of the trigeminal sensorimotor feedback loop regulating behavior via peripheral OXTR.

P2-73

CORTISOL AND SOCIOECONOMIC STATUS IN EARLY CHILDHOOD: A MULTIDIMENSIONAL ASSESSMENT, Amanda Tarullo, *Boston University, United States* E-mail: atarullo@bu.edu

Amanda Tarullo, Boston University; Charu Tuladhar, Boston University; Katie Kao, Boston University; Jerrold Meyer, University of Massachusetts

Young children of low socioeconomic status (SES) are more likely to have dysregulated cortisol (Blair et al., 2013), which is a key physiological mechanism through which early life stress leads to adverse health outcomes (McEwen, 2006). As both SES and cortisol are multidimensional, nuanced consideration of these associations is critical to elucidate mechanisms underlying socioeconomic health disparities. We examined multiple parent-reported socioeconomic indicators in relation to hair cortisol and diurnal salivary cortisol in 12-month-old infants (N=90) and 42-month-old children (N=91). In infants, higher hair cortisol was associated with lower income and parental occupational prestige and higher food insecurity, household chaos, and neighborhood chaos. Food insecurity and neighborhood chaos uniquely contributed to infant hair cortisol, accounting for 18% of the variance, $F(2,67)=8.62$, $p<.001$. Infant salivary cortisol diurnal area under the curve (AUC) correlated positively with food insecurity and household chaos. For preschool children, higher hair cortisol was associated with lower parental education and occupational prestige and higher food insecurity, with food insecurity and education accounting for 22% of the variance, $F(2,80)=12.80$, $p<.001$. No SES indicators related to preschool salivary AUC. Results suggest that in early childhood, hair cortisol relates to multiple dimensions of SES and may be more sensitive than salivary cortisol to the cumulative effects of poverty. The specific associations of food insecurity and neighborhood chaos with infant cortisol parallel adult research linking hair cortisol to unpredictable and unsafe contexts (e.g. Henley et al., 2014). Findings underscore the need for multidimensional assessments of SES when examining physiological impacts of poverty.

P1-69

EARLY GRASPING SKILL PREDICTS LATER GROWTH IN BIMANUAL SKILL IN INFANTS, Megan Taylor, *Florida International University, United States* E-mail: mtayl090@fiu.edu

Megan Taylor, Florida International University; Eliza Nelson, Florida International University

The ability to grasp objects precedes infants' ability to act on objects in complex ways using both hands. However, whether grasping skill can predict the development of bimanual skill is unknown. The goal of this study was to examine developmental cascades in fine motor skill. Ninety infants were examined at seven timepoints in a longitudinal design. Touwen's neuromotor assessment (Touwen, 1976) was used to measure grasping skill at 6 months of age. Grasping skill was rated on a scale from 0 to 5 with 0 indicating that the infant was unable to demonstrate goal-directed motility with the hands and 5 indicating that the infant could hold two toys in one hand in order to acquire a third toy with the open hand. Bimanual skill was measured at monthly assessments from 9 to 14 months. Infants were presented with 17 objects individually that afforded role-differentiated bimanual manipulation (RDBM) where one hand holds the object for the other hand's manipulation. Frequencies of RDBM and hand use were coded offline with the software program the Noldus Observer. Conditional latent growth model analysis revealed that 6 month grasping skill significantly predicted growth in RDBM from 9 to 14 months controlling for socioeconomic status, $\beta=0.006$, SE = 2.42, $p < 0$ .05. Results indicate that early skill level plays a fundamental role in the growth of later skills in motor development. These findings support the notion of developmental cascades and a future direction will be to examine whether early motor skill is linked to social and cognitive development.

S5-4

INFANT SLEEP, MOTHERS' BEDTIME BEHAVIOR, AND 12-MONTH INFANT ATTACHMENT: THE MODERATING ROLE OF INFANT SLEEP DURATION,

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Although sleep in childhood is regarded as promotive of children's self-regulation (El-Sheikh, 2011), linkages between infant sleep and infant attachment security are poorly understood. Attachment theory identifies parenting quality as the primary determinant of infant attachment security (Ainsworth et al., 1978) but says little about the role of child sleep in the development of attachment. At the same time, infants with better regulated sleep may be more capable of organizing behavior and using the parent as a secure base than infants who sleep poorly. The present study examined direct and interactive associations between first-year infant sleep, mothers' emotional availability (EA) with infants during bedtimes, and 12-month infant attachment to mothers.

Data for this study drew from an NIH-funded study of infant sleep, parenting, and infant development. Correlational and multi-level modeling analyses revealed that maternal emotional availability, averaged across the first year, and longer infant sleep durations (from actigraphy, averaged across the first year) each predicted 12-month infant attachment security (from the Attachment Q-Set; Waters, 1995), ps < .05). Importantly, infant sleep duration interacted with mothers' EA, such that mothers EA across the first year predicted infant attachment only among infants with shorter sleep durations (Figure 1), but not among infants with longer sleep durations (Figure 2). These analyses suggest that maternal bedtime parenting quality mattered

more among infants with poor self-regulated sleep than among infants with adequate self-regulated sleep. These and additional results will be discussed in relation to diathesis-stress and differential susceptibility models linking infant sleep, parenting, and attachment.

S2-3

ADAPTATION OF THREAT-RELATED NEUROBIOLOGY FOLLOWING EARLY PARENTAL DEPRIVATION, Nim Tottenham, *Columbia University, United States*
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Nim Tottenham, Columbia University

Early caregiver deprivation has been associated with an increased risk for alterations of neurobiology (e.g., the amygdala, hippocampus, and prefrontal cortex) that give rise to internalizing problems like anxiety and depression. However, these alterations sometimes have cost-benefit trade-offs, suggesting they might be better understood through the lens of developmental adaptations. This talk presents behavioral and neuroimaging findings from children and adolescents who either experienced previous institutional caregiving (PI youth) or caregiving by a biological parent from birth. Participants completed a battery of tasks that assessed emotional attention, emotional learning, and emotional appraisals. Enhanced emotional attention and learning was associated with increased amygdala reactivity and a broader recruitment of several regions, including increased connectivity with prefrontal cortex and hippocampus in the PI youth. These patterns were not observed in the comparison group, and instead are typically observed in adults. However, this more adult-like broader recruitment predicted significant improvements in future anxiety (measured 2 years later). Moreover, more adult-like emotional appraisals were associated with resilience against internalizing problems. These results suggest that early adversity alters the affective neurobiology. However, some of these alterations might be evidence of developmental adaptations that have behavioral advantages following exposure to early parental deprivation. These differences are interpreted as ontogenetic adaptations and potential sources of resilience.

P1-70

COSLEEPING AND BIO-BEHAVIORAL SELF-REGULATION IN INFANTS, Charu Tuladhar, *Boston University, United States* E-mail: tuladhar@bu.edu

Charu Tuladhar, Boston University; Amanda Tarullo, Boston University

Body contact with parents during cosleeping could facilitate biological self-regulation in infants and emerging self-regulatory behaviors. However, there is mixed evidence for whether co-sleeping is associated with better infant cortisol regulation (Beijers et al., 2013, Lucas-Thompson et al., 2009), and the relation between co-sleeping and behavioral regulation has not been examined. Further, to understand environmental influences on infant self-regulation it is critical to determine if biological and behavioral indices are independent or reflect a unified construct. We investigated cosleeping in relation to biological self-regulation (diurnal salivary cortisol), and behavioral self-regulation (self-soothing behaviors during a stranger approach) in 12-month-old infants (N=84, Mage=12.26, Female=42). About 40% of infants coslept at least part of the night. Cosleeping infants had greater cumulative daily cortisol exposure, indexed by salivary cortisol AUC, $t(57.9)=-2.15$, $p=.035$. By contrast, cosleeping infants used more self-soothing behaviors, $t(77.95)=-2.23$, $p=.029$, compared to non-cosleeping infants. Thus, paradoxically, cosleeping related to cortisol dysregulation but to better behavioral regulation. Infants who used more self-regulatory behaviors had a steeper diurnal slope ($r=.311$, $p=.008$), reflecting healthier cortisol rhythm across the day, but diurnal slope was independent of cosleeping. Results suggest some overlap of behavioral and biological self-regulation in infancy, but these indices have differential associations with cosleeping. Further, salivary

AUC and diurnal slope represent distinct aspects of cortisol regulation and may play separable roles in infant self-regulation. For this sample, cosleeping is not the cultural norm, and future research should examine whether the observed association with biological stress generalizes to a culture where cosleeping is more prevalent.

P1-71

TRIGEMINAL GANGLIA CORRELATES OF HYPOTHALAMIC OXYTOCIN PRODUCTION IN NEONATAL MICE., Radhika Vaidyanathan, *Florida State University, United States* E-mail: rv14c@fsu.edu

Radhika Vaidyanathan, Florida State University; Elizabeth Hammock, Florida State University

Oxytocin (OXT) via the oxytocin receptor (OXTR) facilitates species-typical social behavior. Recent evidence indicates that sensory stimulation of the face during the neonatal period can increase the production of OXT in the infant mouse brain. Our lab has identified peripheral regions expressing OXTR protein and Oxtr mRNA in neonatal C57BL/6J mice. Peripheral OXTR may modulate OXT production and release in the hypothalamus. To begin to evaluate the neural circuits by which socially acquired OXT and/or sensory input may enhance infant OXT production, we are performing anatomical and functional studies. In our first study, we further explore the specific subpopulation of trigeminal sensory neurons that express Oxtr mRNA through in-situ hybridization. Double label in situ hybridization will identify which subpopulation of sensory neurons in the trigeminal ganglia express Oxtr mRNA. Because OXTR activation can promote OXT release, in our second experiment, we tested the hypothesis that congenital loss of Oxtr would impair the development of OXT production in C57BL/6J mice. Our preliminary results showed that at postnatal day 8, male Oxtr knockout mice show a 40% reduction in Oxt

mRNA levels compared to WT animals determined by RT-q PCR. In this study, we further explore the congenital loss of Oxtr on Oxt expression in the PVN and SON by RT-q PCR at postnatal day 14 and adulthood. These findings suggest that socially acquired OXT acting at peripheral OXTR may influence the sensory-dependent development of neural circuits and infant production of OXT.

O2-2

IN VIVO RESPONSES TO INFANT VOCALIZATIONS IN THE PARAVENTRICULAR HYPOTHALAMUS, Silvana Valtcheva, *New York School of Medicine, United States* E-mail: silvana.valtcheva@nyumc.org

Silvana Valtcheva, New York School of Medicine; Robert Froemke, NYU School of Medicine

Maternal care is critical for child survival and health (Dulac et al., 2014; Rilling and Young, 2014). Healthy maternal sensitivity is characterized by the ability to reliably recognize and respond to infant signals, initiating appropriate caregiving responses. Although motherhood is a dramatic natural experience, little is known about mechanisms supporting experience-driven plasticity in the maternal brain. Recent studies from our lab (Marlin et al., 2015; Mitre et al., 2016) showed that the neuropeptide oxytocin promotes long-term plasticity in mouse auditory cortex, enhancing maternal behavior and leading to long-lasting changes in neural responses to infant sounds. Physiological release of oxytocin from the paraventricular nucleus (PVN) of the hypothalamus in response to infant vocalizations and other stimuli might help induce recognition of different infant cues and enable appropriate maternal behaviors.

Here we performed in vivo cell-attached and whole-cell recordings from PVN neurons in awake head-fixed mice. We recorded from optically-identified PVN oxytocin neurons in newly-maternal and virgin mice. We found that PVN neurons in dams show reliable responses to pup calls, but responses in PVN neurons of virgins were weak and less coherent. This suggests that PVN neurons are prewired to respond to natural auditory stimuli with behavioral significance and these responses get selectively strengthened with the transition to motherhood. We used retrograde tracing to identify inputs driving auditory responses in PVN neurons. Finally, we mapped which populations of PVN neurons are activated by pup calls or suckling. Our results delineate a complex circuit refined by maternal experience for stimulating oxytocin release.

AS-1

Sandra G. Wiener Student Investigator Award: DEVELOPMENTAL TRAJECTORIES OF STRESS PHYSIOLOGY AND SUBCORTICAL NEUROBIOLOGY FOLLOWING EARLY CAREGIVING ADVERSITY, Michelle VanTieghem, *Columbia University, United States* E-mail: michelle.vantieghem@gmail.com

Michelle VanTieghem, Columbia University; Marta Korom, University of Delaware; Jessica Flannery, University of Oregon; Tricia Choy, Columbia University; Christina Caldera, UCLA; Laurel Gabard-Durnam, Boston Children's Hospital; Bonnie Goff, UCLA; Dylan Gee, Yale University; Kathryn Humphreys, Vanderbilt University; Eva Telzer, UNC Chapel Hill ; Mor Shapiro, Kaiser Permanente Woodland Hills; Dominic Fareri, Adelphi University; Jennifer Louie, Kaiser Permanente; Niall Bolger, Columbia University; Nim Tottenham, Columbia University; Liliana Varman, Teachers College

Prior research has identified altered stress physiology and neurobiology following early adversity either in childhood or adolescence cross-sectional samples, often with conflicting results (e.g. hypo vs. hyper-cortisol; larger vs. smaller amygdala). In the current study, we use an accelerated longitudinal design to characterize

trajectories of diurnal cortisol and subcortical brain development from early childhood to late adolescence following early institutional care. 227 subjects (140 comparisons, 87 Previously Institutionalized (PI]; ages 4-19) participated in 1-3 waves of diurnal cortisol collection and a sub-sample (N = 165; 94 comparisons, 72 PIs) completed 1-3 MRI scans at two-year intervals. Using piecewise mixed-effects modeling, we identified non-linear age-effects in diurnal cortisol within the PI group; such that in childhood, the PI group showed blunted waking cortisol, which changed to heightened waking cortisol during adolescence. Similarly, adversity-related amygdala phenotypes varied by age in the PI group, such that larger amygdala volumes were observed during childhood, which then switched to smaller amygdala volumes by adolescence. In contrast, group differences in hippocampal volumes were age-invariant, with smaller hippocampi in the PI group. Together, these data suggest that the neurodevelopmental sequela following early caregiving adversity is age-specific, with dynamic changes across childhood and adolescence.

P1-72

SOCIAL RELATIONSHIPS CONTRIBUTE TO PHENOTYPIC VARIATION WITHIN CAGES OF LABORATORY MICE, Justin Varholick, *University of Bern, Switzerland* E-mail: justinvarholick@gmail.com

Justin Varholick, University of Bern; Alice Pontiggia , University of Bern; Eimear Murphy, University of Bern; Vanessa Daniele, University of Zurich; Rupert Palme, University of Veterinary Medicine; Hanno Würbel, University of Bern; Bernhard Voelkl, University of Bern; Jeremy Bailoo, The University of Bern, Switzerland

This study examined whether the social-context of groups of mice accounted for more variation than the cage-context, by measuring the social dominance ranks and hierarchies of mice housed in standard laboratory cages and evaluating their relation to phenotypic variation. A total of 78 male and 81 female SWISS mice were housed in 26 and 27 same-sex trios, respectively. Dominance relationships were measured, using the competitive exclusion task, across adulthood for three weeks. The following phenotypes were also measured: agonistic behavior in the home-cage and

during a social-reunion task, exploration in the open field and elevated plus-maze, memory in a novel object test, and glucocorticoid metabolites in fecal boli. Most cages formed unclear dominance relationships, where individuals could not be assigned a unique dominance rank. Of the groups that formed clear dominance relationships, despotic trios — where only one dyadic relationship is unclear — were more common than transitive trios. An information-theoretic approach indicated that the best model, predicting most phenotypes, included: cage assignment, dominance rank, and the interaction between dominance rank and dominance hierarchy as predictors (Akaike weight; wi=1.0); only memory in the novel object test could not be estimated by any predictors. Also, agonistic behavior was not included in any formal analyses due to inflated zero values and virtually no variance. The findings highlight the importance of social-contexts within cages of mice in shaping phenotypic differences. It also offers new areas of investigation concerning the emergence and maintenance of different dominance hierarchies formed by mice housed in laboratory cages.

P2-16

EARLY LIFE ADVERSITY, ATTACHMENT AND CARDIOVASCULAR BLOOD PRESSURE REACTIVITY AND RECOVERY, Shruthi Venkatesh, *Berger Institute for Work, Family & Children, Claremont, United States* E-mail: svenkatesh18@cmc.edu

Shruthi Venkatesh, Berger Institute for Work, Family & Children; Nadya Dich, University of Copenhagen; Thomas Fuller-Rowell, Auburn University; Gary Evans, Cornell University; Stacey Doan, Claremont Mckenna College

Early life adversity (ELA) is associated with physiological dysregulation which in turn increases the likelihood of physical and mental health problems later on in life. However, the effects of ELA can be mitigated by sensitive parental care. Developmental perspectives suggest that the relative contributions of parents may change as a function of the child's age. In particular, a unique characteristic of adolescence is the transition to more independence from the family environment to a

larger social environment that includes intimate friends and other peers. Thus, during adolescence the effectiveness of parents as a stress buffer may be diminished, as peers becoming increasingly important. In the current study we examine the relations between ELA and adolescent's stress response. We also explore the potential moderating role of attachment to parents and peers. Adolescents (N = 204, Mage = 17, Female = 99) and a caregiver participated in the study. Early life adversity was assessed via parental structured interview, and the Life Events Checklist. Adolescents reported on attachment to parents and peers using the Inventory of Parent and Peer Attachment. Stress was assessed using the Trier Social Stress Test via blood pressure assessed at baseline, during reactivity to the stressor, and a rest period afterwards for recovery. Results demonstrate a significant effect of ELA on recovery, but not reactivity. Attachment to peers also interacted with early life adversity, leading to quicker recovery in low risk conditions, but slower recovery in high risk conditions. There was no effect of attachment to parents.

P1-73

EYEBLINK CONDITIONING AS A BIOMARKER FOR CHILDREN'S SUCCESS ON SPATIAL REORIENTATION TESTS, Vanessa Vieites, *Florida International University, United States* E-mail: vviei001@fiu.edu

Vanessa Vieites, Florida International University; Bethany Reeb-Sutherland, Florida International University; Shannon Pruden, Florida International University

After losing a sense of position in the environment, animals use a variety of cues, such as salient landmarks and/or the geometric shape of their environment, to reestablish their orientation and navigate their way in space. One area of the brain known to support the formation of spatial memory is the hippocampus, which develops in a protracted fashion. For example, compared to school-aged children,

pre-school children tend to perform poorly on large-scale spatial tasks (e.g., spatial reorientation), suggesting that their hippocampi are not fully developed. One common, non-invasive technique used to study associative learning and memory processes is Pavlovian eyeblink conditioning (EBC), the neural substrates of which include the hippocampus. Thus, EBC may be a potential, simple biomarker for success in tasks that require the hippocampus, such as spatial reorientation. The present study sought to use EBC to assess whether the hippocampus is involved in the development of spatial reorientation abilities in young children. Fifty children between the ages of 3 and 6 years (M = 4.89; SD = 1.11) completed a spatial reorientation test, a hippocampal-dependent EBC task, and a non-hippocampal-dependent processing speed test. Results revealed that controlling for the effects of age, individual differences in EBC performance significantly predicted children's use of geometric strategies for spatial reorientation (B = .223; p = .014), but did not predict processing speed abilities (B = -.006;p = .866). Findings indicate that hippocampal function as determined by EBC performance plays an important role in the use of geometric strategies for reorienting in space, independent of age.

P2-74

DIFFERENTIAL EFFECTS OF EARLY LIFE STRESS ON COGNITIVE CONTROL AND ANXIETY SYMPTOMS, **Yael Waizman**, *University of California, Los Angeles, United States* E-mail: yaelwaizman00@ucla.edu

Yael Waizman, University of California, Los Angeles; Joao Guassi-Moreira, University of California, Los Angeles; Emilia Ninova, UCLA; Jennifer Silvers, UCLA

Early-life stress (ELS), and particularly institutional orphanage care, has been associated with the development of internalizing psychopathology, such as anxiety as well as problems with cognitive control. However, little prior work has examined

both anxiety and cognitive control in the same ELS-exposed sample. The current study aimed to investigate whether ELS holds differential effects on cognitive control and anxiety. Twenty-five PI youths and twenty-five control youths (Mean age = 15.64) completed a classic Stroop Task to measure inhibition, a core component of cognitive control. Cognitive control was operationalized as the mean difference in reaction time for congruent vs. incongruent trials on the Stroop Task. Thirty-four parents completed the Screen for Child Anxiety Related Disorder (SCARED) questionnaire to assess anxiety symptomatology in their children. Data collection is ongoing. On average, PI youth (M = 20.41, SD = 12.68) exhibited greater anxiety than comparison youth (M = 12.82, SD = 10.19), t(32)=1.92, p=.06. Highly comparable behavior performance on the cognitive control task was found for PI youth (M = -.07, SD = .05) and controls (M = -.09, SD = .06), t(48)=.34, p=.33. Within the same sample, individuals exposed to ELS showed relative impairments in terms of anxiety symptoms, but not in terms of cognitive controls. Additional work is needed to assess the relationship between cognitive control and anxiety within PI youth.

P2-75

EFFECTS OF PRECONCEPTIONAL AND GESTATIONAL OPIOID (BUPRENORPHINE) EXPOSURE IN RATS ON NEURODEVELOPMENT IN MALE AND FEMALE OFFSPRING, **Chela Wallin**, *Wayne State University, United States*
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In the midst of the opioid crisis in the United States, opioid dependence among those of reproductive age and pregnant women has dramatically increased. Importantly, many women are using opioids (illicit or opioid-maintenance drugs, like buprenorphine (BUP)) prior to, at the time of conception, and throughout gestation despite the dearth of knowledge about the long-term consequences of preconceptional and gestational exposure for the offspring. The current study uses a novel translational rodent model of BUP exposure starting before pregnancy and investigates neonatal abstinence syndrome (NAS) and development throughout adolescence in male and female offspring. Female rats are injected (s.c.) daily with either a low- (0.3 mg/kg, mimicking opioid maintenance therapy levels) or high- (1.0 mg/kg, mimicking abuse levels) dose of BUP starting before conception and continuing throughout both pregnancy and postpartum to avoid withdrawal symptoms in the dams. It is expected that dams exposed to high-dose BUP treatment will have increased levels of the stress hormone corticosterone and decreased maternal care compared to low-dose BUP. Both male and female offspring will be tested NAS symptoms and maturational milestones like eye opening. Offspring will also undergo several behavioral tests in adolescence to measure cognitive performance, pain sensitivity, and stress sensitivity. We expect offspring from high-dose dams to perform worse on these tests compared to low-dose or control offspring. Our results will elucidate the consequential effects of preconceptional and gestational BUP exposure on neurobehavioral effects in offspring and may provide critical information relevant to behavioral, developmental, and teratogenic risks in humans.

O2-5

PARENTAL WARMTH AND RESPONSIVITY BUFFERS MALADAPTIVE DIURNAL CORTISOL PATTERNING IN INFANTS AND TODDLERS FROM LOW INCOME, HIGH RISK FAMILIES, Lisa Schlueter, *Children's Hospital Los Angeles, Saban Research Institute, United States* E-mail: ljschlueter@gmail.com

Sarah Watamura, University of Denver; Lisa Schlueter, Children's Hospital Los Angeles, Saban Research Institute

Early life stressors have been associated with poor physical and mental health outcomes in adulthood. Importantly, animal models suggest that caregivers' early life stress can have intergenerational effects that then impact the health and well-being of their offspring. This important question was explored in a population of infants and toddlers (n=134, age M= 24.30, SD= 9.89 months, 41.8% female) and their families enrolled in Early Head Start which consisted largely of Latino immigrant families (52%), living at or near the poverty line (79.9%), with over half of the current sample endorsing at least moderate caregiver mental health symptoms and substantial caregiver history of childhood adversity. Linear regressions were run and results showed that after controlling for important covariates (income-to-needs, caregiver race and ethnicity, and target child early life stress) higher caregiver history of adversity (e.g., ACE 6 or more) was related to higher noon, $b = .28$, $t(77)= 2.45$, $p < .05$, and bedtime cortisol values, $b = .34$, $t(80)= 2.81$, $p < .01$. Hierarchical multiple regression analyses were run and tests of simple slopes revealed that caregiver warmth and responsivity moderated this relationship such that caregiver history of adversity was more strongly associated with higher noon and bedtime cortisol values at lower levels of caregiver warmth and responsivity. These finding suggest an important role of sensitive caregiving in the development of adaptive stress physiology -a key component of later psychological and physical health outcomes- as well as the potential to interrupt the intergenerational transmission of stress.

P1-74

EVIDENCE FOR AUTONOMIC CO-REGULATION THROUGH VOCALIZATION OF MOTHERS AND PRETERM INFANTS DURING A 4-MONTH FOLLOW-UP, **Martha Welch**, *Columbia University Medical Center, United States* E-mail: mgw13@columbia.edu

Martha Welch, Columbia University Medical Center; Amie Hane, Williams College; Robert Ludwig, Columbia University Medical Center; Judith Austin, Columbia University; Michael M. Myers, New York State Psychiatric Institute; Katie Kwon, Columbia University Medical Center

Calming Cycle theory hypothesizes that the autonomic nervous systems of mother and infant become co-regulated via repeated calming cycles. Here, we looked for markers of co-regulation in vocal exchanges between mother and preterm infant. Study subjects included 71 mother-preterm infant dyads from a randomized controlled trial comparing Family Nurture Intervention (FNI) with Standard Care (SC). FNI families received an intervention of repeated calming cycles across their infant's hospitalization in the NICU. Vocal recordings were obtained during a 4-month follow-up, edited by experienced researchers and coded with an automated program. We hypothesized that interactive contingency for vocal Switching Pause would be less variable among FNI mothers compared to SC mothers. Lower self-contingency is believed to reflect greater consistency or homeostatic regulation (i.e., the attempt to maintain target behavior that is informed by prior behavior). Findings show that the variability in mothers' estimated self-contingency for Switching Pause was significantly lower in the FNI group. For every 1-second increase in average prior Infant Switching Pause, current Mother Switching Pause increased by more among SC mothers (+0.204) than among FNI mothers (+0.070). Thus, homeostatic regulation was greater for mothers' Switching Pause among FNI. This maternal vocal finding taken together with prior infant gaze findings supports our hypothesis of mother-infant co-regulation.

P1-75

PATERNAL HIGH FAT DIET AFFECTS EXPRESSION OF HYPOTHALAMIC

POMC IN THE OFFSPRING: A POTENTIAL EPIGENETIC MECHANISM FOR OBESITY, **Aron Weller**, *Bar-Ilan University, Israel* E-mail: aron.weller@biu.ac.il

Aron Weller, Bar-Ilan University; Tzlil Menashe, Bar Ilan University; Tatiana Kisliouk, The Volcani Center; Tzlil Tabachnik, Bar Ilan University; Asaf Marco, Bar-Ilan University; Noam Meiri, The Volcani Center

Parental obesity is a risk factor for future generations. Proopiomelanocortin (POMC) is an anorexigenic precursor neuropeptide regulating food intake and body weight (BW) in the hypothalamic arcuate nucleus (ARC). We have found that maternal high fat diet (HFD) resulted in obese offspring with associated malprogramming of Pomc gene expression. To examine the possibility of epigenetic heredity while minimizing (maternal) environmental effects, we examined the effect of paternal HFD on the offspring.

Method: Male Wistar rats received from postnatal day (PND)21 to PND90 either HFD or chow (control) and were mated with chow fed dams. After conception the males were removed. All dams and offspring received standard chow. On PND21 half of the offspring from both HFD and chow fathers were sacrificed, the other half were challenged with HFD from PND40-60. Offspring feeding, BW, leptin levels and ARC Pomc promoter methylation status were analyzed.

Results: Male offspring to HFD fathers (OtHFDf) weighed less than offspring to control fathers during the 1st two postnatal weeks, but not later. At PND21 they showed higher methylation in site 3 and 4 on the Pomc promoter, NF-KB potential binding sites, compared to offspring of chow-fed fathers. The OtHFDf gained significantly more weight and tended to have higher plasma leptin levels than age matched controls in the HFD challenge, at PND60. OtHFDf presented significantly higher mRNA levels of Pomc and AgRP, compared to offspring of chow-fed fathers that received chow in the HFD challenge.

Conclusions: These results support paternal epigenetic heredity of obesity-related traits.

Support: ISF.

P1-76

AGE-OF-ONSET AND SEX INFLUENCE ESCALATION OF METHAMPHETAMINE SELF-ADMINISTRATION, SUBSEQUENT RECOGNITION MEMORY, AND NEUROADAPTATIONS IN SPRAGUE-DAWLEY RATS, **Sara Westbrook**, *University of Illinois Urbana-Champaign, United States* E-mail: srwestb2@illinois.edu

Sara Westbrook, University of Illinois Urbana-Champaign; Megan Dwyer, University of Illinois Urbana-Champaign; Laura Cortes, University of Illinois Urbana-Champaign; Joshua Gulley, University of Illinois Urbana-Champaign

Adolescent-onset and female drug users often suffer greater consequences than adult-onset and male users. Evidence from some rodent studies supports age-of-onset and sex as vulnerability factors in drug use; however, investigation of the potential interaction of these vulnerability factors is limited. Here, we sought to address this gap by examining Sprague-Dawley rats of both sexes who began methamphetamine (METH, i.v.) self-administration (SA) in adolescence (postnatal [P] day 41) or adulthood (P91). Following recovery from catheterization surgery, rats were given 7 daily 2 h METH SA sessions, followed by 14 daily long access (LgA; 6 h) sessions. LgA SA paradigms have been shown to encourage escalation of intake over time, which is a common drug-taking pattern in human abusers. After 7 and 14 days of abstinence, novel object (OR) or object-in-place (OiP) recognition was assessed with task order counterbalanced. Prefrontal cortex and nucleus accumbens were collected 7 days after the final cognitive test. Assessment of NMDA receptor subunits and dopamine D1 receptor expression is ongoing. We found that during LgA sessions, adolescent-onset rats escalated METH intake more rapidly than adult-onset rats, with adolescent-onset females earning the most infusions. Adolescent-onset rats exhibited modest deficits in OiP compared to adult-onset rats, but there was no sex difference in this effect and no groups differed in OR. Our findings in rats suggest that age-of-onset and sex may confer cumulative vulnerability to problematic patterns of drug-taking, but not drug-induced cognitive dysfunction, that may contribute to the worse outcomes of drug use in these populations.

P1-77

DEVELOPMENTAL CHANGES IN FRONTO-CENTRAL EEG ACROSS INFANCY ARE RELATED TO LANGUAGE AND EXECUTIVE FUNCTIONS IN CHILDREN,

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Theoretical work has suggested that increases in EEG power and decreases in coherence may occur over time among proximal sites that are undergoing maturation and becoming specialized for different functions (Thatcher, 1994). Consistent with this, infant EEG studies have reported that greater differentiation of left frontal and central cortical activity was positively related to expressive communication skills (Mundy, Fox, & Card, 2003). Building on this work, the current study examined longitudinal changes in fronto-central EEG across infancy in relation to expressive and receptive language skills in toddlerhood. Additionally, because early language skills may serve as a foundation for higher-order cognition (Kuhn et al., 2014), indirect effects from EEG changes to executive function (EF) skills in preschool were expected. Baseline EEG was recorded at 10-months and 2-years (N=322); power and coherence from frontal and central sites were analyzed in the 'developmental alpha' (6-9 Hz) band. Language was assessed via maternal report and observation in the toddler period. EFs were observed at 4-years. Path analyses was conducted in Mplus. Increases in central EEG power and decreases in fronto-central coherence across the second year were positively related to language, and indirectly related to EF skills in preschool. Findings suggest that neural processing in the frontal lobe is important for learning what words mean, but that functional differentiation of this region is important for learning to use words as tools to communicate. Neural development in infancy may be related to EFs in preschool indirectly through an influence on early language skills. [NIH: HD049878, HD043057]

P2-76

DIFFERENTIAL RESPONSE IN MALE AND FEMALE INFANT RATS TO MATERNAL PRESENCE DURING FEAR CONDITIONING, Amanda White, *University of Michigan, United States* E-mail: whiteama@umich.edu

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Beginning in infancy, social cues play a crucial role in the regulation of emotional state and behavior. Mothers can suppress amygdala activity, cortisol release, emotional distress, and fear learning in their child, an effect termed “maternal buffering.” When infant rats undergo fear conditioning in the presence of a calm mother, they do not acquire an association between the neutral cue and mild foot shock. There is an emerging literature on sex differences in expression of fear and social regulation of fear in adults; however, sex differences in maternal buffering of fear have not received much attention. Here, we examined whether maternal presence differentially modulates fear in female and male rat pups. On postnatal day 13 (P13), pups received 11 peppermint odor-tail shock pairings in the presence or absence of an anesthetized dam. On P18, pups underwent a freezing test. In females, we found a significant main effect of maternal presence ($p = 0.008$); females that were conditioned in the presence of an anesthetized dam ($n = 6$) froze significantly less than females that were conditioned in the absence of an anesthetized dam ($n = 7$). However, we did not observe this effect in males conditioned in the presence of an anesthetized dam ($n = 7$) and males that were not ($n = 5$) ($p = 0.75$). These data demonstrate that female pups are more susceptible to maternal buffering of fear, and suggest that sex differences in social regulation of emotion emerge very early in life.

P2-02

ANXIETY FACILITATES AFFECTIVE THEORY OF MIND IN TYPICALLY DEVELOPING ADULTS BUT NOT ADULTS WITH AUTISM SPECTRUM DISORDER,

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Research has demonstrated that theory of mind (ToM) predicts social functioning in ASD, but factors that lead to individual differences in ToM in ASD are unclear. Given the recent literature demonstrating the centrality of affective ToM in ASD and the relation between anxiety and ToM in anxiety disorders and typical development (TD), the present study aims to examine whether (1) affective ToM decoding is impaired in adults with ASD, (2) the constructs of facial recognition and affective ToM are dissociated, and (3) anxiety leads to variability in affective ToM in ASD versus TD. Adults with ASD (n = 27) and TD controls (n = 27) matched on age, sex, and Full Scale IQ completed measures of affective ToM (Reading the Mind in the Eyes Task), general facial recognition ability (Benton Facial Recognition Task), and anxiety (Beck Anxiety Inventory and State-Trait Anxiety Inventory, State Subscale). First, adults with ASD showed an impairment in affective ToM decoding of positive and negative emotions and facial recognition ability ($p<.05$). Second, affective ToM and facial recognition were related in ASD ($p<.01$) but dissociated in TD. Finally, increased trait anxiety was associated with increased affective ToM ability in adults with TD ($p<.05$) but not in ASD. The present study clarifies the complex nature of affective ToM and face recognition difficulties in adults with ASD. Results suggest that anxiety is adaptive for reasoning about the affective mental states of others in TD but that anxiety in ASD does not have the same faciliatory effect for improving social cognition.

P2-77

ANTENATAL EXPOSURE TO SYNTHETIC GLUCOCORTICOIDS HAS ADVERSE EFFECTS ON OFFSPRING MENTAL HEALTH, Elina Wolford, *University of Helsinki, Finland* E-mail: elina.wolford@helsinki.fi

Elina Wolford, University of Helsinki; Rebecca Reynolds, University of Edinburgh; Marius Lahti-Pulkkinen, University of Helsinki; Polina Girchenko, University of Helsinki; Jari Lipsanen, University of Helsinki; Soile Tuovinen, University of Helsinki; Jari Lahti, University of Helsinki; kati Heinonen, University of Helsinki; Kadri Haljas, University of Helsinki; Esa Hämäläinen, University of Helsinki; Eero Kajantie, National Institute for Health and Welfare; Anu-Katriina Pesonen, University of Helsinki; Pia Villa, Helsinki University Hospital; Hannele Laivuori, University of Tampere; Katri Raikkonen, University of Helsinki

Synthetic glucocorticoids (sGC) are a standard treatment when preterm birth is imminent to enhance fetal organ maturation. However, sGCs can have adverse effects on neurodevelopment. Their morbidity- and mortality-related benefits outweigh potential neurodevelopmental harms in children born preterm (<37gestational weeks), however, this may not hold true when the pregnancy continues to term (≥37gestational weeks). In the Prediction and Prevention of Pre-eclampsia and Intrauterine Growth Restriction (PREDO) Study, we studied the effect of antenatal betamethasone exposure on child mental health in both preterm and term children. Our study included 4,709 women and their children, born 2006-2010 in Finland, with information on antenatal betamethasone treatment and child mental and behavioral disorders from the Finnish Hospital Discharge Register from the child's birth to December 31st 2016. Of the participating children, 117 were exposed to betamethasone (61 preterm and 56 term). Betamethasone-exposed, compared to non-exposed children, had significantly higher odds of any mental and behavioral disorder (Odds Ratio [OR]=2.75, 95% Confidence Interval [CI]=1.7,4.31), a disorder of psychological development (OR=3.60, 95% CI=2.28,5.93), and emotional and behavioral disorder (OR=3.29, 95% CI=1.86,5.82). They also had higher odds of comorbid disorders (OR=5.99, 95% CI=3.22,11.17). These effects did not vary significantly between preterm and term children. These findings indicate that clinical follow-up of child mental health should extend beyond the preterm group to the group exposed to antenatal sGCs who end up being born at term.

P1-79

USING AUTOMATED CONTROLLED REARING TO EXPLORE THE ORIGINS OF OBJECT RECOGNITION, Justin Wood, *University of Southern California, United States* E-mail: justin.wood@usc.edu

Justin Wood, University of Southern California

How does the brain learn to recognize objects? Although researchers have debated the origins of object recognition for decades, methodological barriers have prevented detailed analysis of how object recognition emerges in newborn brains. To overcome this barrier, my lab developed an automated controlled-rearing method with newborn chicks. This method can be used to study the development of object recognition for extended periods of time (24/7) in strictly controlled virtual environments. First, I describe controlled-rearing experiments demonstrating that newborn chicks have advanced object recognition abilities, including the ability to parse objects from complex backgrounds, bind color and shape features into integrated object concepts, and recognize objects across novel situations. These abilities develop rapidly (within the first few days of life) and can emerge from sparse visual input (e.g., a single view of an object). These findings indicate that newborn visual systems can be highly generative at the onset of vision. Next, I describe controlled-rearing experiments characterizing the role of visual experience in the development of object recognition. Specifically, newborn chicks need experience with naturalistic visual environments, containing objects moving slowly and smoothly over time across patterned backgrounds. Without natural visual experience, chicks develop abnormal or 'incorrect' object concepts. These results illuminate the role of experience in the development of object recognition and provide high-precision benchmarks for testing computational models of newborn vision.

P1-78

ONE-SHOT LEARNING OF ABSTRACT OBJECT CONCEPTS IN VISUALLY NAIVE ANIMALS, Samantha Wood, *University of Southern California, United States* E-mail: samantha.m.w.wood@usc.edu

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To perceive the world successfully, newborns must learn to recognize objects across novel viewing situations (e.g., changes in viewpoint, lighting, and background conditions). Yet the development of this ability is poorly understood. While previous studies have shown that newborns can recognize objects presented on homogenous backgrounds, it is unknown whether newborns can parse objects from complex backgrounds and recognize those objects across novel viewing situations. To address this issue, we used an automated controlled-rearing method with a newborn animal model—the domestic chick. We raised newborn chicks in strictly controlled environments that contained a single virtual object moving on a single background. We then used a two-alternative testing procedure to examine whether the chicks could recognize that object across novel backgrounds and novel viewpoints. Despite receiving experience with just a single object moving on a single background, the majority of chicks developed robust background-invariant and view-invariant object recognition abilities. Thus, newborn brains contain visual parsing mechanisms for decoupling objects from backgrounds. Additionally, we found that this ability depends heavily on motion cues. These results complement previous studies showing that human infants and patients recovering from blindness depend on motion cues to parse and recognize visual objects. More broadly, these results demonstrate that visually naïve newborn animals are capable of one-shot learning of abstract object concepts.

P2-78

OXYCODONE AND THE FEMALE RAT: DEVELOPMENT OF AN ORAL SELF-ADMINISTRATION PROTOCOL AND EFFECTS ON INFANT BEHAVIOR AND COMMUNICATION, Giulia Zanni, *childrens hospital of philadelphia, United States* E-mail: zannig@email.chop.edu

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Abuse of prescription opiates during pregnancy in the US has increased 5-fold since 2008, with a surge of infants experiencing Neonatal Abstinence Syndrome (NAS; also called Neonatal Opioid Withdrawal Syndrome, NOWS). Short-term irritability and neurological complications are hallmarks of NAS, but the long-term consequences are unknown. Here we explored the effects of gestational and postnatal ingestion of oxycodone by female Long-Evans rats that voluntarily drank oxycodone in water (vs. water as control) before, during, and after pregnancy (0.06-0.12 mg/ml). Pups were assessed from P2 to P14 for thermal nociception, a battery of neurobehavioral tasks, olfactory spatial navigation, and maternal separation-induced ultrasonic vocalizations. There was no difference in the number of pups/litter or pup weight over time vs. controls. Oxycodone-exposed pups and their mothers had detectable oxycodone in blood, and pups showed analgesia in the plantar thermal test on P2 but not at P14. Oxycodone-exposed and control pups had similar performance on many tests, including negative geotaxis, cliff avoidance, righting, and olfactory spatial learning. However, P7 oxycodone-exposed pups had reduced pivoting relative to controls. Female but not male oxycodone-exposed rat pups vocalized more after reunion with their mother (P8), suggesting potential differences in social communication. These data suggest gestational and postnatal exposure to opioids has a transient analgesic effect, a mild

locomotor effect, and a sex-dependent effect on “emotional”-like behavior in offspring. This translational rat model is suitable for a longitudinal analysis of the effects of oxycodone on brain and behavior in both mothers and offspring.

P2-79

THE CONTEXT-DEPENDENT NATURE OF AUTONOMIC NERVOUS SYSTEM FUNCTIONING: RESPONSES TO EMOTIONAL AND COGNITIVE CHALLENGES DURING EARLY CHILDHOOD, Selin Zeytinoglu, *University of North Carolina-Greensboro, United States* E-mail: s_zeytin@uncg.edu

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Although autonomic nervous system (ANS) responses are “context-dependent,” few studies have been conducted to understand children’s normative ANS responses to everyday challenges. Most of this work has focused on children’s parasympathetic ANS responses; less is known about children’s sympathetic ANS responses toward distinct challenges. In this study, we examined children’s sympathetic and parasympathetic ANS responses toward distinct emotional and cognitive challenges and compared the magnitude of ANS responses across these challenges. Participants (N=278) were recruited as part of a larger longitudinal study on the relations between physiology, emotion and cognition in early childhood. Sympathetic activity was measured via pre-ejection period. Parasympathetic activity was measured via respiratory sinus arrhythmia. Children’s ANS responses were assessed during 2 cognitively demanding (i.e., Tangrams & Go/No-Go) and 2 emotionally demanding (i.e., blocked goal & interpersonal) challenges in preschool, kindergarten, and first grade. Random-intercept HLM models were conducted to examine the effect of type of challenge on ANS activity. All challenges led to parasympathetic withdrawal, whereas few challenges led to a change in sympathetic ANS activity. The cognitively demanding Tangrams task elicited sympathetic activation, whereas the Go/No-Go task did not elicit a change in sympathetic activity. The blocked-goal challenges did not elicit change in sympathetic activity from baseline to task, whereas two interpersonal tasks led to sympathetic

inhibition. These findings suggest that laboratory challenges differ systematically with respect to the type of ANS responses they elicit across early childhood. These findings have implications for theories on self-regulation and methodological choices in studies on ANS functioning.

P2-80

DEVELOPMENTAL CHANGES IN SKIN CONDUCTANCE AMONG CHILDREN WITH ELEVATED EXTERNALIZING SYMPTOMS, **Xutong Zhang**, *The Pennsylvania State University, United States* E-mail: xxz58@psu.edu

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Electrodermal under-arousal (e.g., low baseline skin conductance level) is frequently reported in association with externalizing problems in samples of adolescents and adults. Vulnerability models of developmental psychopathology have posited that low skin conductance reflects a weakened sensitivity to punishment resulting in poor socialization of prosocial behavior. Alternatively, other developmental models have suggested that low skin conductance is a developmental consequence of correlated risks for externalizing behavior. Specifically, low baseline skin conductance level might be a developmental outcome of hyper-arousal in younger ages, rather than an inherent characteristic that is continuous across time (e.g., El-Sheikh, Keiley, & Hinnant, 2010). The current study examines the association between externalizing symptoms and resting skin conductance levels (SCL) across time (6 to 8 years of age) in a sample of 339 children (64% male) assessed annually from kindergarten through 2nd grade. Teachers in each grade rated children's conduct problems and hyperactivity, and resting SCL was measured each year in a laboratory task. Results of multilevel modeling showed that higher levels of hyperactivity/inattentiveness were related to higher baseline SCL at age 6, but greater decreases in baseline SCL from age 6 to 8.

No association was found for conduct problems. These findings suggest that children who exhibit disinhibited behaviors may experience excessive electrodermal arousal at young ages even without external stimuli. However, their physiological system may burn out over time, and the under-arousal in electrodermal activity emerges developmentally.

P1-80

DISSOCIATING LONG AND SHORT-TERM MEMORY IN 3-MONTH-OLD INFANTS USING THE MISMATCH RESPONSE TO VOICE STIMULI, **Katharina Zinke**, *University of Tübingen, Germany* E-mail: katharina.zinke@uni-tuebingen.de

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Auditory event-related potentials (ERPs), specifically the Mismatch Response (MMR) to deviant stimuli in an oddball paradigm, show distinct changes depending on whether the stimuli are familiar (i.e., retrieved from long-term memory) or unfamiliar, representing an immediate change to the standard stimuli kept in short-term memory. Here, we aimed to extend findings of a familiarity-modulated MMR to 3-month-old infants. Using a voice oddball paradigm, 31 infants repeatedly heard the word “baby” (400ms, ISI=600ms, 10min overall) pronounced by three different female speakers. One voice served as the frequent “standard” stimulus, another voice as the “unfamiliar deviant” stimulus, and the voice of the infant’s mother as the “familiar deviant”. The MMR was determined by the difference between the ERP to the standard stimuli and the ERP to the deviants. The MMR to the familiar deviant (mother’s voice) was larger, i.e., more positive, than that to the unfamiliar deviant between 100-400ms post-stimulus at frontal and central electrode sites. However, a genuine MMR significantly differentiating, as a positive deflection,

between ERPs to familiar deviants and standard stimuli was only found in the 300-400ms interval. In contrast, a genuine MMR differentiating, as a negative deflection, between ERPs to unfamiliar deviants from ERPs to standard stimuli was revealed at 200-300ms. Overall, results confirm a differential MMR to unfamiliar and familiar deviants in 3-month-olds, with the earlier negative MMR to unfamiliar deviants likely reflecting novelty detection based on processes in short-term memory, and the later positive MMR to familiar deviants reflecting subsequent long-term memory-based processing of stimulus relevance.

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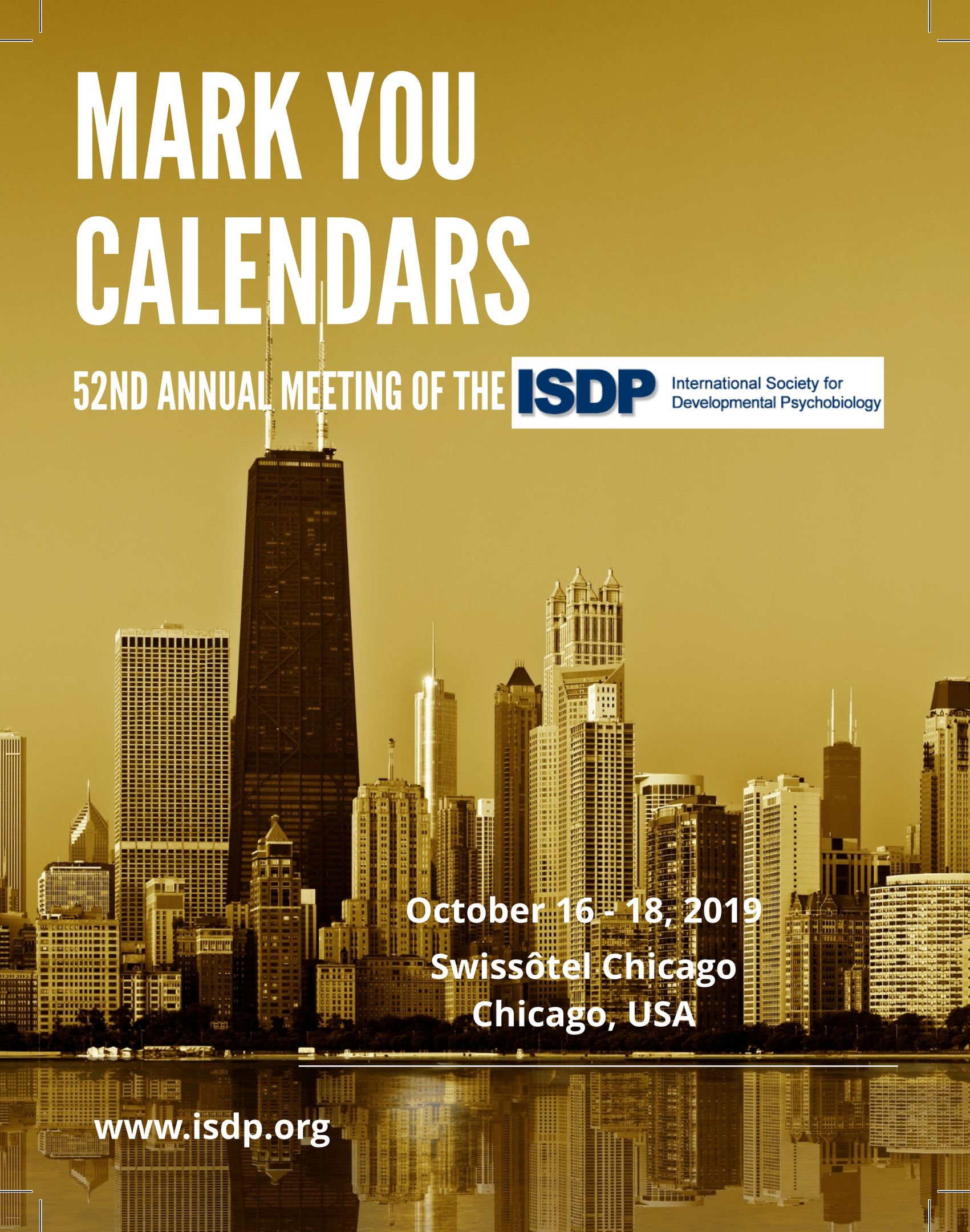

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